April 13, 1954 L. H. HOSBEIN 2,674,871

SECTIONALLY SUPPORTED THIN REFRACTORY WALL, BRACKET, AND WALL TILE THEREFOR

Filed March 1, 1950

3 Sheets-Sheet 1

Fig. 2

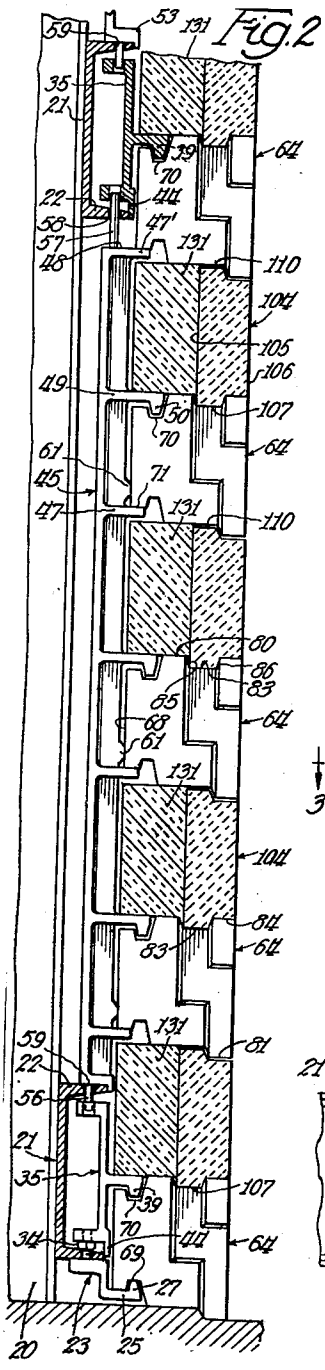
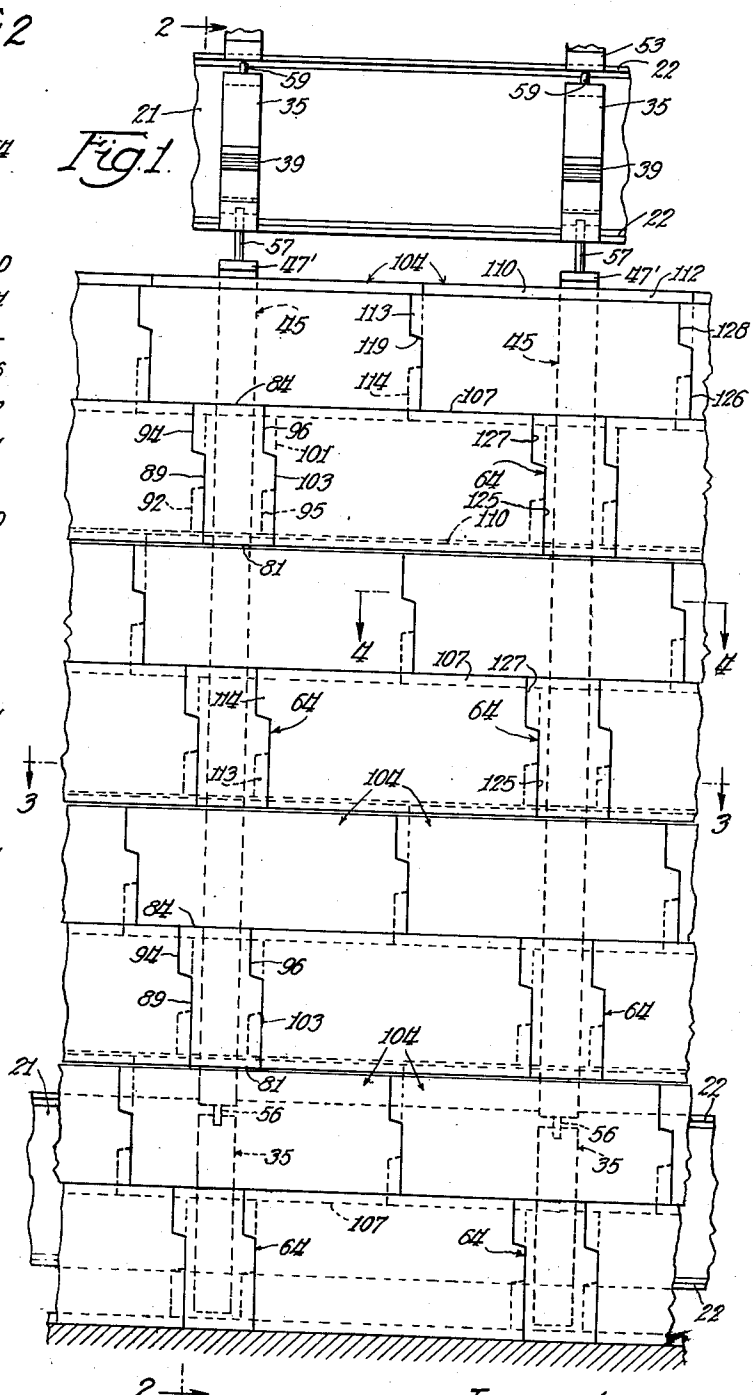


Fig. 1.



