July 23, 1929. W. O. AMSLER 1,721,938

RECUPERATOR AND TILE STRUCTURE THEREFOR

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Fig. 1

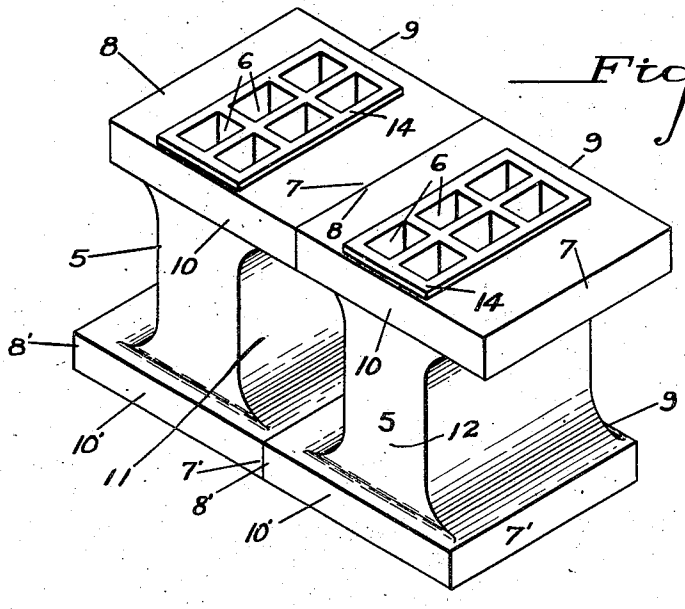


Fig. 2

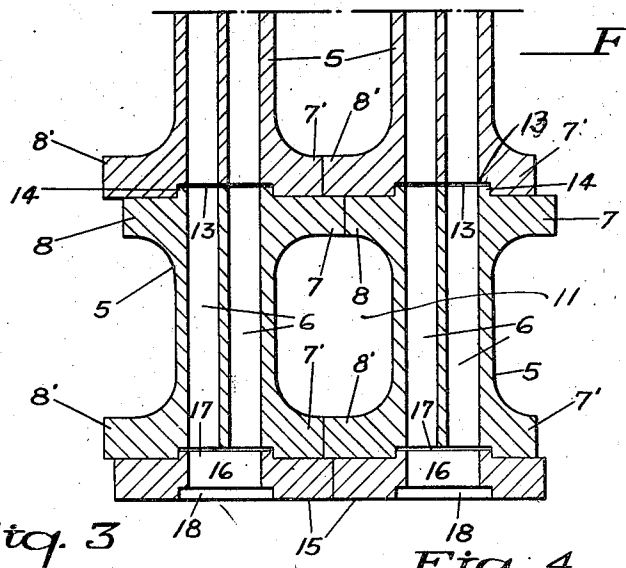


Fig. 3

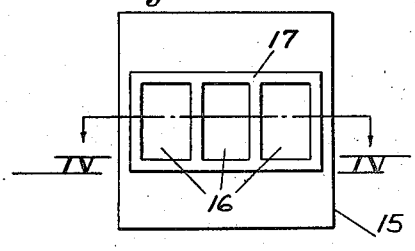
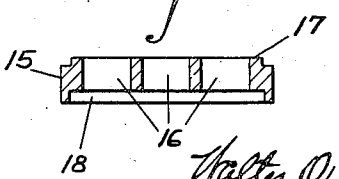


