

Nov. 10, 1942.

H. HELLAN

2,301,400

CHECKERWORK

Filed Jan. 8, 1942

Fig. 1

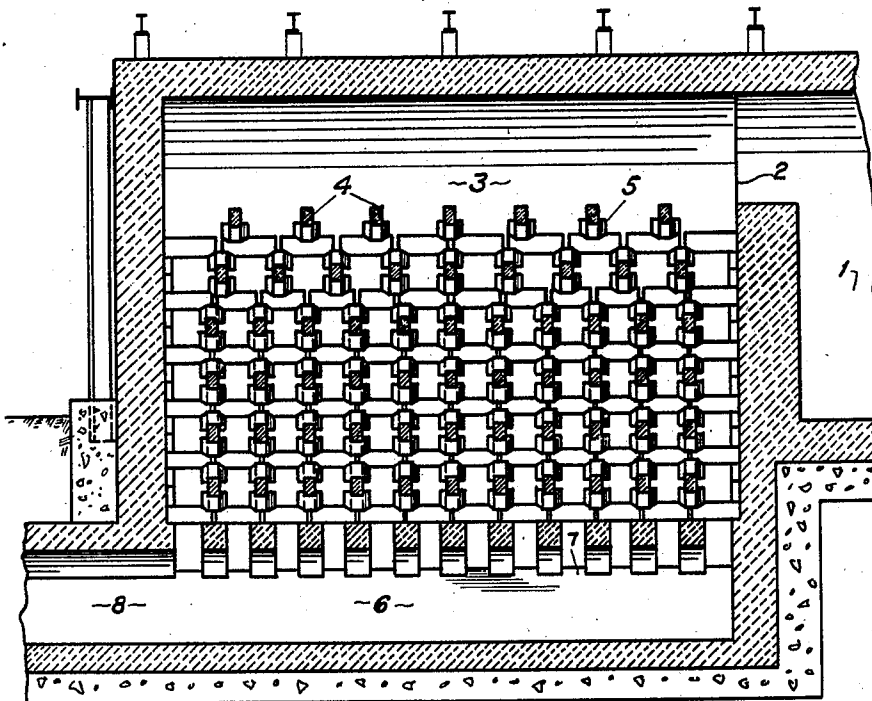


Fig. 2

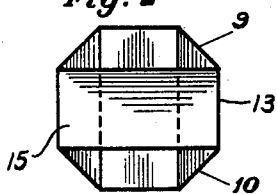


Fig. 3

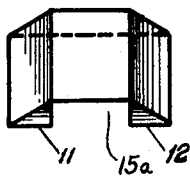
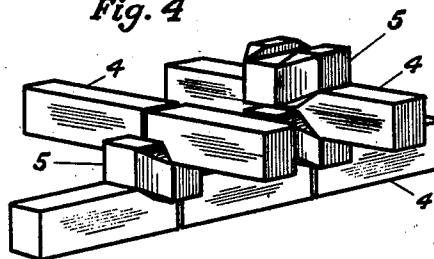


Fig. 4



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2,301,400

CHECKERWORK

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Application January 8, 1942, Serial No. 426,067

15 Claims. (Cl. 263—51)

The present invention relates to brick checker-work for regenerative furnaces and the like, and particularly to a system of checker bricks in alternate courses of parallel rows arranged transversely above each other within a checker chamber.

According to the conventional arrangement hitherto in use the abutting bricks in one row rested on the abutting bricks in the underlying rows, and the spacing of these rows had to be substantially equal to the length of the bricks resting on them. The support provided for each brick was therefore at most only a half brick thickness minus the allowance for brick expansion on heating. When in addition the bricks are separated to take up a total extra length of less than a full brick within the dimensions of the checker chamber, the available supporting area was decreased with a tendency to cause the system to be unstable.