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3 Sheets-Sheet 2

Fig. 3

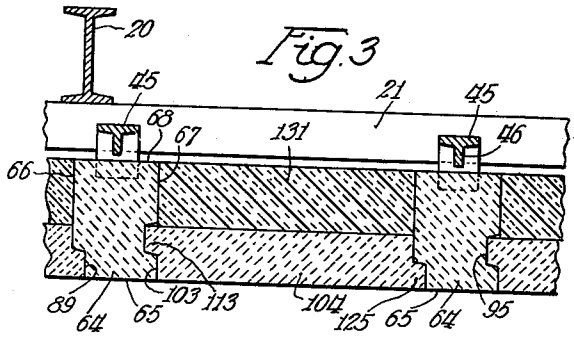

Fig. 4

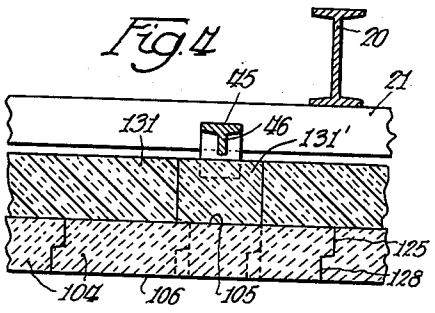

Fig. 12.

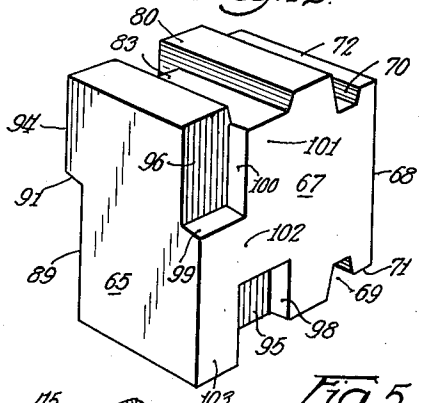

Fig. 13

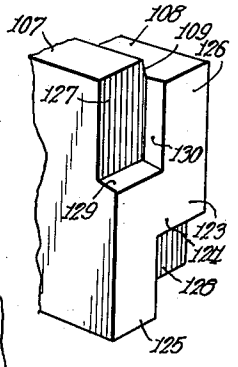

Fig. 5

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Filed March 1, 1950 3 Sheets-Sheet 3

