July 4, 1933. J. C. HAYES, JR., ET AL 1,916,370

CHECKER SUPPORT

Filed March 6, 1931 2 Sheets-Sheet 1

Fig. 1

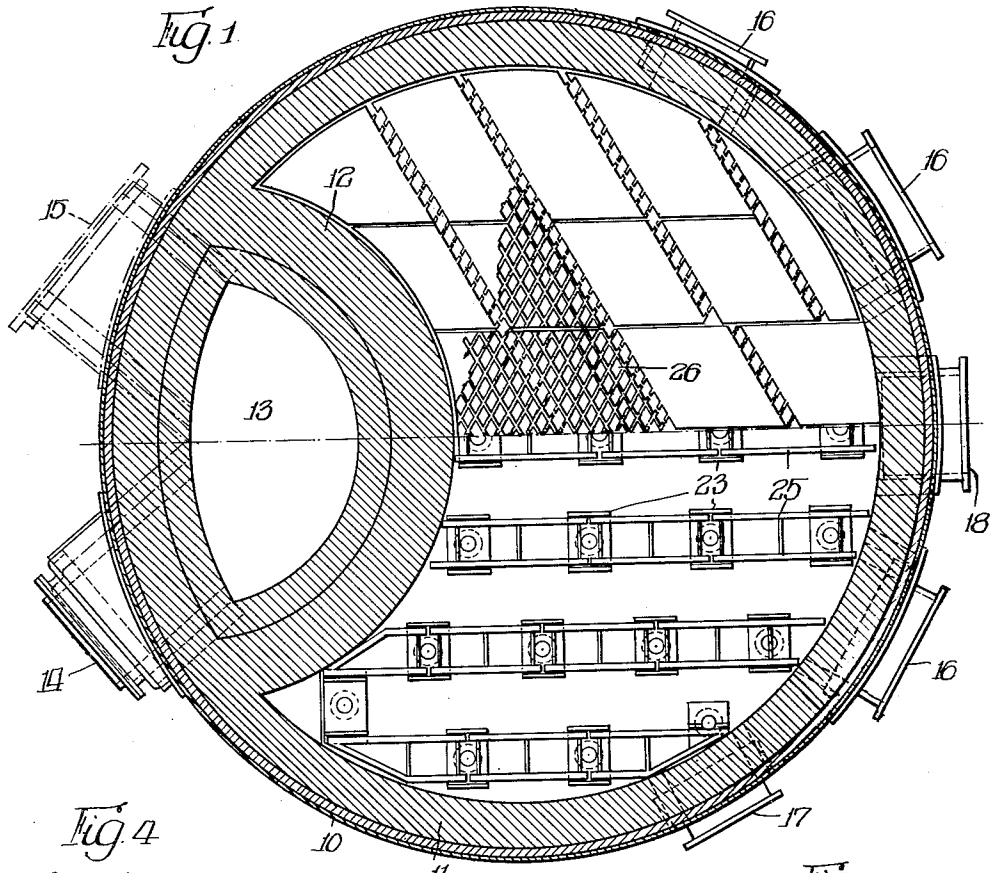


Fig. 4

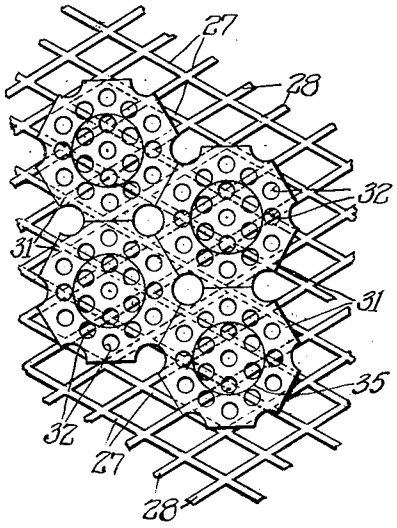


Fig. 6

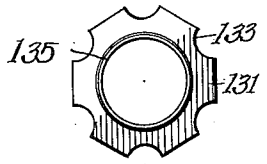


Fig. 8

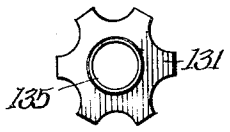


Fig. 7



Fig. 9.



