

[54] FURNACE WALL PARTICULARLY FOR OPEN-HEARTH FURNACES

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- [22] Filed: Aug. 3, 1970
- [21] Appl. No.: 60,688

[30] Foreign Application Priority Data  
 Sept. 16, 1969 Germany.....P 19 46 800.9

[52] U.S. Cl. ....52/496, 52/486, 110/1 A  
 [51] Int. Cl. ....E04b 2/56  
 [58] Field of Search.....52/484, 483, 486, 487, 494,  
 52/496; 110/1 A, 1 L

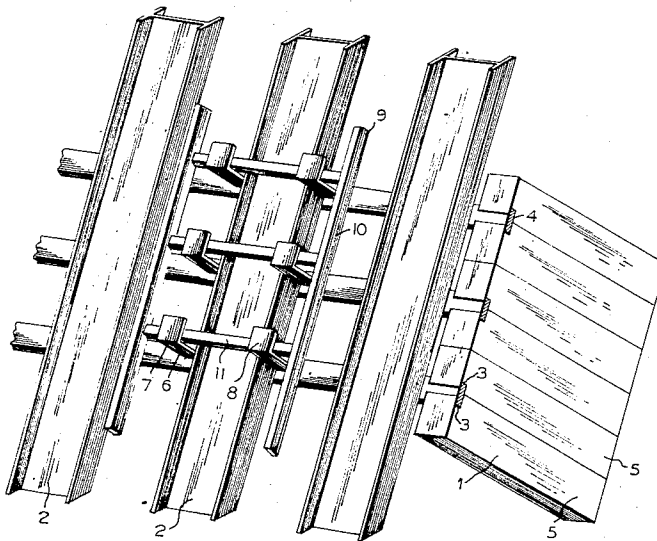
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[57] ABSTRACT

A furnace wall particularly for the rear wall and the like of an industrial furnace having a furnace framing with wall posts. Horizontal carrier rails elevationally slidably mounted on the wall posts locate the wall-forming refractory bricks of each two consecutive courses of bricks. The bricks have complementary cooperating recesses to embrace the carrier rails. Fastening members are provided for the carrier rails and locking elements bearing against the wall posts releasably engage the fastening members. The fastening members are angle brackets projecting externally beyond the thickness of the wall posts with upwardly pointing free angle ends. The locking elements may be ladder-like locking elements having at least one stringer and a plurality of transverse rungs mounted on the sides of the wall posts facing away from the furnace interior so that the rungs interpose themselves between the wall posts and the free angle ends in a vertical row.