Fig. 4



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Fig. 5

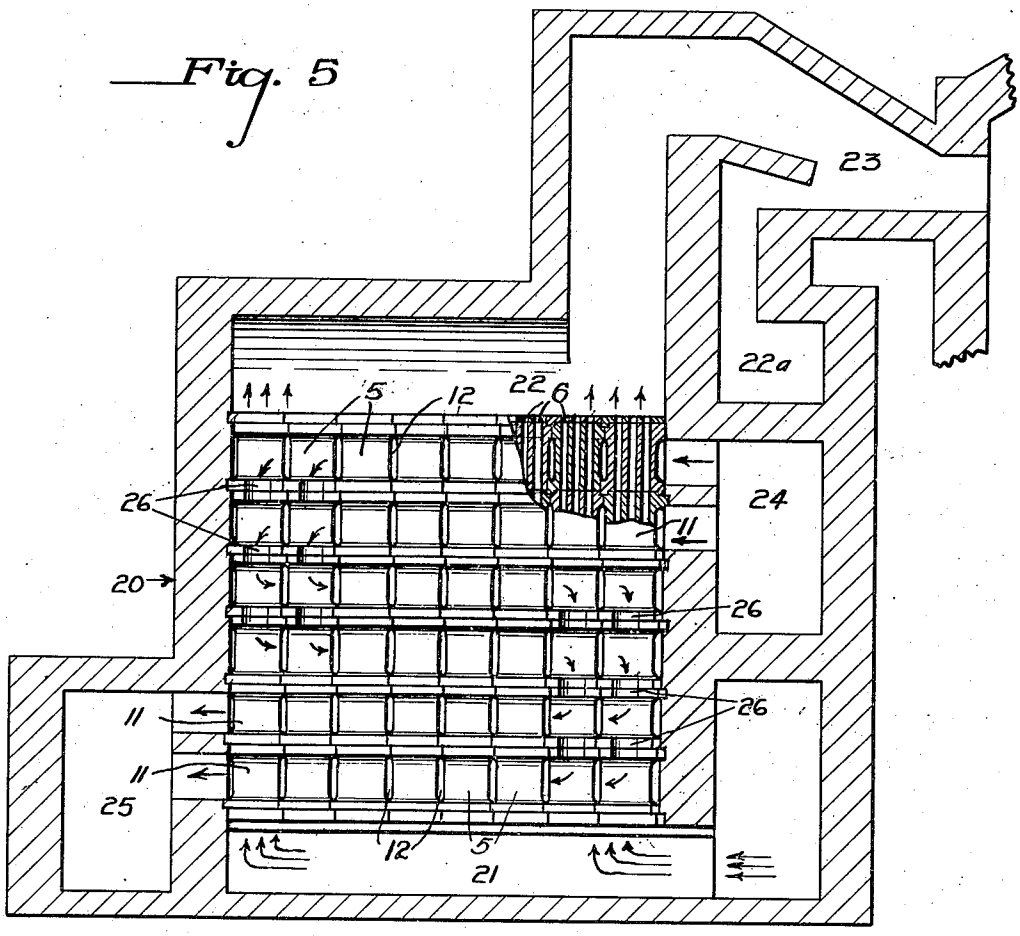


Fig 6

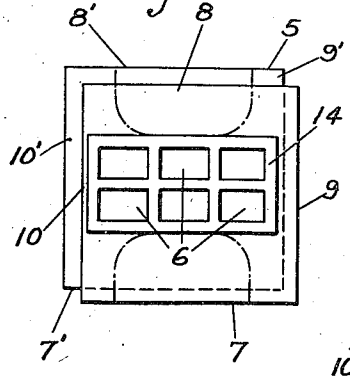
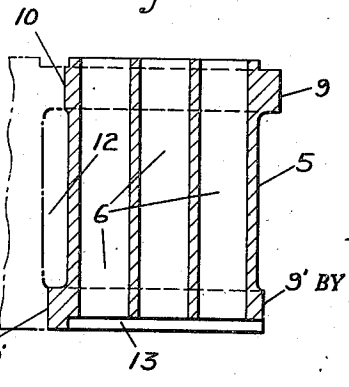


Fig. 7



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UNITED STATES PATENT OFFICE.

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RECUPERATOR AND TILE STRUCTURE THEREFOR.

Application filed August 27, 1925. Serial No. 52,736.

This invention relates to structures such as recuperators for furnaces, and the like, and particularly to an improved tile therefor.

The invention has for its object to provide a recuperator wherein horizontally extending flues or passages are provided between rows of vertical flues or passages. A further object of the invention is to provide a tile adapted to be used in a structure of this kind, adapted to form the vertical and horizontal flues when associated with similar blocks and which are adapted to hold each other in proper spaced relation. A further object is to provide a tile which may be easily built into a recuperator structure of this kind, and wherein the vertical joints between blocks will be staggered, that is, the vertical joints will "break" in the manner that joints in an ordinary brick wall break.

The invention may be readily understood by reference to the accompanying drawings, wherein,

Figure 1 is a perspective view of two of the tiles disposed side by side in the manner in which such tile would ordinarily be set in a recuperator construction.