Fig. 10

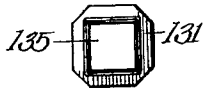


Fig. 11



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CHECKER SUPPORT

Filed March 6, 1931 2 Sheets-Sheet 2

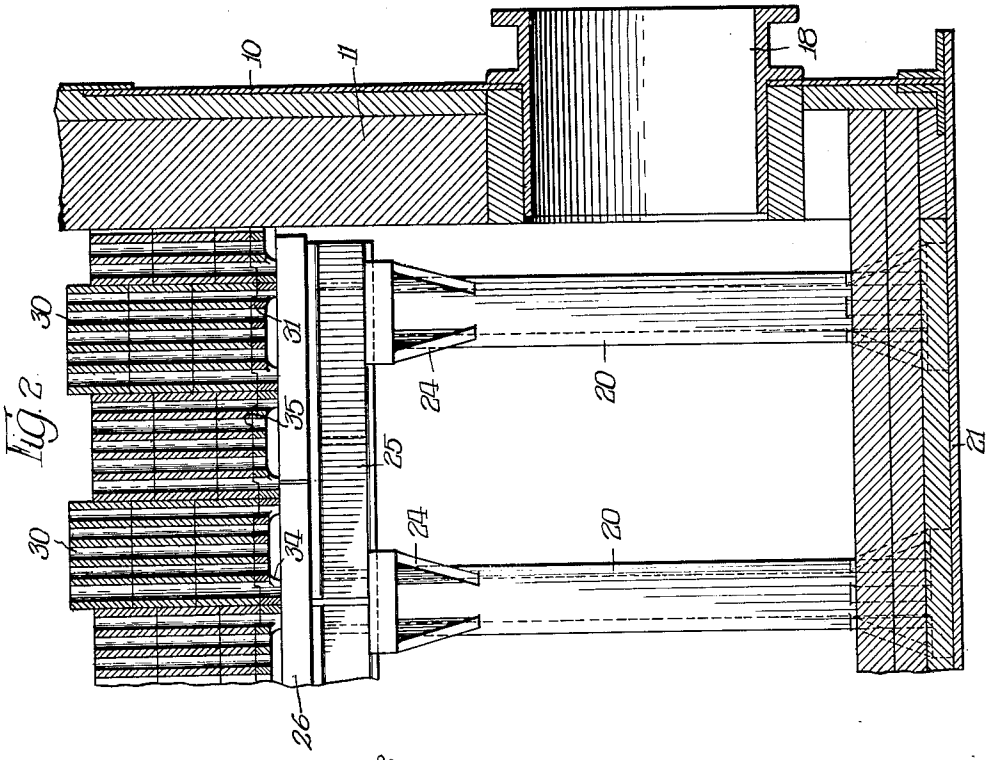


Fig. 2

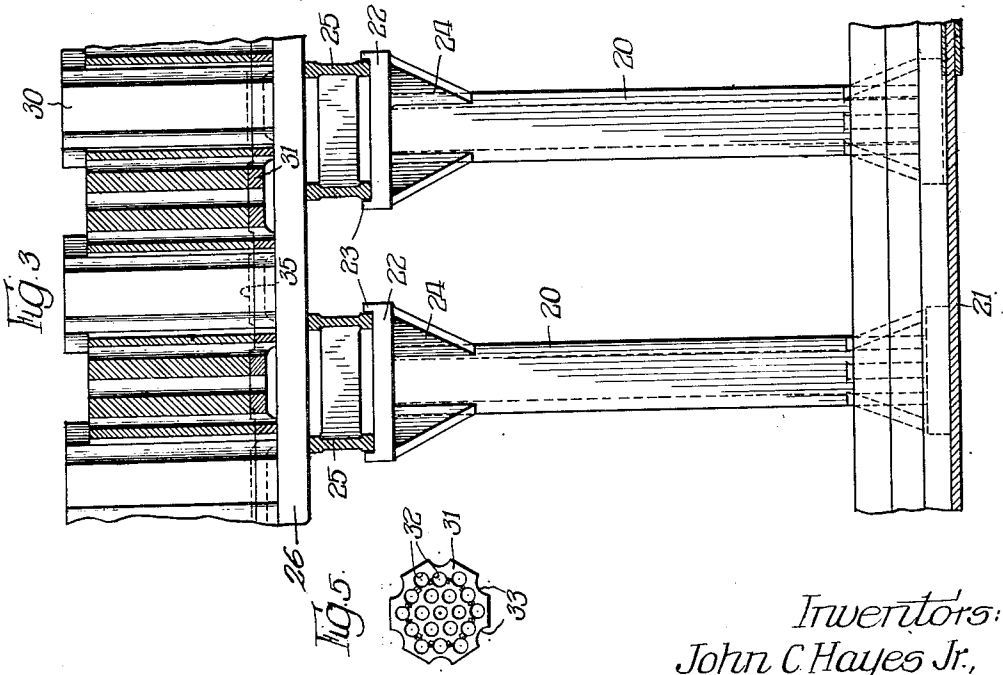


Fig. 3

Fig. 5.

