

Oct. 21, 1941.

H. W. WALTERS

2,259,913

CHECKERWORK

Filed July 5, 1940

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FIG. 1

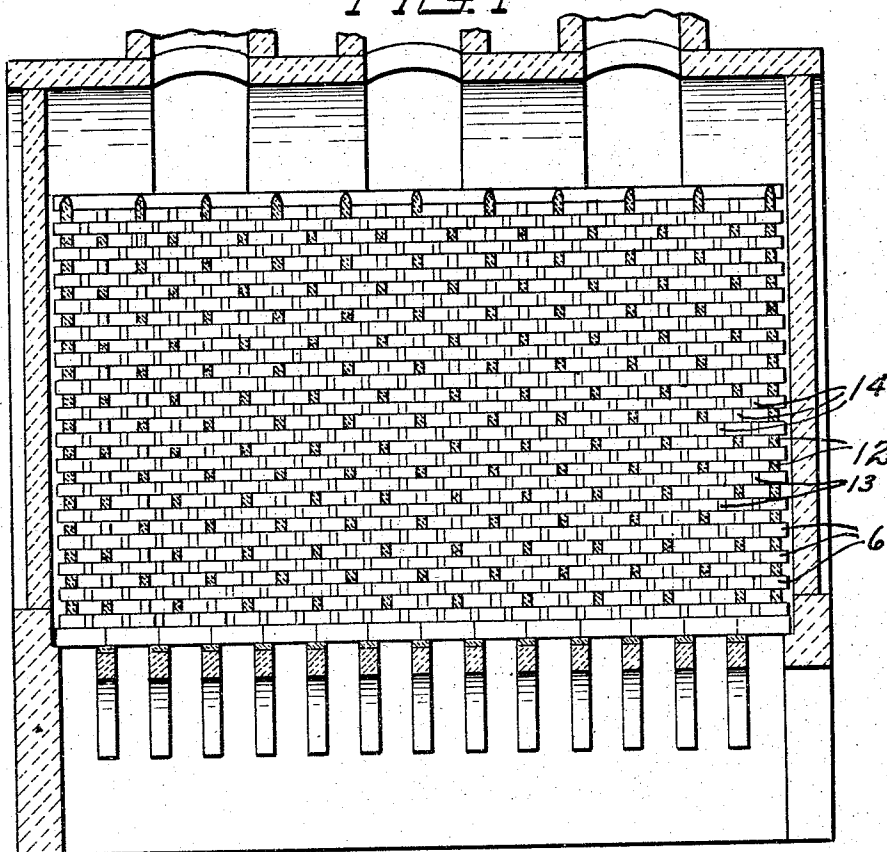
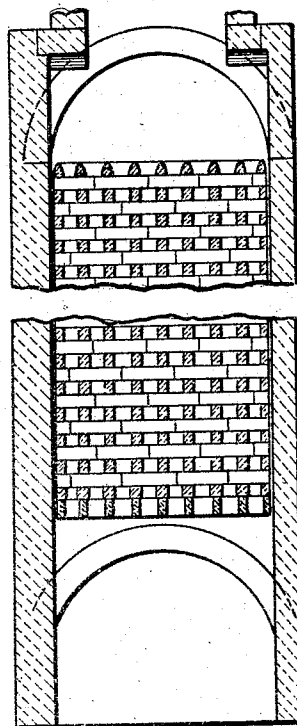


FIG. 2.

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FIG. 3.

