A. ROBERTS.

BLOCK FOR HEATING WALLS AND THE LIKE.

APPLICATION FILED JAN. 21, 1916. RENEWED MAY 9, 1918.

1,295,796.

Patented Feb. 25, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

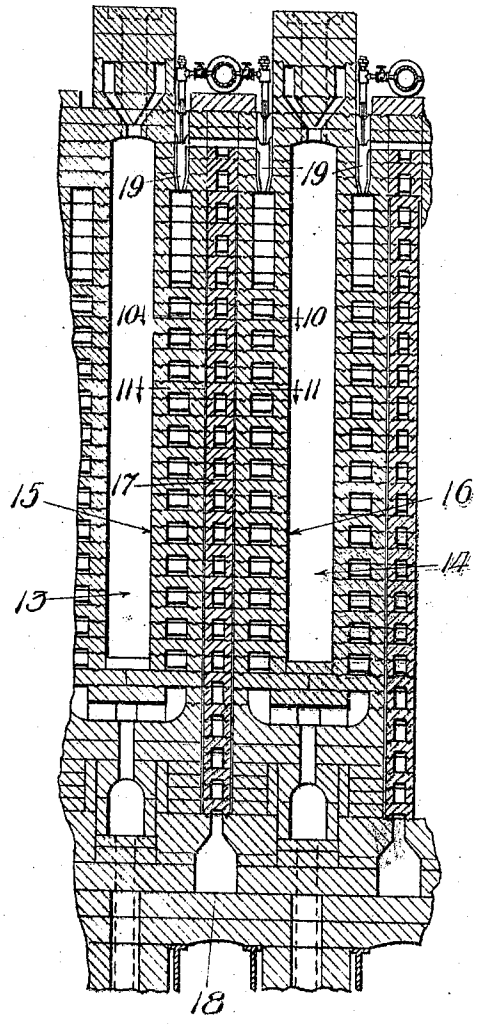


Fig. 2.

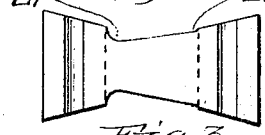


Fig. 3.

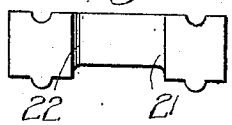


Fig. 4.

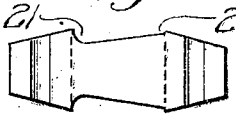


Fig. 5.

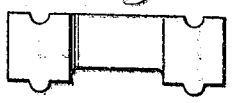


Fig. 6.

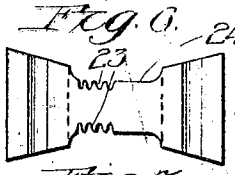


Fig. 7.

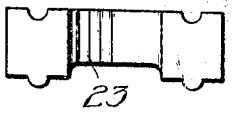


Fig. 8.

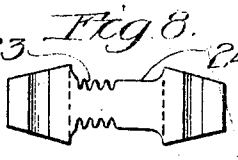
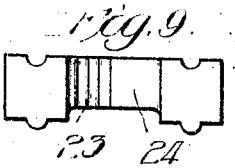


Fig. 9.



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2 SHEETS—SHEET 2.

Fig. 10.

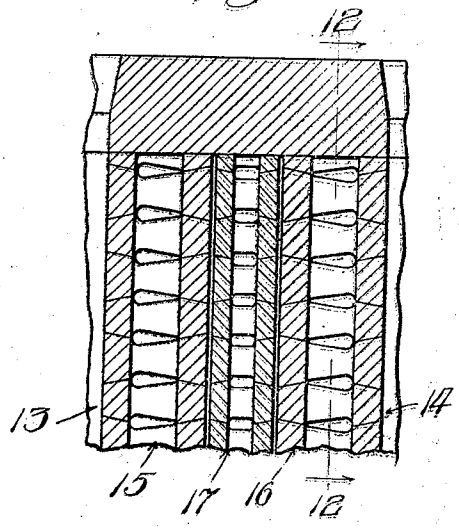


Fig. 11.

