

May 11, 1943.

J. KARMANOCKY

2,319,065

FURNACE

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2 Sheets-Sheet 1

Fig. 1.

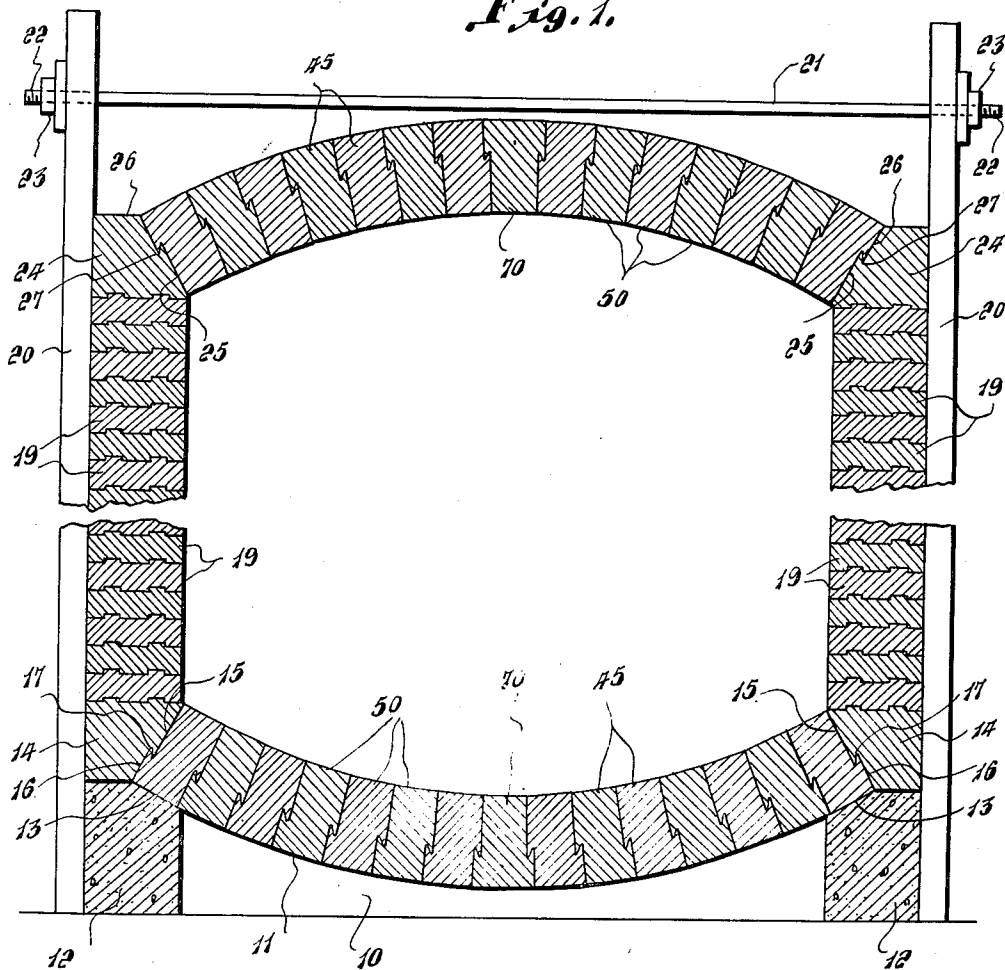


Fig. 9.

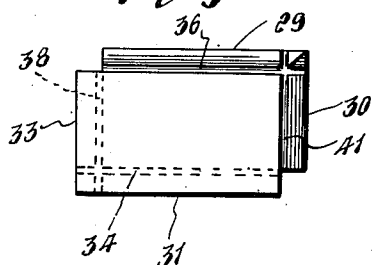
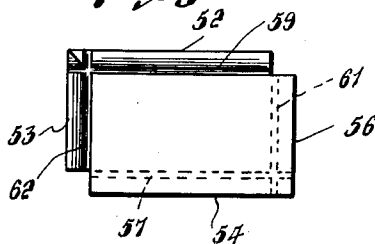


Fig. 10.