There were other detrimental factors present with the above mentioned system affecting brick volume, heating surface and gas flow. The brick volume determines the capacity for storing heat. If the passages are made large to insure against clogging from dust in the waste gases such an open system will be low in brick volume and heating surface with a corresponding lack of efficiency. It is advantageous to have such an open system only in the top courses, where the temperature is high, velocity of gases great, and where fusion between bricks and suspended dust builds up the checkers at expense of proper sized openings. In the lower courses, where the temperature is lower and gases are more dense, it is desirable to have narrower passages and use the space for additional brick volume and heating surface.

Due to conventional brick lengths, however, it has not been possible to obtain a gradual change-over from the larger passages at the top of the system to the narrower flues in the major part of the system. Furthermore, any abrupt increase in spacing will cause many bricks to be placed directly over the vertical flues. Where the distances between the parallel courses is only the intervening transverse course the building up of dust on such staggered rows will cause a choking of passages.

My invention consists in the construction of a checker-work comprising brick of conventional form arranged in regular courses of straights alternating with courses of straights arranged in transverse direction to the first mentioned courses with spacer blocks of particular shape

being placed at the intersection between the rows of two alternate courses.

One object of the invention has been to construct an open system of checker-work with large brick volume, large heating surface and adequate passages both vertically and horizontally. Another object of the invention has been to construct this checker system with decreasing size of passages from the top to the interior so that the cooled and denser gases can be brought into better contact with a larger volume of checker brick. A further object of the invention has been to use standard rectangular firebrick or straights for the regular checker courses and to separate these courses at intersections by spacer blocks resting on the underlying rows and supporting the ends of two overlying straights running transversely to the rows below. Yet another object of the invention has been to provide this spacer block with a large brick volume and small effective height in order to greatly increase the brick volume and heating surface within the chamber. Still another object of the invention has been to provide a newly designed spacer block with side lugs at the top and bottom to register with the straights separated by it and to slope these side lugs where they extend outside the regular courses separated by the block, the slope on these projecting ends being very useful in preventing dust accumulation.

A further object of the invention has been to provide extended support on the spacer block for the ends of the two straights resting on it, and to permit the longitudinal separation of these bricks for the purpose of stretching the rows to suit inside dimensions of the checker chamber, or for the purpose of enlarging the flues formed by the regular courses.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various forms in which the principle of the invention may be used.

In said annexed drawing—

Fig. 1 is a longitudinal section through the checker chamber of a regenerative furnace;

Fig. 2 is a plan view of the spacer block according to the invention;

Fig. 3 is a side view of the block; and

Fig. 4 is a perspective view showing part of

intersecting rows of straights and some spacer blocks separating the same.

Referring to Fig. 1 of the drawing, numeral 1 designates a slag pocket of a regenerative furnace. The waste gases are passing from this pocket, through opening 2 into chamber 3, where they meet a system of loosely laid checker brick 4 arranged in alternating transverse courses separated by spacer blocks 5. After passing down through the checkers into the sub-flues 6 formed by rider walls 7 the waste gases will leave the chamber through opening 8. After a period of about 20 minutes the flow is reversed, the waste gases will leave at the other end of the furnace into another checker chamber, and cold air will flow in through opening 8 from a reversing valve (not shown), ascend through the heated checkers and leave the chamber at the required temperature through openings 2.

The form of my newly designed spacer block is more particularly shown in Figs. 2 and 3. The block comprises a main or body portion 13 of the shape of an octagonal prism whose height is approximately half the length between two opposite sides. The top carries two vertically extending parallel lugs 9 and 10 forming a channel 15 into which the straights snugly fit. Identically shaped lugs 11 and 12 extend downwardly from the bottom base of the octagonal body and include a channel 15a; these bottom lugs are, however, arranged at right angles with the top lugs so that the channels 15 and 15a when projected, the one onto the other, will form a cross. This arrangement of the lugs and the channels formed thereby makes it possible to build the checker-work with alternate rows of straights disposed transversely to each other, as shown in Fig. 4 of the drawing.