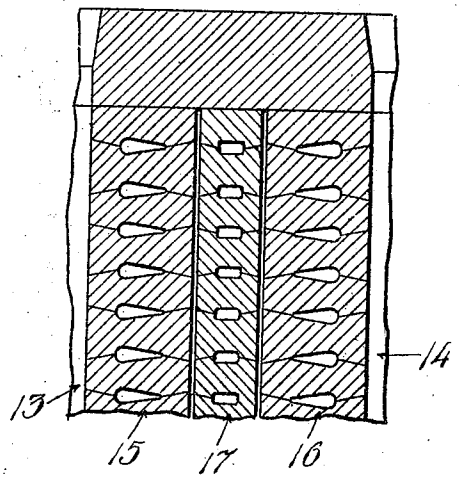
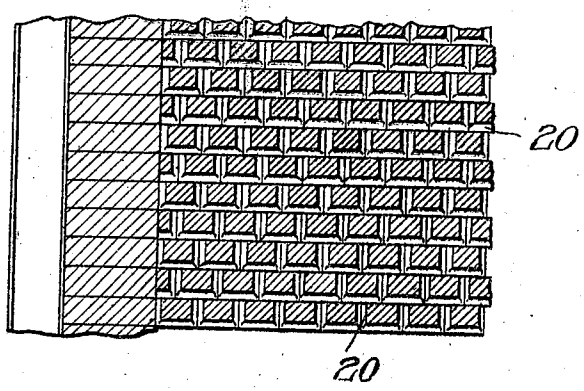


Fig. 12.



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UNITED STATES PATENT OFFICE.

ARTHUR ROBERTS, OF EVANSTON, ILLINOIS.

BLOCK FOR HEATING WALLS AND THE LIKE.

1,295,796. Specification of Letters Patent. Patented Feb. 25, 1919.

Application filed January 21, 1916, Serial No. 73,407. Renewed May 9, 1918. Serial No. 233,606.

To all whom it may concern:

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

In my Letters Patent of the United States, No. 1,132,685, issued to me March 23, 1915, for improvements in coke ovens there is disclosed a construction of heating wall or the like having on its interior a mesh-work of interconnected passages for the heating gases, which passages are so formed that the heating gases in passing through them travel in a zig-zag manner from the point of entrance toward the point of exit or delivery. By means of an arrangement of this kind the gases are caused to repeatedly impinge or bombard against portions of the wall for the purpose of more perfectly interchanging the heat between the gases and the blocks, and for the purpose of preventing the formation of layers of inert gases upon the surface of the blocks. In the particular construction disclosed in that patent the walls are built up from blocks having their vertical and horizontal faces recessed in such a manner that when the blocks are set together the aforementioned mesh-work of passages is provided.

In my co-pending application for Letters Patent of the United States for improvements in recuperative coke ovens, Serial No. 875,503, filed December 4, 1914, there is shown a construction in which the heating walls of each coke oven transmit a portion of their heat to the carbonizing chambers of the respective coke ovens, and also transmit a portion of their heat to recuperating walls which lie between adjacent heating walls. The incoming air for the burners travels through the aforementioned recuperating walls and is heated by them before reaching the burners. In the construction shown in the said application, Serial No. 875,503, no particular provision is made for controlling the proportion of heat within the heating walls, which will be directed into the carbonizing chamber, as compared to the proportion which will be diverted into the adjacent recuperating walls. Ordinarily it is desired to use the major portion of the heat extracted in the heating wall for the heating of the carbonizing chamber, the proportion of heat transmitted into the recuperating structure being relatively small. As a result the construction disclosed in the said application, Serial No. 875,503, is opened to the objection that in some cases a larger proportion of heat may be directed into the recuperating walls than is desired, or necessary.

One of the objects of the present invention is to provide a form of heating wall whereby the desired proportion of heat will naturally travel toward the interior of the carbonizing chamber, leaving only a desired proportion for the heating of the recuperating structure. In this connection a further object is to provide a construction whereby this result may be attained in a heating wall built up from blocks having their vertical and horizontal faces recessed so as to provide a mesh-work of interconnected gas passages.