3 Claims, 6 Drawing Figures



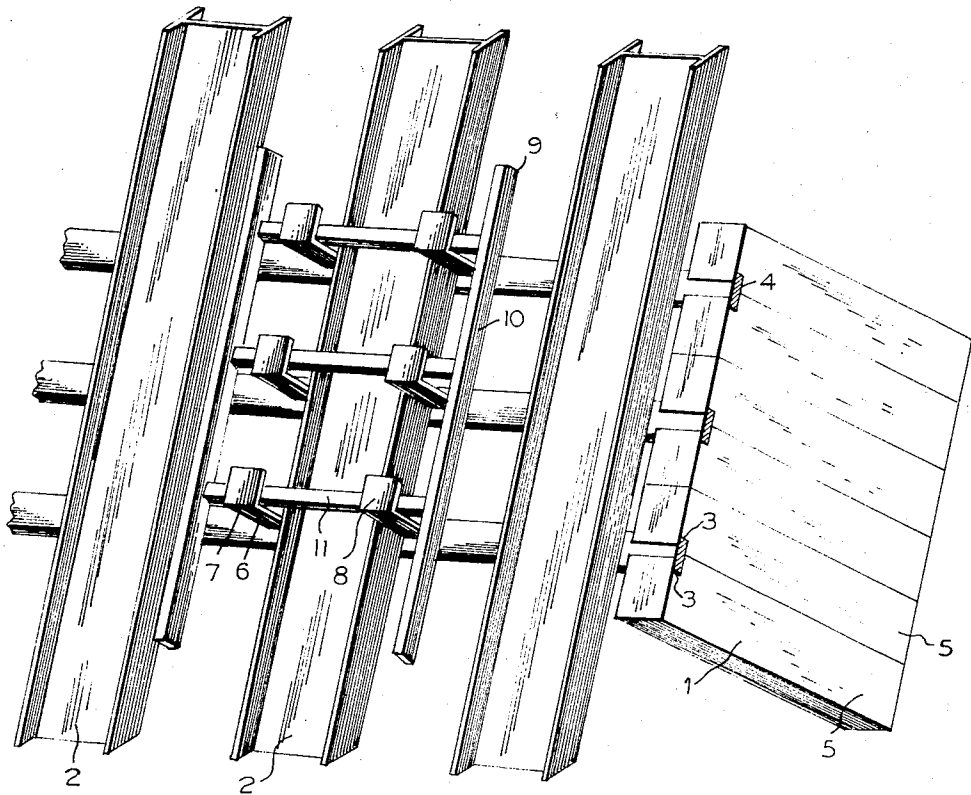


FIG. 1

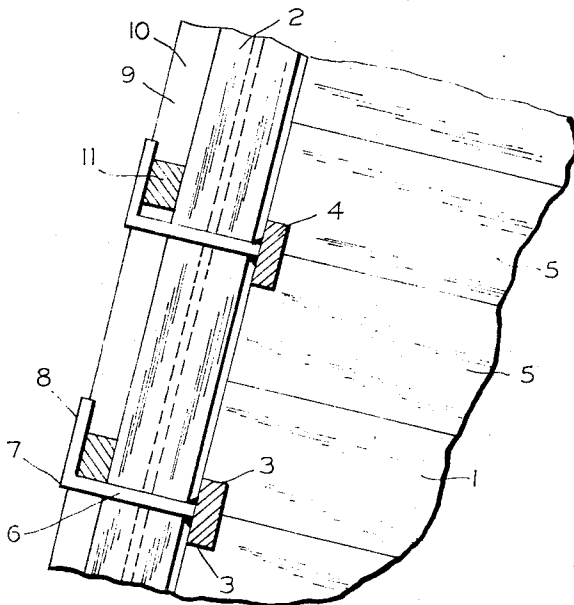


FIG. 2

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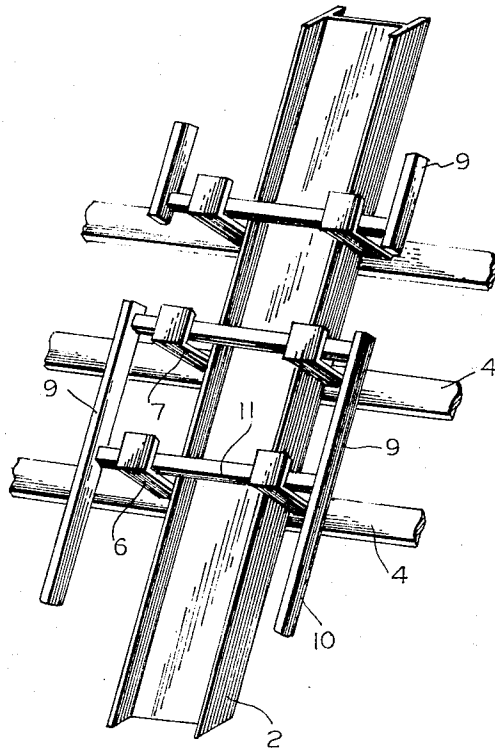


