Dec. 1, 1942. S. P. KINNEY 2,303,559

CHECKERWORK CONSTRUCTION

Filed Dec. 15, 1941

Fig. 1

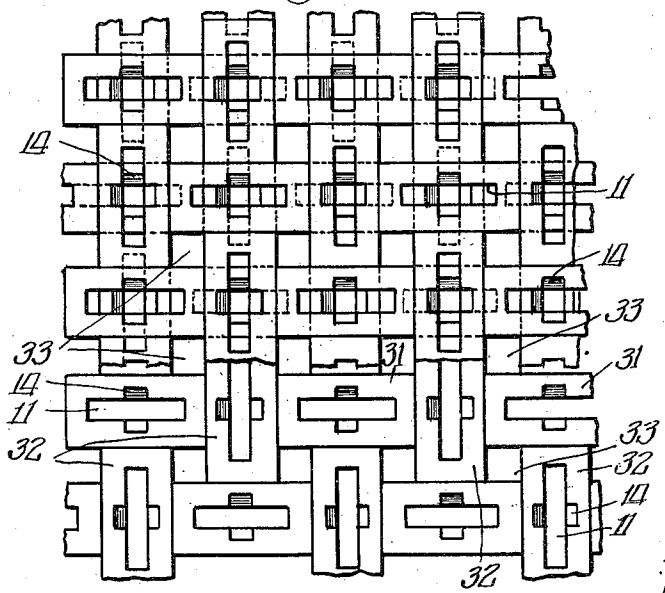


Fig. 2

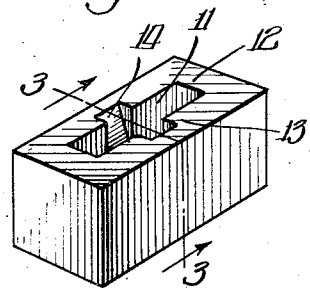


Fig. 3

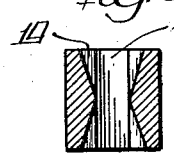


Fig. 4

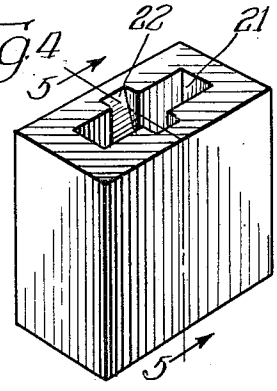


Fig. 5

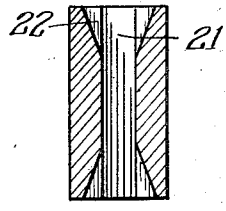


Fig. 6

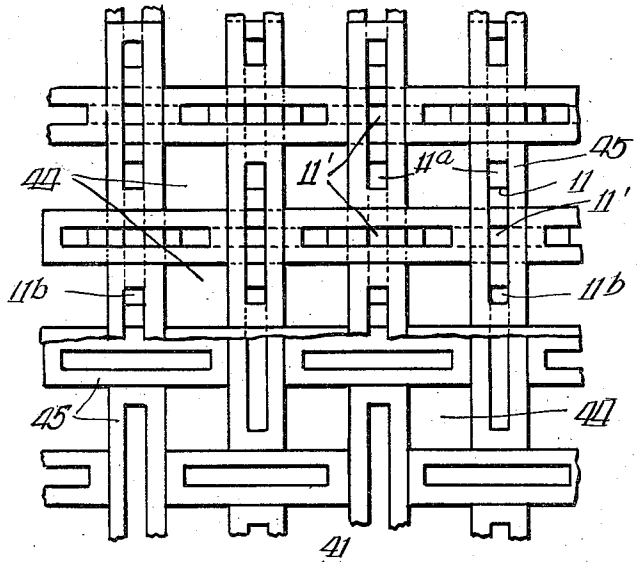
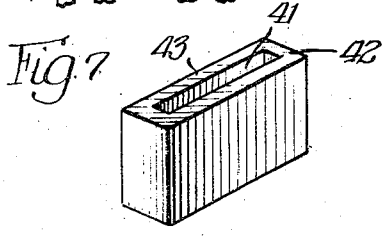


Fig. 7



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UNITED STATES PATENT OFFICE

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CHECKERWORK CONSTRUCTION

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8 Claims. (Cl. 263—51)

This invention relates to a new and improved checkerwork construction and more particularly to such a construction adapted for use in regenerators or other heat transfer apparatus.