Fig. 6

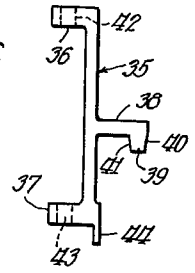


Fig. 7

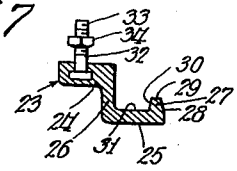


Fig. 8

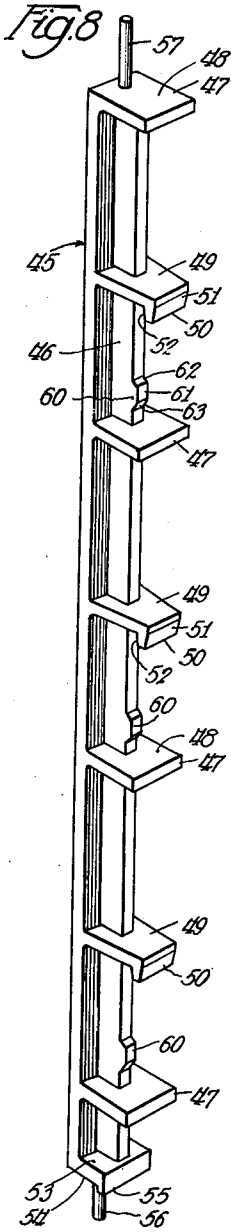


Fig. 9

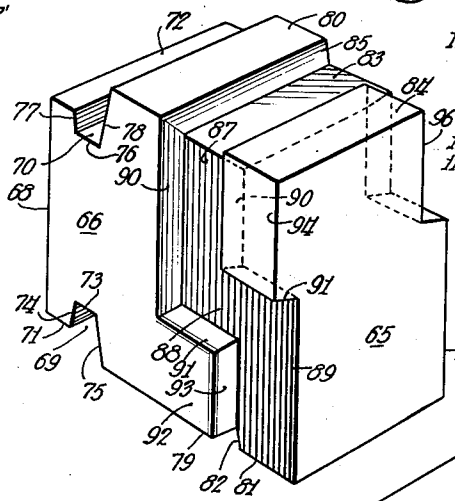


Fig. 10

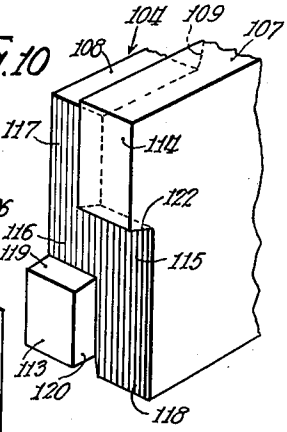
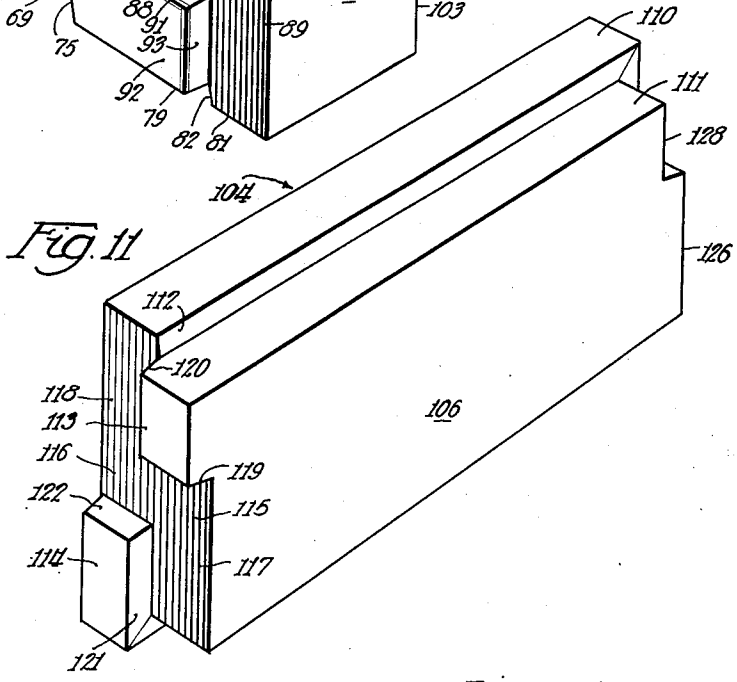


Fig. 11



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Patented Apr. 13, 1954

2,674,871

UNITED STATES PATENT OFFICE

2,674,871

SECTIONALLY SUPPORTED THIN REFRACTORY WALL, BRACKET, AND WALL TILE THEREFOR

Louis H. Hosbein, Glencoe, Ill., assignor to M. H. Detrick Company, Chicago, Ill., a corporation of Delaware

Application March 1, 1950, Serial No. 147,083

13 Claims. (Cl. 72—101)

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My invention relates to refractory walls, and more particularly to a thin refractory wall that is sectionally supported.

It is the general purpose of my invention to provide a construction for a refractory wall whereby a thin wall can be built that is suitable for use where temperatures up to 2200° F. are encountered, that is sectionally supported, and in which the metallic structure forming part of the supporting means is so located in the wall that this metallic structure will not be subjected to the high temperature existing at the exposed face of the wall and in which the metallic parts will be at a much lower temperature than in any previously known construction of thin refractory walls.

It is a further purpose of my invention to provide a wall that is of such a character that the same can be insulated to any desired thickness without departing from the general principle of my invention. My wall structure embodies refractory bracket members that can be varied in length from the inner exposed end thereof to the outer end thereof to provide the desired thickness of heat insulation without departing from the general principle of construction thereof and without impairing the strength and the usefulness thereof in any manner.

More specifically it is a purpose of my invention to provide a refractory wall that comprises wall forming refractory tiles or blocks and supporting refractory blocks or brackets that extend to the inner or exposed face of the wall and form a part thereof, said refractory bracket or supporting members being arranged in spaced relationship both vertically and horizontally in said wall, thus greatly cutting down the heat loss that ordinarily occurs in previously known thin refractory walls, approximately 87½% of the area of the wall being provided with an insulating covering of full thickness and all of the metallic parts of the supporting structure lying outwardly of the outer face of the wall forming tiles or refractory blocks a substantial distance so as to be largely shielded from the heat to which the inner face of the wall is exposed by the heat insulating material, and the only appreciable heat that reaches any of the metallic structure being through the refractory bracket members, with which metallic bracket members are engaged to hold and support said refractory bracket members in wall supporting position.

It is a further specific purpose of my invention to provide a refractory wall construction in which only two shapes of refractory members are utilized, said shapes comprising thin wall forming blocks or tiles and thicker refractory bracket members or wall tile supporting members. My invention further has for its purpose such an arrangement and disposition of the wall forming tiles or blocks and the bracket tiles or blocks that the bracket tiles or blocks are provided only in alternating horizontal rows or courses of said wall forming tiles or blocks, the refractory bracket members or blocks thus supporting not only the wall forming blocks or tiles in the same horizontal row, but those in the horizontal row above the same.

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It is a further purpose of my invention to provide a metallic mounting means for the refractory members that is simple in construction and easily erected and in which no bolts and nuts are required for securing the various parts in position, except for securing the horizontal metallic frame members to the vertical metallic column.

Other objects and advantages of my invention will appear as the description of the drawings proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a fragmentary face view of a refractory wall made in accordance with my invention, as viewed from the inner or exposed face thereof.

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary section taken on the line 3—3 of Fig. 1.

Fig. 4 is a similar section taken on the line 4—4 of Fig. 1.

Fig. 5 is a fragmentary perspective view, showing a portion of my improved thin refractory wall.

Fig. 6 is a view in side elevation of one of the metallic bracket members used in my refractory wall construction.

Fig. 7 is a vertical sectional view of another of said bracket members.

Fig. 8 is a perspective view of another of the metallic bracket members used in my wall construction.

Fig. 9 is a perspective view of one of the bracket tile members, as viewed from one side thereof.

Fig. 10 is a fragmentary perspective view of one of the wall forming tiles, as viewed from one end thereof.

Fig. 11 is a perspective view of one of the wall forming tiles as it would appear in the next row below that in which the tile shown in Fig. 10 would be located.