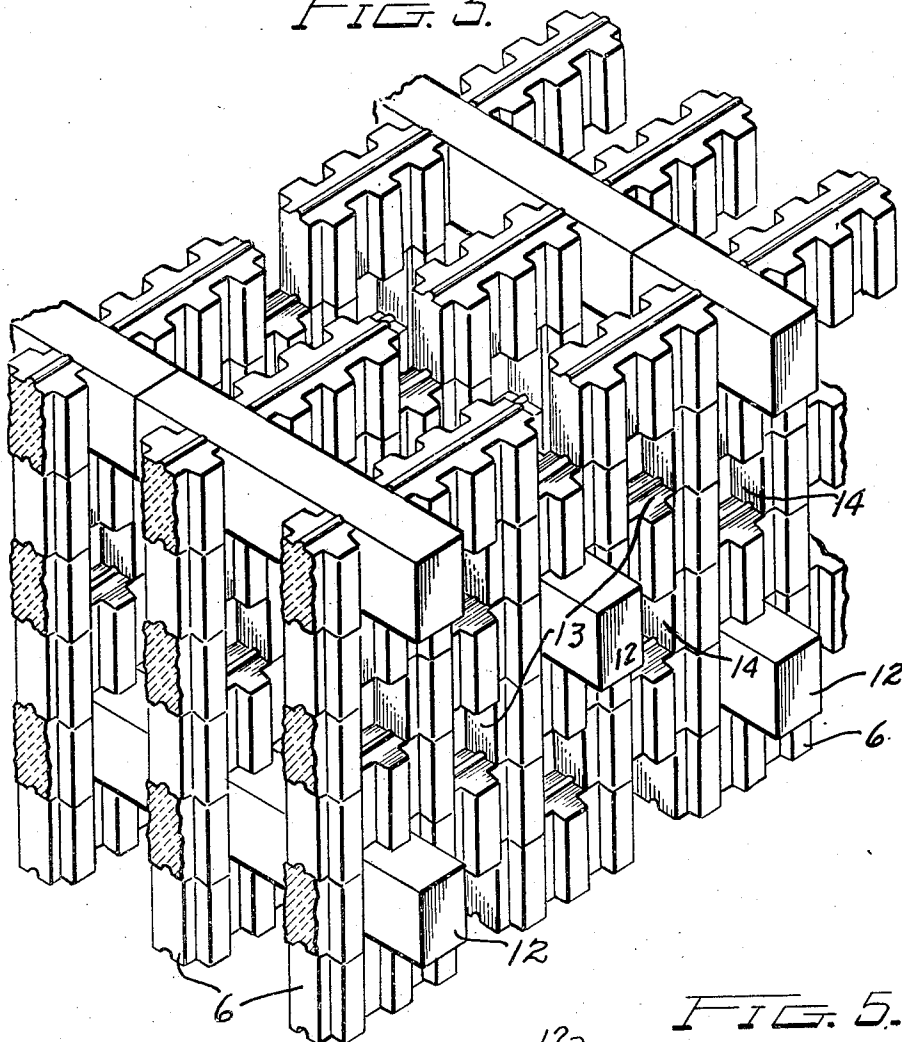


FIG. 5.

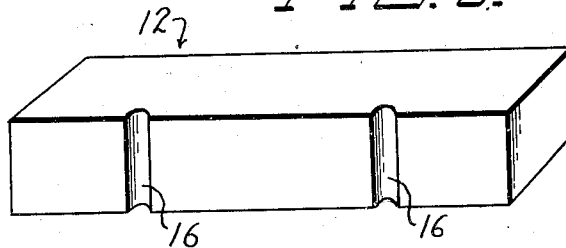
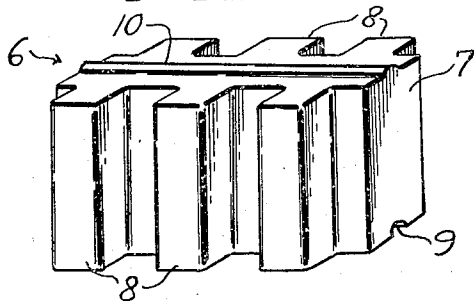


FIG. 4.



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FIG. 6.