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 the drawings:

Figure 1 shows a vertical section through a portion of a bench of coke ovens embodying the features of the present invention, said figure including the adjacent heating walls of two consecutive coke ovens, and also the intermediate recuperating structure;

Fig. 2 shows a plan view of one form of notched block embodying the features of the present invention;

Fig. 3 shows a side elevation of the block shown in Fig. 2;

Fig. 4 shows a plan view of a keystone block corresponding to the block shown in Figs. 2 and 3;

Fig. 5 shows a side elevation of the block shown in Fig. 4;

Fig. 6 shows a plan view of a modified form of block embodying the features of the present invention;

Fig. 7 shows a side elevation of the block shown in Fig. 6;

Fig. 8 shows a plan view of a keystone block corresponding to the block shown in Figs. 6 and 7;

Fig. 9 shows a side elevation of the block shown in Fig. 8;

Fig. 10 shows a fragmentary horizontal

section taken on the line 10—10 of Fig. 1 looking in the direction of the arrows;

Fig. 11 shows a fragmentary horizontal section taken on the line 11—11 of Fig. 1 looking in the direction of the arrows; and

Fig. 12 shows a fragmentary vertical section through one of the heating walls of Fig. 1.

Fig. 12 may also be considered as a section taken on the line 12—12 of Fig. 10 looking in the direction of the arrows.

Referring to Fig. 1 in the construction therein illustrated the two adjacent carbonizing chambers are designated by the numerals 13 and 14. The adjacent heating walls are designated by the numerals 15 and 16. Between the heating walls 15 and 16 is the recuperating structure 17. The incoming air travels from a channel 18 upward through the passages of the structure 17 to the burners 19 where said air mixes with the gas and burns, the burning mixture passing down through the heating walls.

Each of the heating walls is provided on its interior portion with a mesh-work of interconnected passages 20, best shown in Figs. 10, 11 and 12. These passages are secured by building up the heating walls from blocks having their horizontal and vertical faces recessed so that when said blocks are set together the recesses will coöperate to provide the aforementioned passages.

The size, shape and position of the passages is dependent upon the manner in which the recesses are formed in the blocks from which the heating walls are constructed. In the construction disclosed in the aforementioned Letters Patent, No. 1,132,685, the notches are rectangular in form, so that the gases will travel down through all portions of the passages with equal facility. In order to divert the major portion of the heat toward the carbonizing chamber the passages should be so formed that the major portion of the heat will be extracted or delivered from the gases adjacent to said chamber instead of adjacent to the recuperating structure.

In the blocks shown in Figs. 2, 3, 4 and 5 the abovementioned result is secured by forming the notches deeper at their ends 21 adjacent to the carbonizing chamber, than at their ends 22 adjacent to the recuperating structure, so that when the blocks are set together to build up the wall, the passages will be substantially of the shape shown in Figs. 10 and 11. Examination of these figures shows that those portions of the passages adjacent to the carbonizing chambers are very much larger than those portions adjacent to the recuperating structure, so that the major portion of the heating effect is obtained close to the carbonizing chambers.

In the construction of blocks shown in Figs. 6, 7, 8 and 9 the notches are so formed that the portions 23 adjacent to the carbonizing chambers present a greater surface for the extraction of heat per linear unit of block than do the portions 24 adjacent to the recuperating structure. This result is secured by corrugating a portion of the notch adjacent to the carbonizing chamber, leaving the remaining portion of the notch which is adjacent to the recuperating structure plain or uncorrugated. By use of this arrangement a larger percentage of the total heat will be extracted from the gases at a point adjacent to the carbonizing chamber than at a point adjacent to the recuperating structure, because the extraction of heat from the gases depends among other things upon the amount of superficial area against which they travel.

It will be understood that the division of heat in the two directions, namely, toward the carbonizing chamber and toward the recuperating structure is largely dependent upon the distance which the heat must travel in each direction through the body of the blocks. There is a tendency for the heat to take the shortest path of travel, and, therefore, by so forming the blocks that the major portion of the heat is extracted adjacent to the carbonizing chamber, not only is the major portion of the heat extracted at the most advantageous position, but also the distance which said heat will have to travel toward the carbonizing chamber is rendered as short as possible.

