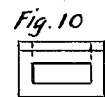
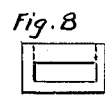
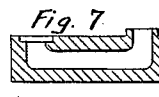
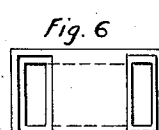
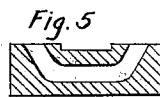
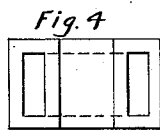
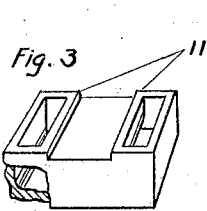
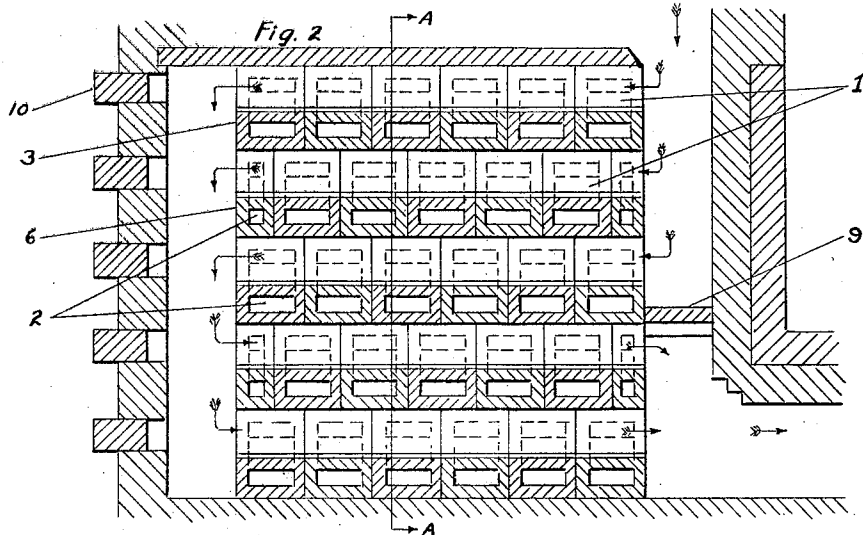
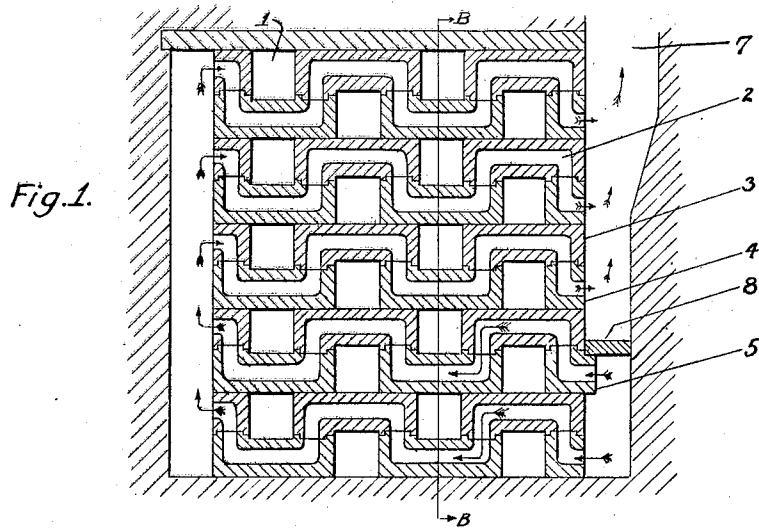


E. R. POSNACK.  
 RECUPERATOR AND BLOCKS FOR BUILDING THE SAME.  
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1,431,486.

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Witnesses:  
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## UNITED STATES PATENT OFFICE.

EMANUEL R. POSNACK, OF BROOKLYN, NEW YORK.

RECUPERATOR AND BLOCKS FOR BUILDING THE SAME.

Application filed April 5, 1921. Serial No. 458,868.

*To all whom it may concern:*

Be it known that I, EMANUEL ROBERT POSNACK, mechanical engineer, a citizen of the United States, residing at Brooklyn, 5 county of Kings, and State of New York, have invented certain new and useful Improvements in Recuperators and Blocks for Building the Same, of which the following is a specification.

10 This invention relates to recuperators having two independent sets of flues, through one of which the hot products of combustion of the furnace pass, preheating the air for combustion flowing through the 15 other set.

For continuous and efficient operation it is essential that a recuperator be leak-proof and have a maximum surface of heat transmission between the heat emitting and heat 20 receiving fluids, with the use of a minimum amount of material. The recuperator here referred to is built up of blocks with horizontal joints, which remain tightly sealed due to the superimposed weights. Further- 25 more, the construction is such that each gas flue is surrounded on all sides by transverse air flues, thus making available a large area for the direct transmission of heat from the gases to the air. No surplus 30 material is used, as the walls of each block are of uniform thickness throughout the entire length of the flue.

The specific construction of the forms and combination of parts and additional features 35 will be hereinafter described.

Referring to drawings: Figure 1 is a transverse section in elevation, taken on the line A—A of Fig. 2; Fig. 2 is a vertical longitudinal section, taken along the line 40 B—B of Fig. 1; Fig. 3 is a perspective of a standard hollow block used in constructing the recuperator, the corner being broken off to show the air passage: Figures 4 and 5 are respectively plan and sectional elevation of a modified form of the standard 45 block; Figures 6 and 7 are plan and sectional elevation respectively of another modification of the block shown in Fig. 3; Fig. 8 is a front elevation, and Fig. 9 a 50 transverse sectional elevation of a side block; and Figures 10 and 11 are respectfully front and transverse sectional elevation of another form of side block.