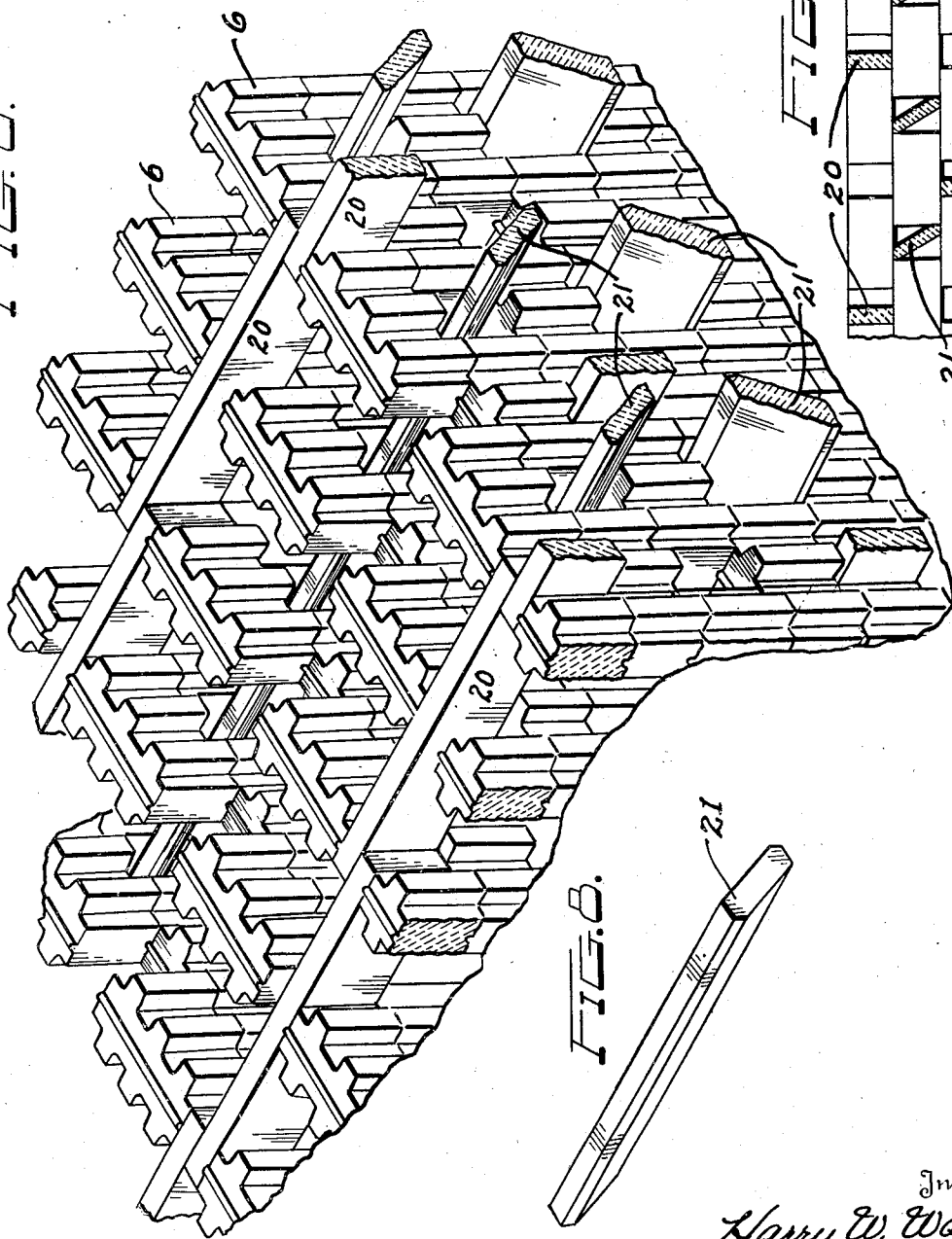


FIG. 6.

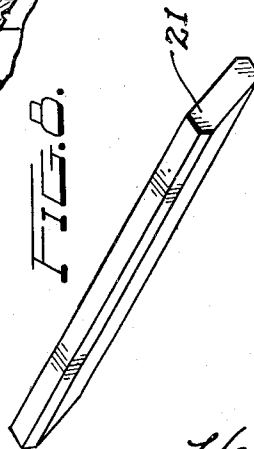
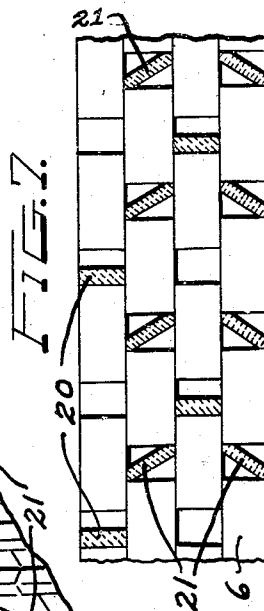


FIG. 7.

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2,259,913

CHECKERWORK

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Application July 5, 1940, Serial No. 343,955

4 Claims. (Cl. 263—51)

This invention relates to checker work for regenerative furnaces, blast stoves, and the like, and is particularly directed to the manner of assembling individual ceramic units to form spaced walls, and the manner of connecting such walls.

The primary object of the invention is the provision of a checker structure which is of a highly "open" nature to decrease the resistance to the passage of gas, but which has a large mass available for the absorption and dissipation of heat. To fulfill this object, the present invention includes spaced walls of bricks of a thickness such that during a normal cycle of operation the entire body heats to a uniform degree, the bricks being laid up in courses with their ends spaced apart to form communicating openings between the flues on each side of each wall, and with the bricks in successive rows breaking joints, the walls so formed being connected by spaced, staggered tie members.