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UNITED STATES PATENT OFFICE

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CHECKER SUPPORT

Application filed March 6, 1931. Serial No. 520,727.

The invention relates to hot blast stoves and more particularly to means for supporting the checker work or brick construction forming the heat-accumulating and heat-exchanging structure of the same.

Brick manufacturers require a considerable tolerance in checker-brick on account of the shrinkage and workage which takes place in the same during firing, and in prior constructions where columns of such brick were supported on metal columns, it was found to be impossible to design these in advance with any accuracy greater than the tolerance required in fire brick dimensions. Also, it is to be noted that the temperature at or near the point of contact between brick and metal in hot blast stoves is subject to enormous change every time the stove is changed from gas burning to air heating. This difference in the coefficient of expansion between fire brick and metal causes creepage of the metal area from the brick at the supporting joints with consequent failure and deterioration of the lowermost checkers.

It is therefore an object of the present invention to provide an improved type of supporting means for supporting columns of checker work, which will obviate any difficulties incident to the fluctuation in the dimensions of the various checker-brick.

Another object is to provide supporting means for columns of checker-brick upon which the same may be positioned irrespective of the location of the main metallic supporting columns.

More specifically an object of the invention is the provision of the metallic shoes for location under the columns of checker-brick and which, by reason of their support upon a grating, will function to prevent any possibility of the brick spalling at the supporting points where the load is concentrated.

A still further object is the provision of a metallic shoe for supporting a column of checker brick and metallic grating for supporting in turn the latter, whereby the construction permits an unobstructed passage of the gases and air and wherein the line of cleavage due to variations in temperature will be between the metallic grating and the metallic shoe.

A still further object is to provide a metallic shoe for supporting the checker-brick which may be used indiscriminately with checkers of different sizes.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings, which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is a sectional view taken transversely through a hot blast stove showing the supporting means for the checker-brick as constructed in accordance with the present invention;

Figure 2 is a fragmentary sectional view showing a plurality of supporting columns supporting the checker-brick;

Figure 3 is a view similar to Figure 2 but taken at right angles thereto;

Figure 4 is an enlarged plan view showing the positioning of the metallic shoes upon the grating;

Figure 5 is a plan view of a metallic shoe;

Figure 6 is a plan view of a metallic shoe of different design;

Figure 7 is a sectional view taken through the center of the same;

Figure 8 is a plan view of a metallic shoe of still different design;

Figure 9 is a sectional view taken substantially through the center of the same;

Figure 10 is a plan view showing a metallic shoe substantially square in contour; and

Figure 11 is a sectional view taken substantially through the center of the same.

Referring to Figure 1 of the drawings a hot blast stove is disclosed of circular cross section having an outer wall 10 of steel or the like, within which is a brick lining 11 of ordinary construction. An interior wall 12 formed integrally with or suitably joined to the lining 11 provides a vertical passageway 13, extending the length of the structure and

which communicates with a gas burner 14 and a hot air outlet 15. Also communicating in a similar manner with the second passageway formed within the stove by the interior wall 12 are chimney valves 16, inspection door 17 and cold air inlet 18. All of the above is common and well known structure as is also the particular function of each in the operation of the complete device and therefore more detailed description of the same is not considered necessary.

The second passageway is filled with heat-accumulating and heat-exchanging brick work, the same extending from points slightly above the apertures 16 and 18 to substantially the top of the structure. When the stove is gas fired the hot gases enter the top of the structure and are conducted through the checker work, to be later described, whereby the same accumulate heat, the gases finally being discharged through openings in the bottom of the stove. In reverse operation the cold blast is introduced through opening 18 and is directed up through the checker work whereupon the same transfer their heat to the air after which the blast is conducted down through passageway 13 and is discharged through the hot air outlet 15, all of which is well known operation of stoves with which the present invention is concerned. Particularly the present invention is concerned with means for supporting the checker-brick in a manner to obviate the difficulties heretofore encountered by reason of the uncertainty in the dimensions of the same and their rapid deterioration due to the sudden changes in temperature to which they are subjected. As shown in Figures 2 and 3 the main supporting means comprise supporting columns 20 located upon base 21 of the stove and provided at their upper end with supporting plates 22 having upwardly directed flanges 23, the plates being rigidly secured to the columns by means of angle plates 24. Adapted to span the distance between adjacent columns are a plurality of girders 25 rectangular in cross section and held in position on the supporting plates 22 by reason of the flanges 23. The girders 25 are preferably made of a length equal to the distance between columns so that adjacent girders abut each other at points centrally of the supporting plates 22.