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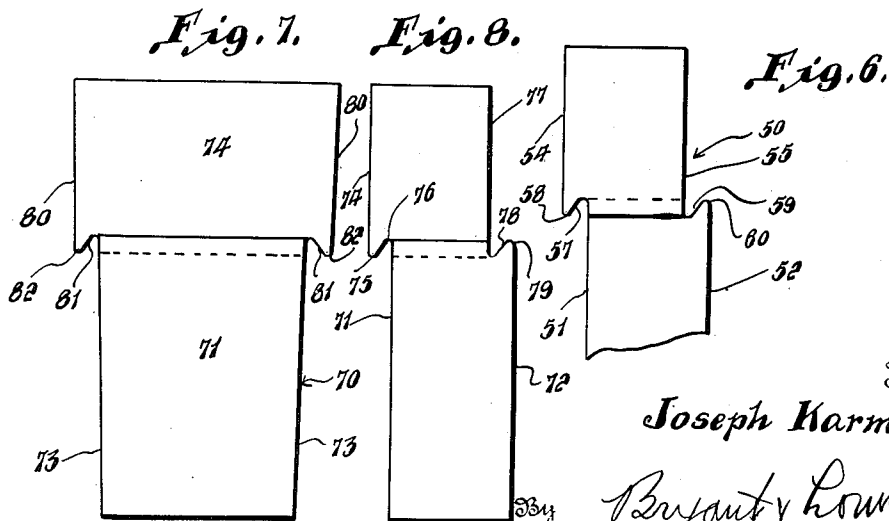
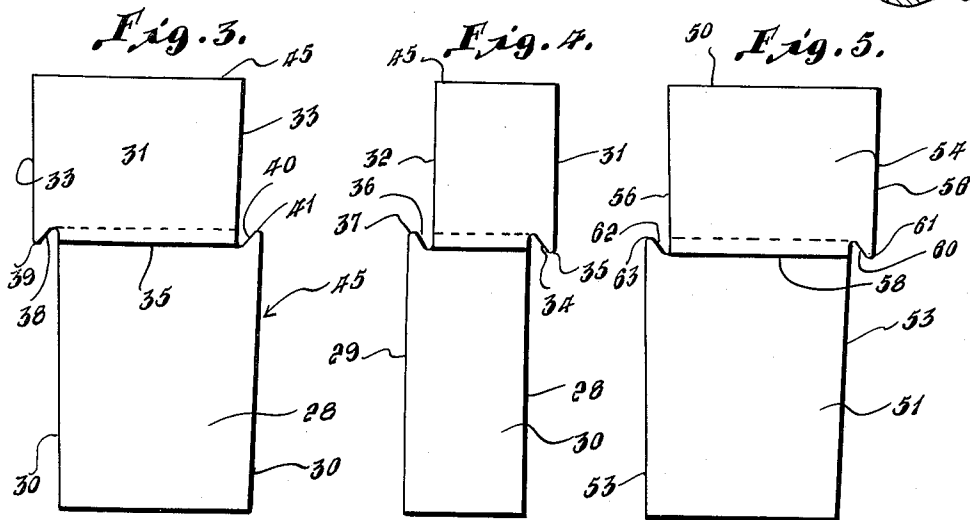
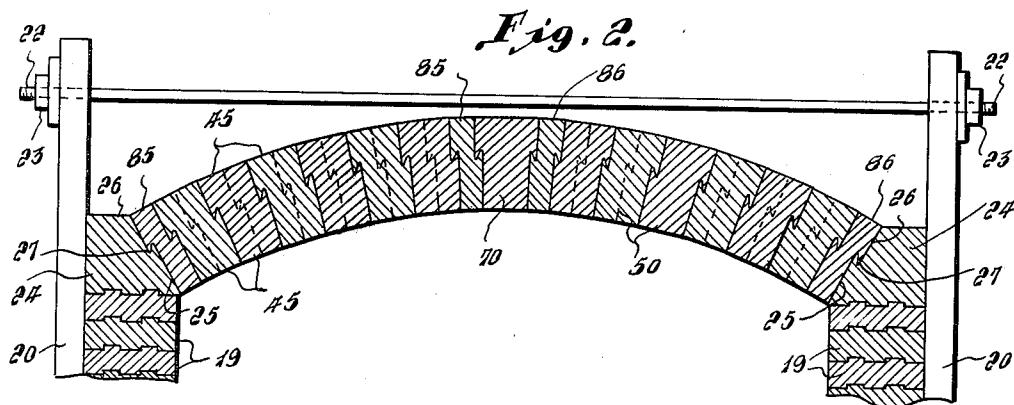
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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FURNACE