Another object of the invention is the provision of a checker structure which is highly "open," and in which the individual bricks, as well as the walls formed therefrom, are securely locked against displacement.

Still another object of the invention is the provision of a checker structure which includes spaced walls tied together by diagonally related members which define diagonal gas paths within the flues formed by the walls.

Other objects and advantages of the invention will become apparent as the description proceeds, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section through the length of a regenerative chamber filled with checker work in accordance with the present invention; Fig. 2 is a vertical section through the width of such a chamber; Fig. 3 is a perspective view of a portion of the checker work formed in accordance with the present invention; Fig. 4 is a perspective view of a single block of the type used in the present invention; Fig. 5 is a perspective view of a tie block used to prevent relative displacement of the several walls; Fig. 6 is a fragmentary perspective view of the checker work modified for particular application to water gas machines; Fig. 7 is a fragmentary, diagrammatic elevation of the checker work shown in Fig. 6, and Fig. 8 is a perspective view of a turbulence block as shown in Fig. 6.

Referring to the drawings, the present invention includes spaced walls consisting of the individual blocks shown in Fig. 4 laid up and connected as hereinafter described. Each block (designated generally by 6) consists of a substantially rectangular body 7 of fire clay or other suitable material, the long faces of which have fins 8 projecting therefrom. Each fin 8 is a vertically extensive mass of such thickness that it is completely and uniformly heated during a normally

long cycle of operation. Similarly, the thickness of the body 7 is such that it also is substantially completely heated during the cycle, taking into consideration that the heat penetration is approximately one inch in fire brick during the normal period between reversals of a regenerative furnace.

The fins 8 are equally spaced along the side-walls of the blocks 6 and are similar in area to the spaces left between them. This provides bricks which may be used in conjunction with each other to build solid walls after they have served their purpose as checkers. It is only necessary to insert the fins of one brick into the spaces between the fins of another brick to build up a satisfactory solid wall from brick which might otherwise be considered scrap.

The body 7 of each block is grooved longitudinally as at 9 on the center of its bottom face and is provided with a tongue 10 on the top. By this expedient each block has provision for a tongue and groove connection with blocks in the next succeeding course both above and below so as to prevent relative lateral displacement when the blocks are laid up in walls.

The present invention contemplates spaced parallel flues in the checker work, each flue being defined by walls made up of the blocks 6. It has long been known that gases passing through a structure of this kind have a tendency to "channel" or to pass repeatedly in certain portions of certain flues to a greater extent than in others, so that at least a portion of the checker work is comparatively inactive. To reduce this tendency, various expedients have been used, principally directed to guiding the gases equally into the entrances of the several flues. It has also been proposed to open up the checker structure to provide intercommunicating passages at intervals in an effort to equalize any pressure differential in neighboring flues and thus even up the gas distribution. Such proposals have been, in the main, haphazard, and confined almost entirely to the two ends of the flues following the same principles which dictated the policy of distributing the gases prior to their entrance into the checker work. In the present invention, however, the blocks comprising the walls are so laid, and the walls are so interconnected as to provide diagonal series of spaced tie blocks 12 alternating diagonally with flue connecting openings 13, and a complete diagonal series of openings 14 between each series of tie blocks. In this way the paths for the gases between the walls are open both diagonally and vertically and reduce to a minimum the resistance to the passage of gases, although slightly encouraging passage in diagonal paths, thus influencing the gases to enter the center of the checker work, the portion which is usually least active in the average installation.

As shown in Fig. 1, the checker work consists

of a first course of blocks 6 laid with their ends spaced apart. The second course consists of a similar row of blocks laid over the openings between the blocks of the first course, with their ends similarly spaced and breaking joints with the blocks of the first row. The third, fifth, seventh, etc., courses are similar in disposition to the first, while the second, fourth, sixth, eighth, etc., are similar to the second.

In the even numbered courses (2, 4, 6, 8, etc.) alternate openings between the blocks receive the tie blocks 12. However, instead of the tie blocks being disposed in a vertical series, they are disposed in mutually staggered relationship and are hence diagonally related. It will be seen that the unobstructed vertical area between the tie blocks is equal to the length of a block 6 and that the diagonal paths in the flues are of even greater area. It will also be seen that between each diagonal series of tie blocks a diagonal series of openings 14 is provided and that between each tie block of each series an additional interconnecting passage 13 between the flues is formed.