FIG. 3

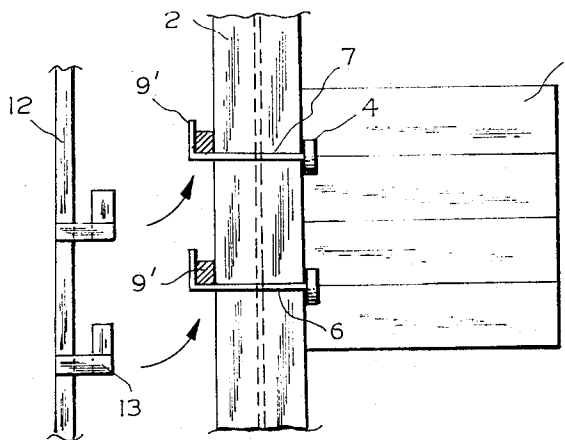


FIG. 4

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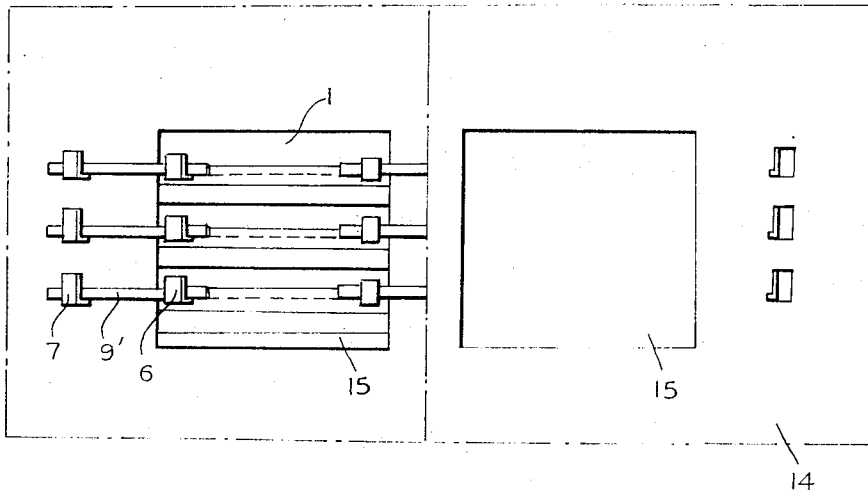


FIG. 5

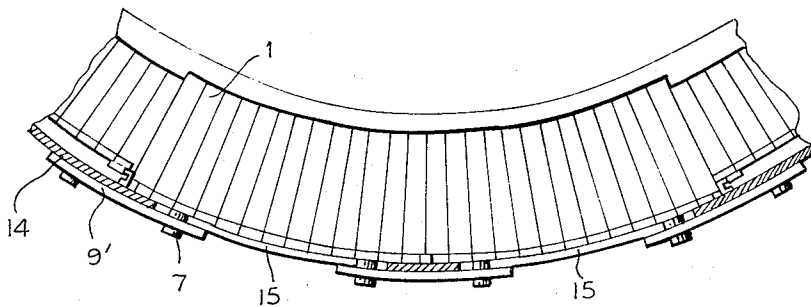


FIG. 6

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## FURNACE WALL PARTICULARLY FOR OPEN-HEARTH FURNACES

The invention relates to the construction of furnace walls, particularly the rear walls and the like of industrial furnaces, such as open-hearth furnaces, in which the wall-forming refractory bricks of each two consecutive courses of bricks are directly located by horizontal carrier bars elevationally slidably mounted on the wall posts of the furnace framing with complementary recesses in the bricks cooperating to embrace the carrier rail.

The furnace walls, particularly the rear walls of industrial furnaces, such as open-hearth furnaces, are among the most highly stressed zones. They are close to the melting flame, exposed to spurts of slag, the impact of a fresh burden, high temperature fluctuations and the presence of much oxygen, all of which naturally lead to rapid wear of the brickwork. Repairs are therefore often necessary to enable an efficient melting routine to be maintained. Such intermediate repairs are very expensive, particularly when the brickwork is so held that the replacement of parts thereof presents considerable difficulties.

Furthermore, it is essential so to suspend the bricks forming the furnace walls that they will remain in position and not cave in or even fall into the furnace interior when in the course of operation of the furnace the lower regions of the supporting wall structure give way.

In the present invention there are provided, on the vertical posts of the furnace framing, horizontal and elevationally adjustable carrier rails which bridge the interspace between two neighboring posts, each directly locating the bricks of two consecutive courses of bricks by virtue of these bricks having cooperating recesses adapted to embrace the carrier rail which at its free end is formed with hooks which with clearance engage projecting flange portions or the like on the wall posts.

A wall construction of this latter kind, which the present invention further seeks to develop, still creates difficulties when it is desired to carry out intermediate repairs and necessitates the performance of some time-consuming and hence expensive work. When it is desired to carry out such an intermediate repair on such a furnace wall while the furnace is hot, the first necessary step is to undo the carrier supporting that portion of the brickwork that requires renewal. This must be done by burning off all the hook ends that project behind the flange parts of the posts and that extend from carriers associated with the brickwork that is to be renewed. Not until this has been done can the bricks be pushed inwards into the furnace interior. Since in some instances it may be necessary to remove an entire worn wall for a main repair the complicated and time-consuming necessity of releasing the carriers is a great nuisance, and the undesirable period for which the furnace must remain idle is of considerable duration.