Positioned upon the girders 25 are a plurality of grid plates 26, the majority of which are formed in a parallelogram shape, the remaining having a single arcuate edge so that the entire area forming the second passageway described can be covered by the grid plates. More particularly shown in Figure 4 the grid plates 26 comprise diagonal members 27 and 28 which intersect each other to form a diamond shaped mesh. Also it is desirable that the material forming the grid plates be a heat-resisting alloy, such as a chromium nickel aluminum alloy.

Forming the supporting means proper for the tiers of checker-brick 30 are metallic shoes 31 preferably formed of cast iron hexagonal in shape so that the same has substantially the same shape as the individual checkers forming the heat-accumulating and heat-exchanging columns 30. Each metallic shoe, as are also the individual checkers, are provided with a plurality of vertical passages 32 and exterior groove 33, the latter forming passages for conducting the gases and air when the shoes and checkers are arranged as show in Figure 4. The metallic shoes 31 are provided with a bottom recess 34 and a projection 35 on its upper surface, the same being circular in contour and disposed centrally of the checker. The lowermost checkers are provided with cavities for receiving the projection 35, whereby the integrity of the columns are maintained, notwithstanding the wide and sudden variations in temperature to which the metallic shoes and checkers are subjected.

Figures 6, 8 and 10 disclose modified forms of metallic shoes 131 having projections 135 provided thereon for the purpose described. The shoes are for use with various forms of checkers commonly employed in hot blast stoves. The shoes are preferably made slightly smaller than the checkers with which they are adapted to be associated, providing just sufficient surface for either over-sized or under-sized checkers.

The construction above functions to overcome many disadvantages. The difference in the coefficient of expansion between the fire brick and metal causes creepage of the metal away from the brick at the supporting points unless some arrangement, such as the metal shoe disclosed in the present invention, is incorporated. The shoe being recessed into the fire brick column will follow the brick in any movement due to temperature changes and the line of cleavage will be between the metal shoe and the metal support thus preventing any disintegration of the brick. Also the underlying supporting columns can be designed in advance and the grating allows the shoes to be positioned without regard to location of the columns supporting the grate. The brick may then be laid up as closely or as loosely as desired to the end that full advantage may be taken of the space available for laying brick and avoiding any crowding or unnecessary cutting where the brick tends to run consistently over specified dimensions.

It is to be understood that we do not wish to be limited by the exact embodiment of the device shown, which is merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without

departing from the spirit of the invention or the scope of the claims.

We claim:

1. Supporting means for use in hot blast stoves for supporting checker-brick, comprising in combination main supporting columns, a metallic grating supported thereby, and metallic shoes supported by said grating.

2. Supporting means for use in hot blast stoves for supporting checker-brick, comprising in combination main supporting columns, a metallic grating supported thereby, and metallic shoes supported by said grating, each of said shoes forming a support for a column of checker-brick.

3. Supporting means for use in hot blast stoves, comprising main supporting columns, a metallic grating supported thereby, and metallic shoes positioned on said grating and supporting a column of checker-brick.

4. Supporting means for supporting checker-brick comprising a plurality of spaced supporting columns, a plurality of grid plates supported thereby, and shoes positioned on said grid plates, said shoes having located thereon a column of checker-brick.

5. Supporting means for supporting checker-brick comprising a plurality of grid plates, metal shoes supported thereon, and a column of checker-brick positioned on each of said shoes, said shoes having interfitting engagement with said brick.

6. A support for checker-brick comprising a plurality of supported grid plates, a plurality of metal shoes supported thereby and adapted to have lateral movement thereon, and a column of checkers supported by each shoe.

7. A support for checker-brick comprising a plurality of supported grid plates, a plurality of metal shoes supported thereby and adapted to have lateral movement thereon, and a column of checkers supported by each shoe, said shoes having means interfitting with said checkers.

8. A support for a column of checker-brick comprising a supported grid plate, a metal shoe supported thereby and adapted to have lateral movement thereon, said shoe supporting a plurality of checkers, and means provided on said shoe for preventing movement between said shoe and the checker adjacent thereto.

9. A support for a column of checker-brick comprising a supported grid plate, a metal shoe supported thereby and adapted to have lateral movement thereon, said shoe supporting a plurality of checkers forming a column, and means on said shoe having interfitting engagement with the base of said column.

10. An article of manufacture for association with checker brick comprising a metallic shoe having a plurality of vertical passages extending therethrough, and a projection provided on one surface thereof for interfitting engagement with said checker brick.

11. An article of manufacture for association with checker brick comprising a cast iron shoe, a plurality of vertical passages extending through said shoe, and an annular projection provided on one surface thereof for interfitting engagement with a recess formed in said checker brick.

Signed at Chicago, Illinois, this 3rd day of March, 1931.

JOHN C. HAYES, JR.
CHARLES G. BIGELOW.