Figure 2 is a vertical section through a portion of a structure formed by said tiles.

Figure 3 is a plan view of a base or sealing tile to be used in combination with the tiles of Figs. 1 and 2.

Figure 4 is a transverse section through one of said base tiles on the line IV—IV of Fig. 3.

Figure 5 is a vertical section through a recuperator built from tiles of the type embodying the present invention.

Figure 6 is a plan view of one of the special tiles providing for the vertical passage of the gases from one horizontal flue to another.

Figure 7 is a longitudinal section through one of the tiles, this section being at right angles to the plane of the section of the blocks in Fig. 2.

Referring to the drawings, 5 designates generally the rectangular body of a tile having a vertical opening therein which is preferably divided by partition walls into a plurality of small vertical passages 6.

Projecting laterally from the top of the block are side flanges 7 and 8, flange 7 being wider than flange 8. At the bottom of the block are similar flanges 7′ and 8′. Flange 8′ is on the opposite side of the block from wide flange 7 at the top, and is wider than flange 7′. On that body at the upper end of the block is a lateral flange 9 and at the opposite end is a flange 10. Flange 9 is preferably of greater width than flange 10. At the bottom of the block are similar end flanges 9′ and 10′, and the latter, diagonally opposite flange 9, is wider than flange 9′.

As thus constructed the tiles when fitted together form the vertical flues 6, and also form horizontal passages 11, which latter are connected by transverse passages 12.

The blocks will break all vertical joints by reason of the diagonally opposite flanges being respectively wider or narrower.

The lower ends of the block are preferably recessed, as indicated at 13 to receive a rib 14 at the top of the block beneath it, as shown.

The blocks or tiles may be used in conjunction with blocks 15 having central openings 16 adapted to line up with flues 6, and having ribs 17 on their upper faces and recesses 18 on their lower faces. These blocks are for use at the top or bottom of a column of the tiles 5.

In Fig. 5 I have shown a recuperator 20 constructed with tile as described. In this construction 21 is the cold air inlet and 22 the hot air outlet to burner 23. At 24 is the waste gas supply passage and at 25 is the outlet or flue connection. The tiles 5 are arranged as shown so that air from passage 21 to passage 22 must rise through the several vertical passages 6 in the tiles, 22^a is a gas inlet passage.

The waste gases travel in a sinuous path from chamber 24 to passage 25 through the horizontal flues 11. The flanges of some of the blocks are cut away, as indicated at 26 in Fig. 5, and as shown by the dotted lines of Fig. 6 to connect the ends of the horizontal passages to provide for the back and forth travel of gases. The gas may circulate through transverse passages 12 from one horizontal flue to a corresponding flue in the same plane. Thus the gases may circulate around all of the vertical side walls of the tiles to heat the air moving through passages 6.

It will be apparent that the blocks will maintain themselves in proper spaced relation, and that they may be easily and cheaply assembled into an efficient recuperator structure.

While I have illustrated a preferred embodiment of the invention, it will be under-

stood that various changes and modifications may be made within the scope and spirit of the appended claims.

I claim as my invention:

1. A recuperator made up of tiles each having a body portion with a passageway therethrough and lateral flanges projecting from its sides near the ends of the body portion, the tiles being built into columns and fitted directly together to form vertically extending passages therethrough and horizontally extending passages therebetween.

2. A recuperator made up of tiles having a body portion with a passageway therethrough and lateral flanges on the four sides of one end of the body, lateral flanges on the four sides of the other end of the body, two of the flanges at right angles to each other at each end of the body being wider than the corresponding flanges at the other end of the body, said tiles being built into columns and fitted together to form vertically extending passages therethrough and horizontally extending passages therebetween.

3. A recuperator comprising a suitable housing, having air inlet and outlet chambers and having waste gas inlet and outlet chambers, and a plurality of vertical flues between the air inlet and outlet chambers, a plurality of horizontal flues between the waste gas inlet and outlet chambers, some of the horizontal flues being above others of the horizontal flues and being connected at opposite ends so as to provide for the back and forth travel through the horizontal flues, and transverse passages between some of the vertical flues connecting some of the horizontal flues with other horizontal flues in the same plane.