Fig. 12 is a perspective view of the bracket tile, as viewed from the other side thereof, and

Fig. 13 is a fragmentary perspective view of a wall tile, shown in Fig. 10, as viewed from the other end thereof.

Referring in detail to the drawings, my improved wall structure is mounted on a suitable structural framework comprising vertical frame members or columns 20 and horizontal frame members 21, which are shown as being channel members. The channel members 21 are secured to the columns 20 by means of bolting in the usual manner, the bolts not being shown in the drawings. The flanges 22 of the channel members 21 are provided with vertically aligning openings therein, through which pins provided on the various bracket members extend, as will be described below.

Said bracket members comprise a bottom bracket 23, shown in Fig. 7, which has an upper horizontally extending portion 24 and a lower horizontally extending portion 25 connected by means of a vertical portion 26, the portion 25 terminating in an upstanding hook-like flange 27, which has an inclined outer face 28, a substantially flat top face 29 and a vertical wall 30 extending from the flat top wall 31 of the lower portion 25 of the bracket. The bracket 23 has a headed fastening element 32 cast in the portion 24 thereof, which has a screw-threaded portion 33 with which a nut 34 engages, the nut 34 serving to hold the bracket member 23 in the position shown in Fig. 2, the threaded shank portion 33 extending through an opening in the lower flange 22 of the lowermost horizontal frame member 21 and the nut 34 being applied to clamp the bracket on said flange 22.

The metallic brackets 35 are mounted between the flanges 22 of a channel member and are shown more in detail in Fig. 6. Said brackets comprise a vertically extending body portion, which has an ear 36 at the upper end thereof and an ear 37 at the lower end thereof and which is provided with a laterally extending flange 38 thereon that extends in the opposite direction to the ears 36 and 37 and which is provided with a depending hook formation 39 thereon that is similar to the hook formation 27, previously described, having an inclined outer wall 40 and an inclined inner wall 41 extending to the flat bottom face of the flange 38. The top face of the flange 38 is flat, as will be obvious from Figs. 5 and 6. The ears 36 and 37 have aligning openings 42 and 43 therein and the brackets 35 each have a depending lip 44 thereon that extends downwardly from the inner edge of the bracket 35 below the lower ear 37. This lip 44, it will be noted upon reference to Fig. 2, extends downwardly over the inner edge of the flange 22 to prevent rotation of the bracket 35 about the axis of the openings 42 and 43. The bracket 35 is placed in position as shown in Fig. 2 with the upper end portion of the threaded shank 33 of the headed member 32 extending through the opening 43 in the low ear 37. The brackets 23 are provided only at the lower end portion of the structure below the lowermost horizontal frame member 21, but the brackets 35 are provided between the flanges of all of the horizontal frame members 21, as will be obvious from Figs. 1 and 2.

The metallic bracket bars 45 constitute the principal metallic supporting means for mounting the wall structure on the framework. Said bar-like members 45 are substantially T-shaped in cross section, having a medial flange 46 extending longitudinally thereof between the various horizontal flanges provided thereon, that will be described below. Said horizontal flanges comprise a plurality of substantially rectangular flanges 47, which have flat top faces 48 and which have side edges that are parallel to each other and perpendicular to the forward end edges thereof. The flanges or ears 47 alternate with flanges or ears 49 that are of a hook-like character, the flanges or ears 49 tapering toward their hook ends 50, the hook ends of said ears or flanges 49 being directed downwardly and having inclined outer faces 51 and inclined inner faces 52, thus being shaped very similarly to the hook flange formations 39 on the brackets 35. The opposite ends of the bracket bars 45 are also provided with flanges or ears comprising a lower ear or flange 53 and an upper flange or ear 47', which is shaped very similarly to the flanges or ears 47, having a flat top face 48.

The bottommost ear or flange 53 has a flat bottom face 54 and is provided with a depending marginal lip 55. The lip 55 is adapted to fit around the inner edge of the top flange 22 of a horizontal frame member 21 with the flat bottom face 54 in engagement with the top face of said flange 22. A pin 56 projects downwardly from the bracket bar 45 from the bottom flat face 54 of the ear 53, and a pin 57, somewhat longer than the pin 56, projects upwardly from the flat top face 48 of the upper ear or flange 47'. In assembling the bracket bar 45 with the frame members 21 the long pin 57, integral therewith, is projected through an opening 58 in a lower flange 22 of a frame member 21 and the bracket bar is pushed upwardly until the flat face 48 of the ear 47' reaches the lower face of the flange 22. The pin 56 can then be passed through the aligning opening 59 in the upper flange of the next lower horizontal frame member 21 and the bracket bar 45 permitted to move to the position shown in Fig. 2. When this happens the pin 56 enters the opening 42 in the upper ear 36 of the bracket 35, the brackets 35 and 45 being thus held in fixed position on the framework and against rotation about the axis of the pins 56 and 57 because of the lips 55 and 44.

It will be noted that the forwardly extending rib or flange 46 extends between all of the flanges or ears provided on the bracket bar 45, and that there is a forward projection 60 above each of the flanges 47, in spaced relation thereto, on the rib or flange 46, that has a flat vertical face 61 and inclined top and bottom walls 62 and 63. The purpose of the projections 60 will become obvious as the description proceeds. It is to be understood that the bracket members 35 and 45 alternate, with the bracket members 35 always between the flanges of a channel member 21 and the bracket members 45 always between the flanges of adjacent channel members 21.