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Application August 4, 1941, Serial No. 405,387

1 Claim. (Cl. 110-99)

This invention relates to certain new and useful improvements in furnaces, and more particularly to furnace structures employed in heat treating metal and the like.

The primary object of the invention is to provide a furnace which is capable of withstanding high temperatures and to provide a refractory brick wall structure which may be easily repaired without requiring the dis-mantling of the entire furnace structure including the arch and bottom wall.

A further object of the invention is to provide a furnace structure composed of a number of refractory fire bricks having interlocking portions locking in a direction downward from the left and right of the median line of the furnace so that centralmost bricks may be removed from the furnace arch in burned out areas therein in a considerable short period of time, whereby the furnace operation will not be delayed and the furnace will not remain idle for long periods of time during repair.

A still further object of the invention is to provide an interlocking refractory fire brick having its side walls inclined so that the arch sweep will be proportionate to the radius emanating from a point from the central portion of the furnace in the floor thereof.

A still further object of the invention is to provide a refractory fire brick having interlocking portions arranged so that the bricks may be staggered so as to provide a checkered wall.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings, wherein,

Figure 1 is a front elevational view of a furnace structure embodying the invention, illustrating the furnace arch and hearth constructed in accordance with the present invention;

Figure 2 is a vertical fragmentary sectional view illustrating the staggered course of refractory brick in dotted line;

Figure 3 is a front elevational view of an interlocking refractory brick formed for constructing arch and hearth sections to the left of the median line of the furnace;

Figure 4 is an end elevational view of the same;

Figure 5 is a front elevational view of a refractory interlocking fire brick designed for constructing the area to the right of the median line of the furnace;

Figure 6 is a fragmentary end elevational view

of the refractory brick employed in forming the right half of the furnace arch or hearth;

Figure 7 is a front elevational view of a central refractory interlocking fire brick, showing the interlocking projections on opposite sides thereof;

Figure 8 is a side elevational view of the central interlocking refractory fire brick, showing the interlocking projections in the front and back thereof;

Figure 9 is a top plan view of the refractory brick shown in Figures 3 and 4; and

Figure 10 is a top plan view of the refractory brick shown in Figures 5 and 6.

In the drawings, wherein for the purpose of illustrating the invention and wherein like reference characters will be employed to designate like parts throughout the same, the reference character 10 will generally be employed to designate the concrete base of a furnace structure having an arcuately curved portion 11 which is the sub-tended arc of a radius emanating from the roof of the furnace.

Concrete end blocks 12 are provided with cut-away portions 13 and above the end blocks 12 there is provided skew backs 14 having angular inner faces 15 terminating at the lower end in a reduced portion 16, thus forming an interlocking ledge 17 by reason of a cut-in connecting portion between the inclined surfaces 15 and 16.

The furnace also comprises side walls built up by a series of brick structures 19 to provide oppositely disposed side furnace walls.

Throughout the length of the furnace walls 19 there is provided a series of vertical uprights 20 connected at the top by a horizontal bar 21 threaded at each end as at 22 for receiving locking nuts 23.

Mounted along the top of the brick side walls 19 is a course of skew backs 24 having inclined inner surfaces 25 connecting a similarly inclined surface 26 by means of a notched portion 27. The skew backs 24 are identical to the skew backs 14, but are mounted on top of the brick walls 19 in reverse relation.

The arch and hearth are formed from refractory bricks, indicated in Figures 3 to 10 inclusive and the left side of the arch and the right side of the hearth are constructed from bricks shown specifically in Figures 3 and 4. These bricks comprise front walls 28 and rear walls 29 connected by side walls 30 inclined at an angle approximately 2° thirty minutes.