Checkerwork for this purpose are normally constructed of brick of standard size, with the brick in each course arranged in basket-weave design, the ends of each brick abutting the center of adjacent brick. It is customary to break joint in successive courses, which provides a stable construction. Checkerwork of this character provides vertical flues extending throughout the construction.

Checkerwork formed in this manner with standard rectangular brick does not lend itself to the maximum area of heating surface for the volume of the checkers. Other forms of checkers have been put into use for the purpose of giving increased area of exposed surface, but such forms, in general, require expensive and fragile brick of special sizes and shapes. Where thinner brick are used to give increased surface, the checker construction is reduced in both strength and stability.

It is an object of the present invention to provide a new and improved checkerwork which is strong and stable in construction.

It is also an object to provide a checkerwork having a flue system which is open from the top to the bottom of the checker system, with the flues arranged so that they may be cleaned when required.

It is a further object to provide a system of this character which presents a maximum of heat transfer surface per unit of brick volume while maintaining a strong and stable construction.

It is an additional object to provide a checker system which gives a high efficiency of heat transfer with reversal of flow of gas throughout the system.

It is another object to provide a checkerwork which presents both vertical and horizontal heating surfaces, combined with cross flues, thus producing turbulent gas flow and rapid heat transfer throughout the system.

Other and further objects will appear as the description proceeds.

I have shown certain preferred embodiments of my invention in the accompanying drawing, in which—

Figure 1 is a fragmentary plan view of one form of checkerwork according to the present invention, one course of brick being broken away so as to show the next lower course;

Figure 2 is a perspective view showing one form of brick;

Figure 3 is a section taken on line 3—3 of Figure 2;

Figure 4 is a view similar to Figure 2 but showing a modified form of brick;

Figure 5 is a section taken on line 5—5 of Figure 4;

Figure 6 is a view similar to Figure 1 but showing a modified form of brick; and

Figure 7 is a perspective view of the form of brick used in the construction of Figure 6.

Referring first to the form of brick used in the checker construction of Figure 1, the brick may be of the shape shown in Figures 2 and 3 or the shape shown in Figures 4 and 5. The differences are readily apparent, particularly from a consideration of Figures 3 and 5. The brick of Figures 2 and 3 is an elongated rectangle which may be of substantially the same proportions as usual types of brick. The brick is provided with a central slot 11 which extends through the brick from top to bottom thereof. The slot is so proportioned and located that end walls 12 of the brick adjacent the ends of the slot are of a thickness substantially equal to the width of the slot, and the side walls 13 of the brick are of similar thickness. As shown in Figures 2 and 3, the slot 11 is provided with flared portions 14 adjacent the center of the upper and lower faces of the brick. These flared portions 14 are substantially equal in width to the width of the slot 11 itself.

The form of brick shown in Figures 4 and 5 differs from that of Figures 2 and 3 only in that it is of considerably greater height. This brick is provided with a slot 21 having the lateral cutaway or flared portions 22. As shown in Figure 5, these flared portions 22 do not extend to the median line of the brick as is the case in the construction of Figures 2 and 3.

Referring now to Figure 1, which may be taken as showing the checkerwork made with either the brick of Figures 2 and 3 or the brick of Figures 4 and 5, it will be apparent that the brick are laid up in what is commonly designated a basket-weave pattern. Taking the lower portion of Figure 1, which represents a lower course of brick, certain brick 31 extend horizontally in the figure, while the intermediate brick 32 are at right angles to the brick 31 and placed so as to have their ends extend uniformly against opposite sides of the brick 31. This construction forms square flues 33, each flue 33 being defined on two sides by brick 31 and on two sides by brick 32. The slots 11 in the individual brick also furnish vertical flues through the individual course considered.

The brick in the next course shown in the upper portion of Figure 1 are individually placed at right angles to the brick immediately below them in the course, a portion of which is shown in the lower part of Figure 1. Consequently the superposed central portions of the slots 11 form continuous flues from the top to the bottom of the checkerwork. The cutaway or flared portions

14 of one brick overlie the slot 11 of an adjacent brick. These cutaway or flared portions therefore, facilitate flow of gases from one brick to and through the slot in the brick superposed thereon. It will be apparent that the superposed slots form vertical flues of varying cross-sectional area, the area varying from that of the flared portions 14 plus the intermediate portion of the slot 11 to the full area of the slot 11 at the central horizontal plane of each brick. It will be apparent from an examination of Figure 1 that in this form of construction, due to the relative widths of the end walls 12 and side walls 13, there is no lateral transfer between the flues formed by the slots 11 and similar adjacent flues, nor is there any transfer between such flues and the square flues 33 formed between the brick.