4. A recuperator including a housing, an air inlet passage at the bottom of the housing, and an air outlet passage at the top of the housing, a plurality of tiles interposed between the air inlet and outlet passage, said tiles having alined vertical flues therethrough and having lateral flanges thereon to maintain the tiles in spaced relation and provide horizontal flues between adjacent tiles, the lateral flanges of some of the tiles being partially cut away to provide a connection between horizontal flues at different levels, and means for introducing waste gases into some of the horizontal flues and withdrawing waste gases from other of the horizontal flues.

5. A recuperator including a housing, an air inlet passage at the bottom of the housing, and an air outlet passage at the top of the housing, a plurality of tiles interposed between the air inlet and outlet passage, said tiles having alined vertical flues therethrough and having lateral flanges thereon to maintain the tiles in spaced relation and provide horizontal flues between adjacent tiles, the lateral flanges of some of the tiles being partially cut away to provide a connection between horizontal flues at different levels, and means for introducing waste gases into some of the horizontal flues and withdrawing waste gases from other of the horizontal flues, the lateral flanges of said tiles being provided on four sides thereof, whereby the horizontal flues extend in two directions into the structure, whereby gases may circulate around all sides of substantially all of the tiles.

6. A recuperator made up of tiles each having a body portion with a vertical passageway therethrough and lateral flanges projecting from its sides near the ends of the body portion, the tiles being built into columns and fitted together to form vertically extending passages therethrough and horizontally extending passages continuous in two directions at right angles to one another.

7. A recuperator made up of tiles each having a body portion with a vertical passageway therethrough and lateral flanges projecting from its sides near the ends of the body portion, the tiles being built into columns and fitted together to form vertically extending passages therethrough and horizontally extending passages in each horizontal course of the tiles completely surrounding each of said body portions.

8. A recuperator made up of tiles each having a body portion with a vertical passageway therethrough and lateral flanges projecting from its sides near the ends of the body portion, the tiles being built into columns and fitted together to form vertically extending passages therethrough and horizontally extending passages, the tiles having vertical joints breaking with those in contiguous vertical courses.

9. A recuperator made up of tiles each having a body portion with a vertical passageway therethrough and lateral flanges projecting from its sides near the ends of the body portion, the tiles being built into columns and fitted together to form vertically extending passages therethrough and horizontally extending passages, each of the tiles having interlocking portions with the contiguous tile in a vertical direction.

10. A recuperator consisting of a plurality of similar tiles in contiguous courses in both vertical and horizontal directions, the tiles having aligned vertical passageways therethrough, and each tile having a constricted portion which with the corresponding portions of the contiguous tile form a horizontal flue, the tiles being so constructed that the passageways are sealed one from another.

11. A recuperator consisting of a plurality of contiguous courses of similar tiles in a vertical and two perpendicular horizontal directions, the tiles having aligned vertical passageways therethrough, and each tile having a constricted portion which with the corresponding portions of the contiguous tiles forms horizontal passageways extending in two perpendicular horizontal directions and

completely surrounding the walls of said vertical passageways, the tiles being so constructed that the passageways are sealed one from another.

12. A recuperator consisting of a plurality of contiguous courses of similar tiles, in both vertical and horizontal directions, the tiles having aligned vertical passageways therethrough and each tile having a constricted portion which with the corresponding portions of the contiguous tile form a horizontal flue, the tiles being so constructed that the passageways are sealed one from another, and having breaking joints in contiguous vertical courses.

13. A recuperator consisting of a plurality of contiguous courses of similar tiles in both vertical and horizontal directions, the tiles having aligned vertical passageways therethrough and each tile having a constricted portion which with the corresponding portions of the contiguous tile form a horizontal flue, the tiles being so constructed that the passageways are sealed one from another, and means for preventing the lateral displacement of each horizontal course with respect to the contiguous courses in a vertical direction.

14. A recuperator consisting of a plurality of contiguous courses of similar tiles in both vertical and horizontal directions, the tiles having aligned vertical passageways therethrough and each tile having a constricted portion which with the corresponding portions of the contiguous tile form a horizontal flue, the tiles being so constructed that the passageways are sealed one from another by pairs of contacting surfaces at right angles with one another.

15. A recuperator unit comprising a pair of spaced heads of non-circular peripheral contour having eccentrically disposed aligned openings, and a body interconnecting said heads and having a passageway aligned with said openings.

In testimony whereof I affix my signature.

WALTER O. AMSLER.