Formed above the base portion of the bricks is an offset portion including front and back walls

31 and 32 connected by tapered side walls 33 which are in a plane parallel to the side walls 30, although offset therefrom. The front wall 31 is set forwardly of the plane of the front wall 28 and is connected by an inclined ridge 34 providing a rounded corner portion 35.

Similarly, the wall 32 is offset inwardly of the wall 29 and provides a reversely positioned inclined connecting surface 36 terminating in a rounded portion 37 at the point of connection with the front wall 29.

One of the side walls 33 is offset beyond the plane of the side wall 30 and is connected thereto by an inclined portion 38 forming a rounded rib 39 and the opposite wall 33 of the offset portion extends in the same plane as the lower wall 30 and parallel thereto and is offset inwardly thereof by means of an inclined connecting portion 40 forming a rounded upwardly extended ridge 41.

It will be noted by an examination of Figure 9, that the point of intersection of the inclined portions of the ribs 36, 41 and 34 and 38 are continuous to opposite sides of the brick.

The brick thus described, will generally be designated by the reference character 45 to establish the correct positioning of the bricks in the arch and hearth. The brick for forming the right side of the arch and left side of the hearth will be designated by the reference character 50.

The refractory brick for forming the right half of the arch and left half of the hearth is reversely formed from that shown in Figures 3, 4 and 9 and is specifically shown in Figures 5, 6 and 10 and comprises a base portion including front and back walls 51 and 52 connected by inclined side walls 53 inclined to an angle approximately 2° thirty minutes. An offset portion is formed above the refractory brick 51 and includes a front wall 54 offset forwardly from the front wall 51 and a rear wall 55 offset inwardly from the rear wall 52. The walls 51, 54, and 52 and 55 extend in the same parallel plane. End walls 56 connect the front and back walls 54 and 55 and one of the end walls 56 extends beyond the side wall 53 of the refractory brick, while the other wall 56 is offset inwardly from the lower inclined side wall 53. The side walls 56 are in the same angular plane as the walls 53.

The front walls 53 and 54 are connected by an inclined portion 57 forming a depending rib 58, while the rear walls 52 and 55 are connected by an inwardly extending inclined wall 59 forming a rounded upwardly directed rib 60. Similarly, one of the side walls 53 is offset from the top wall 56 by means of an inclined connecting portion 60 forming a downwardly depending curved rib 61 overhanging the side wall 53. The other side walls 53 and 56 are connected by a downwardly inclined portion 62 forming an upwardly projecting rib 63 having its edge curved similar to the edges 58 and 61. The intersections of the reversely formed inclined connecting portions 57—61 and 52—62 as shown in Figure 10 allow the staggering of the bricks when the same are laid in staggered courses to form the arch and hearth.

In forming the hearth, a series of refractory interlocking bricks 45 are laid from one of the skew backs 14 so that the inclined wall 40 will engage within the notch 17 and the bricks are then laid on the arcuately curved surface 11 in interlocking fashion, as shown in Figure 1, to the center of the furnace. The other side of the hearth is similarly laid with bricks 50, as shown

in Figures 5 and 6, so that in laying the first course from the left skew back 14, the inclined connecting portion 62 will engage under the depending ridge 17 of the skew back and the bricks may then be laid in inverted fashion as the bricks 45 until the center of the hearth is reached so that a central brick 70, as shown in Figures 7 and 8, may be inserted and said refractory brick 70 comprises front and rear walls 71 and 72 connected by inclined side walls 73 inclined to an angle approximately 2° thirty minutes. An offset portion is formed on top of the block 70 and includes a projected wall 74 extending over the front wall 71 and provides an overhanging rib 75 connected by means of an inclined portion 76. A rear inset wall 77 extends in the same plane as the rear wall 72 and is connected thereto by an inwardly extending inclined portion 78 forming an upwardly extending rib 79. The end walls 80 of the offset portion of the block extend beyond the plane of the side walls 73 and are connected thereto by upwardly inclined portions 81 forming downwardly depending ribs 82. The ribs 82 have their free edges rounded similar to the block interfitting portions of the bricks 45 and 50.