The form of brick shown in Figure 7 differs from that previously described, in that the length of the brick is greater relative to its width. This brick is not provided with any flared portions of its central slots 41. The end walls 42 and side walls 43 are preferably of the same cross-sectional thickness as the slot 41. A preferred method of laying up this brick is shown in Figure 6. These brick are also laid up in checkerwork designed with alternate bricks at right angles to each other in the same manner as the brick of Figure 1. The vertical flues 44 between the brick are larger in proportion to the brick than the similar flues 33 of the construction of Figure 1. This form of brick and this method of construction as shown in Figure 6, however, differ from the construction of Figure 1 in that here there is a cross transfer of gases between adjacent flues extending through the brick of the checkerwork. This will be apparent from a consideration of the upper portion of Figure 6. The flue 11 of a brick in the upper course of Figure 6 extends over the central portion of the flue designated by 11' of the next lower course of brick, immediately underneath the brick designated as 45. Due to the length and narrowness of the brick, however, the flue 11 also extends over the ends 11a and 11b of the slots 11 in the two bricks whose ends abut the center of the brick immediately below the brick 45. Consequently there is a constant interchange of gas between adjacent flues which increases the turbulence and the heat transfer as the gases pass upwardly or downwardly through the flues.

While I have shown certain preferred embodiments of my invention in the accompanying drawing, it will be understood that the shapes and proportions may be modified to meet differing conditions and requirements and so afford different proportioned areas of flues between and within the brick. I contemplate, therefore, such modifications as come within the spirit and scope of the appended claims.

What is claimed is:

1. Checkerwork construction comprising a plurality of courses of brick, the individual brick having elongated slots extending vertically therethrough, superposed brick in successive courses being placed at right angles to each other with central portions of the elongated slots in alignment to form continuous vertical flues.

2. Checkerwork construction comprising a plurality of courses of brick, the individual brick having elongated slots extending vertically therethrough, superposed brick in successive courses being placed at right angles to each other with central portions of the elongated slots in alignment to form continuous vertical flues, the brick having the aligned portions of the slots flared outwardly adjacent the upper and lower faces of the brick.

3. Checkerwork construction comprising a plurality of courses of brick, the individual brick having elongated slots extending vertically therethrough, superposed brick in successive courses being placed at right angles to each other with central portions of the elongated slots in alignment to form continuous vertical flues, the brick having the aligned portions of the slots flared outwardly adjacent the upper and lower faces of the brick, the flared portions being substantially equal in length to the width of the slot in the adjacent brick.

4. Checkerwork construction comprising a plurality of courses of horizontally elongated brick, the individual brick having elongated slots extending vertically therethrough, the alternate brick in a course being placed at right angles to each other to provide vertical passages between the brick, the brick in superposed courses being located with portions of the slots in registration to provide vertical passages through the brick.

5. Checkerwork construction comprising a plurality of courses of horizontally elongated brick, the individual brick having elongated slots extending vertically therethrough, the alternate brick in a course being placed at right angles to each other to provide vertical passages between the brick, and successive courses being placed with the vertically adjacent brick at right angles to each other with the central portions of the elongated slots in alignment with each other to form vertical flues.

6. Checkerwork construction comprising a plurality of courses of horizontally elongated brick, the individual brick having elongated slots extending vertically therethrough, the alternate brick in a course being placed at right angles to each other to provide vertical passages between the brick, and successive courses being placed with the vertically adjacent brick at right angles to each other with the central portions of the elongated slots in alignment with each other to form vertical flues, the brick having the aligned central portions of the slots flared outwardly adjacent their upper and lower faces.

7. Checkerwork construction comprising a plurality of courses of horizontally elongated brick, the individual brick having elongated slots extending vertically therethrough, the alternate brick in a course being placed at right angles to each other to provide vertical passages between the brick, the brick in superposed courses being located with portions of the slots in registration to provide vertical passages through the brick, the brick being so sized and shaped that the vertical passages between the brick are square in cross section.

8. Checkerwork construction comprising a plurality of courses of horizontally elongated brick, the individual brick having elongated slots extending vertically therethrough, the alternate brick in a course being placed at right angles to each other to provide vertical passages between the brick, and successive courses being placed with the vertically adjacent brick at right angles to each other with the central portions of the elongated slots in alignment with each other to form vertical flues, the end portions of the slot in each brick overlying the end portions of the slots of other bricks in vertically adjacent courses.

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