The refractory bracket members or blocks 64 are mounted on the metallic brackets. All said refractory bracket members are alike, each thereof having flat inner or exposed end faces 65 and flat side faces 66 and 67. The rear or outer face 68 of said bracekt member is also flat and of less vertical extent than the inner or exposed face 65. A downwardly opening groove 69 extending in the direction of the length of the wall or crosswise of the bracket member 64 is

provided on the lower side of the refractory bracket member and a similar upwardly opening groove 70 is provided on the upper side thereof, said grooves defining longitudinal ribs 71 and 72 on said bracket member, the rib 71 projecting downwardly and the rib 72 upwardly. The groove 69 is provided with a flat bottom wall 73, and inclined side walls 74 and 75, while the groove 70 is provided with a flat bottom wall 76 and inclined side walls 77 and 78. The groove 69 thus flares downwardly and the groove 70 upwardly. A flat bottom face 79 is provided on the bracket member between its inner and outer ends, and a narrower flat top face 80 is provided on said block between its inner and outer faces. The ribs 71 and 72 have flat bottom and top faces, respectively, which are offset upwardly and downwardly respectively, relative to the flat faces 79 and 80.

The blocks 64 are mounted on the metallic bracket bars 45 so that each of said refractory bracket blocks, except the lowermost ones, has the flat bottom face of a rib 71 mounted on the flat top wall 48 of a flange or ear 47 or 47', said flanges or ears thus serving as shelf-like portions on the brackets 45 for supporting the refractory blocks 64. The depending hook ends 50 on the hook flanges 49 of the bracket members 45 are seated in the grooves 70 of the blocks 64, that rest on the shelf-like flanges 47, while the depending hook flanges 39 on the brackets 35 seat in the grooves 70 of the blocks 64 that are mounted on the shelf-like flanges 47' on the bracket members 45. The flat rear faces 68 of the refractory bracket blocks engage with the flat faces 61 of the projections 60 on said brackets 45, thus holding the refractory bracket members 64 from tilting on the shelf-like members 47. The lowermost refractory bracket members 64 have the upwardly extending hook formations 27 on the brackets 23 mounted in the grooves 69 thereof and have the depending hook flanges 39 on the brackets 35 mounted in the grooves 70 thereof. Vertical rows of vertically spaced bracket members 64 are thus provided on the metallic framework.

On their lower sides said refractory bracket members 64 have ribs 81 that project downwardly below the flat bottom face 79 extending longitudinally of the wall or transversely of said refractory bracket members, an inclined wall 82 connecting the rib 81 with the flat face 79. A groove 83 extending longitudinally of the wall and thus transversely of the bracket member 64 lies between the flat face 80 and a rib 84 on the upper side of said bracket member, the rib 84 having a flat top face in the same plane as the flat face 80 and being shorter than the flat face 80. Said groove 83 is provided with inclined side walls 85 and 86, the groove 83 thus flaring upwardly.

The side face 66 is provided with a flat face inwardly offset therefrom forming the bottom of a groove or recess having a vertically extending portion 87 and a transversely extending portion 88. (See Figs. 5 and 9.) The flat bottom face of said groove aligns with the inwardly offset flat face 89 forming a part of said recess opening into the forward wall 65. The portions 87 and 88 of the groove have inclined side walls 90 and 91, the portions 87 and 88 of the groove thus flaring outwardly. A similar inclined wall 93 connects the flat face 66 with the inwardly offset flat face 89. The vertical and horizontal portions 87 and 88 of said groove define a projection 94

on the one side face of the hanger bracket that has its outer face in alignment with the flat face 66, and there is a forward projection 92 on the wall 66 aligning with the vertical portion 87 of the recess or groove in said face.

The opposite flat face 67 of the hanger bracket is recessed at 95 and 96. The recesses 95 and 96 have flat bottom faces, the flat face of the recess 95 extending to the bottom face of the refractory hanger member, and the flat face of the recess 96 extending to the forward flat face 65 of the hanger bracket and to the flat top face 84. The recesses 95 have inclined walls, such as the wall 98, that extend to the flat face 67 from the flat bottom walls of said recesses, and the recesses 96 have similar inclined walls 99 and 100. The recesses thus define a transverse portion 102 of the flat side wall 67 connecting the wall portion 103 lying on the opposite side of the recess 95 from the main portion of the flat face 67 with said main portion of the flat face 67.

Thus a refractory bracket member is provided that has a recess in one side face thereof that is made up of an upper portion 87 and a lower portion 89 out of vertical alignment and connected by means of the transverse groove 88, and an opposite face that has a pair of recesses 95 and 96 provided therein that are separated by means of a transverse wall portion 102 and which recesses are out of vertical alignment so that the one recess 95 lies spaced from the forward or inner face 65 of the bracket 64 and the other, the recess 96, opens into said inner face of the bracket 64. The recesses in the opposite faces of the bracket are complementary to each other, in that the portions 87, 88 and 89 that are recessed on the one face 66 of the bracket are in alignment with portions 101, 102 and 103 on the opposite face 67 thereof that are in the plane of the flat face 67, while the recesses 95 and 96 in the face 67 lie opposite portions 92 and 94 that are in alignment with said flat face 66.