At the ends the lugs are cut off so as to form sloping triangular portions, which are capable of shedding the dust which would otherwise accumulate at these end portions projecting from the straights and exposed to the passing gases. This shape is also convenient because there are no frail projections on the block easily damaged in handling.

As mentioned before, it is one of the main objects of my improved checker-work to increase the brick volume and heating surface within the chamber. Tabulation of a checker-work embodying the principle of the present arrangement relative to an arrangement without spacer blocks shows an increase of 25% in brick volume for a condition where the spacer block has the same volume as a straight composing the regular courses, and a height equal to half of a regular course. The heating surface is similarly increased about 5%. Also, the horizontal flues have double the height of a regular course due to one transverse course and two spacer blocks separating the parallel courses.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate

courses, said spacer blocks having a brick volume substantially equal to or larger than a straight in the regular courses.

2. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate courses, said spacer blocks having an effective height smaller than one regular course.

3. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate courses, said spacer blocks having side lugs at the bottom to register with the underlying straights.

4. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate courses, said spacer blocks having side lugs at the top to register with the straights resting on it.

5. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate courses, said spacer blocks having side lugs at the top and bottom to register with the straights separated by said block.

6. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course, in combination with spacer blocks at intersections between the rows in two alternate courses, said spacer blocks having side lugs with sloped ends projecting beyond the vertical side walls of the intersecting straights.

7. A regenerative checker-work comprising a plurality of regular courses of spaced parallel rows of abutting straights alternating with transversely arranged parallel rows of other abutting straights spanning the rows in the underlying course in combination with spacer blocks at intersections between the rows in two alternate courses, the horizontal distance between said spacer blocks being gradually increased in the upper courses.

8. A spacer block for a checker-work comprising a center body in the form of an octagonal prism, side lugs projecting vertically upward from said center body, said side lugs being adapted laterally to confine straights supported by said spacer block.

9. A spacer block for a checker-work comprising a center body in the form of an octagonal prism, side lugs projecting vertically downward from said center body, said side lugs being adapted laterally to confine straights underlying said spacer blocks.

10. A spacer block for a checker-work comprising a center body in the form of an octagonal

prism, a pair of side lugs projecting vertically upward from said center body, said side lugs being adapted laterally to confine straights supported by said spacer block and a second pair of side lugs projecting vertically downward and adapted to confine straights underlying said spacer block, said second pair of lugs being at right angles with said first pair of lugs.

11. A spacer block having a main body of the shape of an octagonal prism, said main body carrying on top two parallel side lugs extending over the length of said main body and forming a channel between them for supporting and laterally holding against displacement straights of brick.

12. A spacer block having a main body of the shape of an octagonal prism, said main body carrying on top two parallel side lugs extending over the length of said main body and forming a channel between them for supporting and laterally holding against displacement straights of brick, said side lugs having sloping triangular end portions capable of preventing dust accumulation.

13. A spacer block having a main body of the shape of an octagonal prism, said main body carrying at the bottom two parallel side lugs extending over the length of said main body and forming a channel between them for holding against

lateral displacement underlying straights of brick.

14. A spacer block having a main body of the shape of an octagonal prism, said main body carrying one pair of parallel side lugs on top and another pair of parallel side lugs at the bottom thereof, said side lugs extending over the length of said main body and forming a channel between them for spacing and laterally holding against displacement straights of brick, both pairs of said side lugs having sloping triangular end portions capable of preventing dust accumulation on top of the block and present convenient edges for handling.

15. A spacer block having a main body of the shape of an octagonal prism, said main body carrying one pair of parallel side lugs on top and another pair of parallel side lugs at the bottom thereof, said second pair of side lugs being arranged at right angles to said first pair of side lugs, both pairs of side lugs extending over the length of said main body and forming a channel between them for spacing and laterally holding against displacement straights of bricks and having sloping triangular end portions capable of preventing dust accumulation on top of the block and present convenient edges for handling.

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