It will be understood that many other forms of passages might be devised than those provided by blocks of the particular forms herein disclosed, and for that matter many other forms of block might also be devised for accomplishing the results mentioned herein. However, it will be understood that I contemplate within the scope of my invention any form of heating wall or the like in which the major portion of the heat will be transmitted in one direction with a greater facility than in the other direction, and also that I contemplate within the scope of my invention other suitable forms of block for accomplishing this result.

I claim:

1. The combination with a recuperating structure, of a heating wall adjacent to said structure, the heating wall comprising blocks laid up in courses, each block having at least one side face and at least one horizontal face recessed, the recesses of the various blocks communicating with each other to provide a mesh-work of passages on the interior of the heating wall, the recesses of the blocks being suitably formed for the abstraction of a larger proportion of heat from gases in that portion of the heating wall farthest from the recuperating structure than in that portion of the heating wall closest to the recuperating structure.

2. The combination with a recuperating structure, of a heating wall adjacent to the same, said heating wall being formed from blocks, selected ones of said blocks being recessed in their side and bottom faces, to thereby provide a mesh-work of passages on the interior of the heating wall, said recesses being suitably formed for the abstraction of a larger proportion of heat from the gases in that portion of the heating wall lying farthest from the recuperating structure, than in that portion of the heating wall lying closest to the recuperating structure.

3. A heating wall comprising courses of blocks, selected ones of said blocks having at least one side face and at least one horizontal face recessed, and the recesses of the various blocks communicating with each other to provide within the body of the wall a mesh-work of interconnected passages, the recesses being suitably formed for the abstraction of a greater amount of heat from the gases adjacent to one surface of the heating wall than adjacent to the opposite surface of said wall.

4. A heating wall comprising blocks, selected ones of said blocks being recessed on two or more adjacent faces, and the recesses of the various blocks communicating with each other to provide on the interior of the wall a mesh-work of interconnected gas passages, the recesses being so formed that a greater portion of heat is abstracted from the gas adjacent to one surface of the wall than adjacent to the opposite surface of the wall.

5. A heating wall comprising blocks, selected ones of said blocks having recesses in two contiguous faces, the recesses of the various blocks communicating with each other to provide within the body of the wall a meshwork of intereonnected passages, and the recesses being suitably formed for the abstraction of a greater amount of heat from the gases adjacent to one surface of the heating wall than adjacent to the opposite surface of said wall.

6. A heating wall comprising blocks, selected ones of said blocks being suitably recessed to provide within the body of the wall a gas passage, and the recesses being suitably formed for the abstraction of a greater amount of heat from the gases adjacent to one surface of the heating wall than adjacent to the opposite surface of said wall.

7. A heating wall comprising blocks, selected blocks being recessed for the provision of a gas passage within the body of the wall, the arrangement being such that a greater amount of heat is delivered from the gases into one face of the wall than into the opposite face thereof.

8. As a new article of manufacture, an integral block for a heating wall, said block comprising a central neck and a pair of enlarged end portions, the neck being of reduced cross-section as compared to the end portions, one end of the neck being corrugated and the other end thereof being plain, for the purpose of giving added surface to the corrugated portion of the block, for the purpose specified.

9. As a new article of manufacture, a block for a heating wall, said block having its end portions suitably formed for coöperation with other blocks to provide a heating wall, one end of the central portion of the block being corrugated, and the other end of said central portion being plain, for the purpose of giving added surface to the corrugated portion of the block, for the purpose specified.

10. As a new article of manufacture, a block for a heating wall, said block having its end portions suitably formed for coöperation with other blocks to provide a heating wall, the central portion of the block being of reduced cross-sectional area, one end of said reduced portion being corrugated and the other end thereof being plain for the purpose of giving added surface to the corrugated portion of the block, for the purpose specified.

11. As a new article of manufacture, a block for a heating wall, having its end portions suitably formed for engagement with other blocks to provide a heating wall, the central portion of the block being of reduced cross-section, and of suitable formation intermediate the end portions to provide increased heat abstracting ability at one end of the block for the purpose specified.

ARTHUR ROBERTS.

Witnesses:

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THOMAS A. BANNING, Jr.