The major portion of the thin refractory wall is made up of wall forming blocks 104, which have parallel flat side faces 105 and 106, the side face 106 being narrower or of less height than the side face 105, thus providing a pair of flat faces 107 and 108 on one of the longitudinal edges of said wall forming blocks that are offset from each other so as to provide a longitudinal inclined shoulder 109 between said faces 107 and 108, and a pair of flat faces 110 and 111 on the other longitudinal wall thereof defining an inclined shoulder 112 between the same. The one end wall of the wall forming blocks 104 is provided with a pair of projections 113 and 114 that have flat faces that lie in the same plane and which project endwise from the flat wall 115, said projections being rectangular and the projection 114 being somewhat longer or taller than the projection 113. The flat wall 115 has a transverse portion 116 separating the projections 114 and 113 and has portions 117 and 118, that are out of alignment with each other, extending from the transverse portion 116. The projections 113 and 114 have inclined walls 119, 120, 121 and 122 connecting the flat faces of said recesses with the flat wall 115. (See Figs. 10 and 11.)

The opposite end of the wall forming blocks 104 has a flat end wall 123 that has a transversely extending portion 124 connecting the portions 125 and 126, that are out of alignment with each other, and has recessed portions 127 and 128 that are provided with flat bottom walls and are connected with the flat end wall 123 by means of in-

clined wall portions, such as the inclined wall portions 129 and 130. The flat bottom wall of the recess 127 corresponds to the flat top wall of the projection 114 and the flat bottom wall of the recess 128 corresponds to the flat top wall of the projection 113, while the wall 123 corresponds in shape to the wall 115. (See Fig. 13.)

Thus if the end of the wall forming member having the projections 113 and 114 thereon is moved toward the end portion of an adjacent wall forming member 104 in the same horizontal row with the upwardly offset portions 107 of said wall forming members in alignment, the projection 114 will seat in the recess 127 and the projection 113 will seat in the recess 128, the shoulders 109 between the portions 107 and 108 forming a continuous shoulder along the entire horizontal row of said wall forming members and the shoulders 112 of said wall forming members 104 forming a similar continuous shoulder along said entire row.

Similarly, if the wall forming members 104 are reversed top for bottom from the position shown in Fig. 10 to that shown in Fig. 11, the recesses 128 and 127 will again receive the projections 113 and 114 and the shoulders 109 and 112 will again be continuous longitudinally of the horizontal row of such wall forming members 104. Furthermore, if each horizontal row or course of the wall forming members 104 are reversed top for bottom, the shoulders 109 of one horizontal row or course and the shoulders of the next higher horizontal row or course will engage with each other and the shoulders 112 of one horizontal course or row will engage with the shoulders 112 on the next lower horizontal row or course.

Furthermore the recess 96 in the refractory bracket 64 has a flat bottom face of the same size as the flat top face of the projection 114, whereas the recess 95 has a flat bottom face of the same size as the flat top face of the projection 113. Accordingly if the block 104 shown in Fig. 10 is brought into engagement with the side of the refractory bracket member 64 shown in Fig. 9 that is toward said block 104, the projection 114 will seat in the recess 96 and the projection 113 will seat in the recess 95, while the recessed or set back wall portion 115 will receive the wall portions 102, 103 and 101 in the portions 116, 118 and 117 thereof. Thus with the refractory bracket member mounted on the metallic brackets provided therefor, the refractory bracket member will support the adjacent refractory wall forming block 104 and be interlocked therewith so as to hold it in position against movement in any direction, either crosswise or vertically of the wall, and also prevent any relative tilting of the wall forming block on said refractory bracket member 64.

The other side of the refractory bracket member 64 similarly interlocks with the refractory wall forming member 104 on the other side thereof, as the projection 94 has a top face of the same size as the bottom wall of the recess 127 and will be received in said recess, while the projecting portion 92 on the wall 66 is of the same size as the recess 128 and will seat therein in a similar manner, while the recess made up of the portions 87 and 89, connected by the transverse portion 88, will receive the wall portions 126 and 125, connected by the transverse portion 124, said transverse portion 124 seating in the transverse portion 88.

In assembling the wall, the wall forming blocks 104 alternate in one horizontal row with the refractory bracket members 64, while in the next higher row there are no bracket members 64, but only wall forming blocks 104. The rows containing the refractory bracket members 64 and those having no refractory bracket members therein alternate, as will be obvious from Fig. 1, and the refractory bracket members 64 are arranged in vertical rows. In Fig. 3 a horizontal section is shown through one of the rows that has the refractory bracket members therein, while in Fig. 4 is shown one of the rows that has no refractory bracket members therein. The lowermost horizontal row is made up of bracket members 64 and wall forming members 104 that are arranged alternately and are interlocked as above described. The next higher horizontal row or course in the wall is made up entirely of the members 104 and these are arranged so as to break joints with the members 104 of the next lower horizontal row. The downwardly projecting portions 107 of the next higher row of said refractory blocks, as shown clearly in Fig. 2, seat in the grooves 83 of the refractory bracket members and are back of the shoulders 109 of the refractory blocks 104 of the next lower row, with the shoulders 109 of said next higher horizontal row of blocks in engagement with the shoulders 109 of the lower blocks 104.