This disposition of the blocks 6 and tie blocks 12 has been found extremely advantageous, since almost instantaneous equalization of gas pressures between the flues is had with the consequent reduction in the tendency of the gases to channel in the checker work. It will be appreciated that this disposition of the blocks is made possible by the tongue and groove connection between the courses which prevents the free ends of the blocks, adjacent the flue connecting openings, from being displaced laterally.

By reason of the fact that substantially the entire volume of each block 6 and of each tie block is available for the absorption and dissipation of heat, I am enabled to employ a checker work having much more numerous voids or openings therein than is the usual practice.

Each tie block 12 is provided on its lower surface with spaced grooves 16 which engage the tongues of the blocks 6 which support the tie blocks so that the walls are firmly connected. It will be noted in Fig. 2 that each tie block laps two walls and terminates in the center of a flue and that vertically succeeding tie blocks are used to connect different pairs of walls. An extremely rigid structure is thus provided which is not likely to collapse even after considerable erosion has taken place.

If desired, headers may be placed above the topmost series of blocks and may be given a tapered or stream-lined form to decrease turbulence at this point and to provide for the easy entrance and exit into and from the flues. Such headers may be made of a highly refractory material capable of withstanding not only mechanical erosion but chemical reaction with the gases passing through the checker work. The headers may thus serve as a protection for the fire brick which they cover.

When the invention is applied to certain specialized structures such as water gas machines, it may be desirable to change the form of the tie blocks 12 and to introduce turbulence producing blocks into the checker work. As shown in Figs. 6, 7 and 8, the disposition of the ribbed blocks 6 remains the same, but the tie blocks 20, instead of completely filling a space between two ribbed blocks are reduced to half the thickness. The span of the tie blocks may be increased to overlie three walls if desired.

Further, it is sometimes necessary to increase the turbulence of the gas flow within the checker

work. This may be readily accomplished by inserting a thin turbulence block 21 in each opening of the vertical series between the tie blocks. Preferably the turbulence blocks are diagonally disposed and each in the direction opposite to that of its neighbors.

While the invention has been described in connection with individual bricks of a particular character, it should be expressly understood that any brick capable of sustaining the mechanical load and having the proper heat absorption characteristics, may be utilized. Various other changes will suggest themselves to those skilled in the art and it should be expressly understood that such changes are within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent, is:

1. Checker work for regenerative furnaces or the like, having spaced parallel walls, each composed of successive rows of brick laid with their ends spaced apart to form openings connecting the flues formed by the walls and with the brick of successive rows breaking joints, and wall tying members in mutually staggered relation mounted in alternate openings of alternate rows to provide diagonal series each comprising alternate openings and tie members and diagonal series of openings alternating with said first series.

2. Checker work for regenerative furnaces or the like, having spaced parallel walls forming vertical flues with each wall comprising successive rows of oblong brick, one over another, with the brick of each row endwise spaced to provide openings therebetween connecting said flues and with the brick of successive rows breaking joints to dispose said openings in diagonal series, and horizontally disposed tie members of elongated block form for connecting adjoining walls, said tie members disposed in diagonal series and mounted in predetermined openings of alternate series with the members substantially filling the openings, whereby diagonal flue paths are provided between the walls with a full row of unobstructed openings in register with each path and with at least one unobstructed opening between each adjacent pair of tie members of a series.

3. Checker work for regenerative furnaces or the like, having spaced parallel walls forming vertical flues, each wall being composed of a plurality of rows of oblong brick, one over another, with the brick of each row endwise spaced to provide openings therebetween connecting said flues and with the brick of successive rows breaking joints so that each brick completely bridges a respective opening of the next underlying row, and tie members of block form for the successive walls mounted in predetermined openings of alternate rows and extending into said flues into endwise abutting relationship, whereby said tie members define diagonal paths for traversing said flues.

4. Checker work for regenerative furnaces or the like, having spaced walls forming vertical flues, each wall comprising brick laid with spaced diagonally related openings tie members for the walls mounted in said openings and spanning at least two walls, and interlocking means formed on said tie members and on the bricks with which they engage, said tie members spanning at least two walls and being disposed in endwise abutting relationship at points between said walls and defining diagonal gas paths in the flue.

HARRY W. WALTERS.