Referring to the drawings, 1 indicates the 55 horizontal gas flues through which the hot products of combustion pass on the way out

to the stack, the gas in this particular case making two passes. The air required for combustion passes through flues 2, formed by assembling blocks 3, 4, 5 and 6 in man- 60 ner shown, and thence to passage 7 and on to the combustion chamber. The air follows a sinuous path, making two passes as indicated, though the actual number of passes will vary with the design of the furnace. 65 The position of the baffle 8 can be so arranged that each succeeding air pass shall contain one or more additional rows of air flues, to provide for the expansion of the air due to the absorption of heat; and baffle 9 70 can be so located that each succeeding gas pass shall have one or more rows of gas flues less in number, on account of the decreased volume of gas resulting from the abstraction of heat therefrom. 75

It will be noted in Figure 2 that the joints are staggered, which is effected by introducing at each end of alternate rows blocks 6, these being identical with blocks 3 80 but of one half the width. Plugs 10, set in opposite each gas flue, can be removed for cleaning and inspecting these flues.

Figure 3 shows the type of block used in the construction of the recuperator of Fig- 85 ures 1 and 2, the rabbets being omitted in this view. A modification of this form of block is represented by Figures 4 and 5, showing a passage with flatter curves, thus offering less resistance to the flow of air. Another modification of the block is shown 90 in Figures 6 and 7. Here the extensions 11, indicated on Fig. 3, are eliminated, so that the surface containing the two openings is flat, except for the male and female rabbets.

The side piece shown in Figures 8 and 9, 95 and represented as piece number 4, is set in on both sides of the recuperator, so that the side with the opening is flush with the exposed side of the block 3. To accommodate the baffle 8, piece number 5 is used, repre- 100 sented by Figures 10 and 11, the baffle resting on the extended portion.

The walls of the blocks forming the gas flues are of uniform thin-walled construction throughout the entire length of the 105 flues, and serve as a direct heat transmitting medium between the gases and the air. As these walls are contiguous on all sides to the air passages, there is a continuous flow of heat in all directions from gas to air, result- 110 ing in a greater effective surface per unit of recuperator volume than is possible in

those cases where the gas flues are bordered on only two sides by the air flues.

The recuperator is free to expand, as the sides thereof are not in contact with the walls or other parts of the furnace. The joints should be fitted with rabbets to render them more secure from leakage.

The sinuous air path makes possible the use of fewer horizontal air passes than is required when the air path is straight, as the former presents a longer path of air travel than the latter for a recuperator of the same width.

The width, height, and length of the recuperator is determined by the design of the furnace, depending essentially upon furnace capacity, fuel used, temperature, and space requirements.

What I claim is:—

1. A hollow recuperator block having an open-sided channel extending across an outer surface thereof, said block containing an enclosed open-ended passage extending completely around the three walls of said channel.

2. A hollow recuperator block having an enclosed open-ended passage beginning and terminating in one of the surfaces of said block.

3. A hollow recuperator block having an enclosed open-ended passage beginning in one side and terminating in an adjacent side of said block.

4. A hollow recuperator block, composed of two adjacent arms at an angle to each other, the said hollow block having an enclosed open-ended passage beginning in the side of one arm and terminating in the side of the adjacent arm of the said block.

5. A recuperator, its construction consisting of a combination of hollow blocks having open-sided channels and enclosed open-ended passages extending around the three walls of each of said channels, the blocks being so arranged that said channels in combination with the sides of the blocks form a series of laterally closed straight horizontal flues, and said passages form a series of con-

tinuous sinuous flues separated from and at an angle to the straight flues.

6. A recuperator, its construction consisting of a combination of hollow blocks, including blocks having open-sided channels and enclosed open-ended passages extending around the three walls of each of said channels, blocks with passages beginning and terminating in adjacent sides, and blocks composed of two adjacent arms at an angle to each other, and containing enclosed passages beginning and terminating in adjacent arms of said blocks, the blocks being so arranged that said channels in combination with certain sides of these blocks form a series of laterally closed straight horizontal flues, and said passages form a series of continuous sinuous flues separated from and at an angle to the straight flues.

7. A recuperator, its construction consisting of a combination of hollow blocks each containing an enclosed open-ended passage beginning and terminating in one surface of the block, said blocks being so arranged that the sides of the blocks form a series of laterally closed straight horizontal flues, and said passages form a series of continuous sinuous flues separated from and at an angle to the straight flues.

8. A recuperator, its construction consisting of a combination of hollow blocks, including blocks having enclosed open-ended passages beginning and terminating in one surface, blocks with enclosed passages beginning and terminating in adjacent sides, and blocks composed of two adjacent arms at an angle to each other, and containing enclosed open-ended passages beginning and terminating in sides of the adjacent arms of said blocks, the blocks being so arranged that certain sides of these blocks form a series of laterally closed straight horizontal flues, and said passages form a series of continuous sinuous flues separated from and at an angle to the straight flues.

In testimony whereof I affix my signature.

E. R. POSNACK.