Thus all of the refractory blocks 104 of a row containing no refractory brackets 64 are interlocked with the refractory bracket members 64 of the next lower row so that the refractory blocks 104 of the next higher row can not shift either inward or outward relative to the bracket member 64 below the same. Also each refractory block 104 in each row is interlocked at its ends with the part adjacent refractory block of said horizontal row, and the shoulders 109 and 112 of a block 104, in the position shown in Fig. 11, which is that of a row either above or below one containing the refractory bracket members 64, will be in engagement with the shoulders 109 and 112 of the refractory members 104 in the horizontal rows below and above the same. As a result none of the wall forming members 104 can move out of fixed position in the wall after being assembled in the manner shown and described.

A relatively thick layer of heat insulating material is provided back of the outer face of the wall between said wall forming blocks 104 and the metallic supporting structure, being shown in the drawings as made up of blocks of insulation 131 and blocks of insulation 131' shorter than the blocks 131. It will be noted that the metallic structure that is engaged with the refractory bracket members 64 comprises only the extremities of the shelf-like portions 47 and the hook-like ends of the members 49 and the end faces 61 of the projections 60, and that all of these are near the outer extremities of said refractory bracket members and have heat insulating material between the same and the relatively thin walled members 104. As a result very little of the heat is transferred to the metallic bracket members and supporting structure. The insulating layer of blocks 131 and 131', or other suitable heat insulation, can be made as thick as may be found desirable to keep the temperature of the metallic structure to the desired low temperature, as the length of the portion of the refractory bracket member 64 from the inclined shoulder 85 to the outer wall 68 thereof can be increased as much as may be found desirable to obtain the desired thickness of insulation. However, the grooves 69 and 70 will always be closely

adjacent the wall 68, as the walls 80 and 79 will only be made wider to accomplish this purpose, and not the rib portions 71 and 72.

What I claim is:

1. A wall structure of the character described comprising thin flat faced elongated refractory blocks arranged edgewise in said wall to extend lengthwise thereof with the flat faces thereof lying in the inner and outer faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall, and projecting from the outer face of said wall, each of said refractory bracket members being located between a pair of vertically spaced blocks and between a pair of horizontally spaced blocks, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, said bracket members having recesses in the side faces thereof, the recesses in each of said side faces having the upper and lower portions thereof out of vertical alignment with each other, and the end faces of said blocks having projections thereon that are out of vertical and transverse alignment with each other seating in said recesses of adjacent bracket members, said blocks having recesses in the end faces thereof the upper and lower portions of which are out of vertical alignment with each other, the blocks of alternating rows being endwise adjacent and the projections on the end faces of endwise adjacent blocks seating in said recesses.

2. A wall structure of the character described comprising thin flat faced refractory blocks arranged edgewise in said wall with the flat faces thereof lying in the opposed faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the exposed face of said wall, and projecting from the opposite face of said wall, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, said wall comprising horizontal rows containing said bracket members and said blocks and horizontal rows alternating therewith having said blocks arranged in end to end adjacency, and means on said bracket members and adjacent blocks of the same row and adjacent blocks of an adjacent row to interlock said brackets and blocks.

3. A wall structure of the character described comprising thin flat faced refractory blocks arranged edgewise in said wall with the flat faces thereof lying in the opposed faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the exposed face of said wall, and projecting from the opposite face of said wall, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, said wall comprising horizontal rows containing alternating bracket members and blocks and horizontal rows alternating therewith having said blocks arranged in end to end adjacency throughout the length of said row, and means on said bracket members and adjacent blocks of the same row and adjacent blocks of an adjacent row to interlock said brackets and blocks.

4. A wall structure of the character described comprising thin flat faced refractory blocks arranged edgewise in said wall with the flat faces thereof lying in the opposed faces of said wall and horizontally spaced vertical rows of vertically spaced refractory bracket members extending crosswise of said wall, having flat end faces lying in the exposed face of said wall, and projecting from the opposite face of said wall, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, said blocks extending in continuous horizontal rows between said vertically spaced bracket members, and being interposed between the vertical rows of said bracket members to alternate with bracket members of adjacent vertical rows, interengaging means on said bracket members and on the ends and bottom edges of said blocks adjacent said bracket members cooperating to support adjacent blocks on said bracket members and hold said blocks from transverse movement on said bracket members, and interengaging means on the ends of adjacent blocks holding the same against relative vertical and transverse movement.

5. A wall structure of the character described comprising refractory blocks and refractory bracket members extending outwardly from said wall, a metal framework having flanged horizontal members having openings in the flanges thereof, metallic brackets having hook portions thereon engaging said refractory brackets and having pins extending through said openings, metallic brackets having hook portions thereon engaging said refractory brackets and mounted between the flanges of each of said horizontal members, said last mentioned metallic brackets having openings therein receiving said pins to hold said brackets on said horizontal members, and means on said refractory bracket members and said blocks for supporting said blocks on said refractory bracket members.

6. A refractory bracket having a body portion reduced at one end thereof, the opposite end of said bracket having a flat end wall and flat faced recessed side walls, the recessed portions of said side walls comprising recesses at the upper and lower portions of each of said side walls out of vertical alignment with each other having end and side walls extending perpendicularly to each other, the end walls of said recesses being out of transverse alignment, the top and bottom faces of said bracket having marginal ribs at the end thereof having the recessed side walls, and one of said faces having grooves therein adjacent both ends thereof.