In forming the hearth, to complete the structure, after the right and left sections 45 and 50 have been placed in position, a central block 70 is slid into place after being inverted so that the ribs 82 will interlock with the rib 39 of the blocks 45 and 61 of the blocks 50.

In laying the next course of bricks, a refractory brick half the size of the bricks 45 and 50 are placed on opposite sides of the central brick 70 whereby the bricks 45 and 50 may then be laid in a staggered course with respect to the first course.

In forming the arch, the blocks 45 may be first placed on the left hand side of the furnace median line and the first course of bricks is laid by placing the inclined surface 38 in interlocking relation with the notch 27, formed in the skew back 24. The bricks are then interlocked by placing adjacent interlocking portions 38 in the previously placed or positioned inclined surface 40 of the next brick.

The first course of bricks are similarly laid from the right hand side of the furnace by placing the inclined surface 60 of one of the refractory bricks 50 in interlocking relation with the notch 27 in the skew back 24. The next brick in the course is laid with its inclined surface 60 in interlocking relation with the inclined connecting portion 62 of the previously positioned brick. After the first course of bricks have been laid by interlocking the refractory bricks 45 and 50 to a point adjacent the center of the furnace, a refractory block 70 is placed in position so that its inclined depending portion 82 will interlock with the inclined portions 40 and 62 of the respective blocks 45 and 50.

In laying the next course of blocks, a refractory brick 85, substantially identical to the refractory brick 45, is placed in position on the skew back 24 and said refractory brick 85 is one half the width of the block 45. After the block 45 has been positioned so that its interlocking portion engages the correspondingly shaped inclined notch of the block 85, the bricks 45 may be laid in a course staggered to the first course. The blocks 45 are then placed so that their front and rear walls are interlocked by the downwardly depending rib 35 and the upwardly extending rib 37. When a point adjacent the median line

of the furnace is reached, another half sized block 85 is positioned so that the central block 70 may be interlocked therewith and the central blocks may be arranged in direct alignment throughout the length of the furnace.

In constructing the next course of bricks on the right hand side of the furnace median line, a block or refractory brick 86, substantially identical to the refractory block 50, except that it is half the width of the block 50, is placed so that its downwardly depending rib corresponding to the rib 61 on the block 50 is engaged within the notch 27 in the skew back 24. After the half sized block is in position, the blocks 50 may be laid in staggered relation with respect to the first course by interlocking the downwardly extending ribs 58 and 61 in adjacent upwardly extending inclined portions 59 and 62 until the center of the furnace is reached, at which time another half size block or refractory brick 86 is placed in position so that its corresponding depending ridge 61 is interfitted and interlocked with the inclined surface 62 of the block to which it is attached. The central block 70 is then placed in position to span the gap between the semi, or half size blocks 86. The furnace arch may be built by alternately arranging the bricks in staggered relation and the sweep of the arch may be determined by the chord of a circle having a radius emanating from a point in the central portion of the hearth.

It will readily be observed that burned out portions of the furnace arch may be replaced with new bricks by simply removing the central bricks 70 and the burned out bricks on each side thereof, to the right and left, and then replacing

the burned out bricks with new ones. It will be obvious that sections of the hearth and arch may be restored without requiring the entire structure to be dis-assembled and dismantled to effect repairs and replacements.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claim.

I claim:

A furnace arch comprising a series of bricks laid with all of their faces adjacent in interlocking relation from the side of the furnace to the center thereof, each course of brick being laid in staggered relation with respect to adjacent courses, each brick including a body portion substantially rectangular in cross section and having a pair of opposite side walls inclined with the other pair of opposite walls parallel, an offset head portion of substantially the same dimensions as the base portion extending laterally from the base portion in the direction of one of said inclined side walls and one of said parallel walls, interlocking ribs formed on the overhanging edges of the offset portion and overlapping the base portion, interlocking ribs formed on the exposed edges of the base portion projecting toward and overlapping the offset portion, and a central key brick for connecting the centralmost bricks to facilitate the endwise vertical removal of burned out areas of the arch without dismantling the entire arch structure.

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