7. A refractory bracket having a body portion reduced at one end thereof, the opposite end of said bracket having a flat end wall and flat faced recessed side walls, the recessed portions of said side walls comprising recesses at the upper and lower portions of each of said side walls out of vertical alignment with each other having end and side walls extending perpendicularly to each other, the end walls of said recesses being out of transverse alignment, the top and bottom faces of said bracket having marginal ribs at the end thereof having the recessed side walls, one of said faces having grooves therein adjacent both ends thereof, and the other of said faces having a groove in only the reduced end of said bracket.

8. A wall structure of the character described comprising thin, flat faced, elongated refractory

blocks arranged edgewise in said wall to extend lengthwise thereof with the flat faces thereof lying in the inner and outer faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall and projecting from the outer face of said wall, each of said refractory bracket members being located between a pair of vertically spaced blocks and between a pair of horizontally spaced blocks, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, interengaging means on the sides of said bracket members and the ends of said blocks horizontally adjacent said bracket members cooperating to support horizontally adjacent blocks on said bracket members and hold said blocks from transverse movement on said bracket members, and interengaging means on the ends of adjacent blocks holding the same against relative vertical and transverse movement.

9. A wall structure of the character described comprising thin, flat faced, elongated refractory blocks arranged edgwise in said wall to extend lengthwise thereof with the flat faces thereof lying in the inner and outer faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall and projecting from the outer face of said wall, each of said refractory bracket members being located between a pair of vertically spaced blocks and between a pair of horizontally spaced blocks, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, said bracket members having recesses in the side faces thereof, the recesses in each of said side faces having the upper and lower portions thereof out of vertical alignment with each other, and the end faces of said blocks having projections thereon that are out of vertical and transverse alignment with each other seating in said recesses of horizontally adjacent bracket members.

10. A wall structure of the character described comprising thin, flat faced, elongated refractory blocks arranged edgewise in said wall to extend lengthwise thereof with the flat faces thereof lying in the inner and outer faces of said wall and vertically and horizontally spaced refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall and projecting from the outer face of said wall, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, each of said refractory bracket members having a block located on each side thereof and between said refractory bracket member and the refractory bracket member vertically upwardly spaced therefrom, interengaging means on said bracket member and on the adjacent ends of said blocks on each side thereof and interengaging means on the top of said bracket member and the bottom edge of the block between the same and said vertically upwardly spaced refractory bracket member, cooperating to support adjacent blocks on said bracket member and hold said blocks from transverse movement on said bracket member, and interengaging means on the ends of adjacent blocks holding the same against relative vertical and transverse movement.

11. A wall structure of the character described comprising thin, flat faced refractory blocks arranged edgewise in said wall with the flat faces thereof lying in the inner and outer faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall and projecting from the outer face of said wall, a metal framework, means on said framework engaging said bracket members in spaced relation to said last mentioned face of said wall to hold said bracket members in wall supporting position on said framework, each of said refractory bracket members having a block located on each side thereof and between said refractory bracket member and a refractory bracket member vertically spaced therefrom, interengaging means on the sides of said bracket members and ends of said blocks located at the sides of said bracket members cooperating to support said blocks on said bracket members and hold said blocks from transverse movement on said bracket members, the blocks of alternating rows being endwise adjacent, interengaging means on the ends of adjacent blocks holding the same against relative vertical and transverse movement, and heat insulation between the outer face of said wall and bracket holding means on said framework.

12. A wall structure of the character described, comprising thin, flat faced refractory blocks arranged edgewise in said wall with the flat faces thereof lying on the inner and outer faces of said wall and refractory bracket members extending crosswise of said wall, having flat end faces lying in the inner face of said wall and projecting from the outer face of said wall, a metal framework having vertically spaced flanged horizontal members having openings in the flanges thereof, metal bars extending vertically between said horizontal members and having pins at opposite ends thereof projecting endwise of said bars, the pin at the upper end of each of said bars being longer than that at the lower end thereof, said pins extending through said openings to mount each of said bars independently and detachably on said horizontal members, supporting means on said bars for said refractory bracket members, means on said bars for holding said refractory bracket members on said supporting means, and means on said refractory bracket members and said blocks for supporting said blocks on said bracket members.

13. A refractory wall tile having a pair of flat opposite side faces and having narrow end, top and bottom walls, said top and bottom walls being offset midway between the longitudinal edges thereof to provide a longitudinal shoulder on each of said top and bottom walls lying between a pair of long narrow faces of equal width offset from each other, one of said end walls having a flat face having a pair of vertically elongated flat faced rectangular projections thereon out of vertical alignment with each other and vertically spaced, said flat face having portions out of vertical alignment with each other longitudinally aligned with said projections and a transverse portion connecting said last mentioned portions lying between and separating said projections, said projections providing a pair of oppositely directed transverse shoulders at said transverse portion, and the other of said end walls having a flat face having a pair of flat bottomed rectangular recesses out of vertical alignment with each other and vertically spaced, said last mentioned

end wall having a flat face having portions vertically aligning with and endwise adjacent said recesses and out of vertical alignment with each other, said portions vertically overlapping and being transversely connected by a portion of said flat face lying between said recesses, said last mentioned end wall having a pair of oppositely directed transverse shoulders between said flat faced portion and the flat bottoms of said recesses.

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