It is therefore an object of the present invention to permit worn unplated furnace walls or parts thereof to be removed prior to their renewal, i.e., to perform part or main repairs that are due in a simple and easy way with a view to saving work and time and to taking the furnace into operation sooner than would otherwise have been possible.

A further object is to provide a construction wherein the carrier rails are provided with fastening members that are releasably engageable by locking elements bearing against the wall posts. This permits the fastening elements to be released by removing the locking elements and hence the associated horizontal carrier rails and the bricks they carry to be detached from the wall posts of the furnace shell in a manner that is as simple as it is quick. The released worn brickwork which is to be replaced can be tipped into the furnace interior without further ado.

A further object is to provide a construction wherein one locking element may be arranged releasably to locate a plurality of fastening members on one wall post. This enables a plurality of carrier rails and the courses of bricks they carry to be simultaneously released from the wall posts. If the locking elements are suitably dimensioned the furnace wall can thus

be divided into several areas or sections so that each can be individually released from the wall posts and then tipped into the furnace interior.

A still further object is to provide a construction wherein the free ends of the carrier rails and their sides facing away from the furnace interior may be provided, by way of fastening members with angle brackets that project on the outside of the furnace beyond the thickness of the wall posts, and that have upwardly pointing angle ends and, for locating the carrier rails and the brickwork supported by them, ladder-like locking elements consisting of at least one stringer and a plurality of transverse rungs may be provided and adapted so to be mounted on the sides of the wall posts facing away from the furnace interior so that the rungs interpose themselves between the wall posts and the free angle ends of the bracket members in a vertical row and thus locate them.

In order to provide for unequal expansion of individual courses during operation of the furnace, causing the elevation level of the carrier rails to change, and in order nevertheless to maintain the location afforded by the rungs of the locking elements to the fastening members and more specifically the angle ends of the angle brackets, the length of the angle ends of the angle brackets may be arranged to exceed the thickness of the rungs of the locking element.

With the above and other objects in view which will become apparent from the detailed description below, some preferred embodiments of the invention are shown in the drawings in which:

FIG. 1 is a perspective view of the construction of a furnace wall according to the invention;

FIG. 2 is a cross sectional view of the furnace wall;

FIG. 3 is a perspective view of the furnace wall comprising divided locking elements;

FIG. 4 is a cross sectional view of a furnace wall, also indicating a releasing tool;

FIG. 5 is an external fragmentary view of the wall of an electric furnace; and,

FIG. 6 is a cross section of such a wall portion.

The furnace wall consists of a wearing wall of refractory bricks 1 forming a lining on the inside of the posts 2 of the furnace framing. The ends of the bricks 1 of the wearing wall facing away from the furnace interior are each formed with a recess 3 or the like. Location of the bricks 1 by a carrier rail 4 during the assembly of the wall is obtained by so placing the bricks that the recesses 3 of the bricks 1 in consecutive courses 5 together embrace the carriers 4. At the same time the bricks 1 are maintained in contact with the carriers 4 which thus keep them in position. One carrier 4 holds two consecutive courses 5.

For locating the carriers 4 on the wall posts 2, the free ends and the sides of the carriers facing away from the furnace interior are fitted with angle brackets 7 forming fastening members 6. The length of the angle brackets 7 is so determined that when the carriers 4 are placed flush against the inside faces of the wall posts 2, the angle brackets project a certain distance on the outside of the wall posts. The angled ends 8 of the angle brackets 7 point upwards. The carriers 4 are located on the wall posts 2 by the interposition of locking elements 9. The locking elements 9 may be simple integral locking bars 9' (FIGS. 4, 5 and 6) or they may be ladder-like elements (FIGS. 1, 2 and 3) consisting of one or two stringers 10 to which rungs 11 are attached, or which are interconnected by rungs 11. The spacing of the rungs 11 corresponds to the spacing of the carriers 4 for the bricks 1 of the wearing wall.

The carriers 4 and hence the courses of bricks 5 are located on the wall posts 2 by the locking elements 9 and 9' after the wearing wall or part thereof has been erected. During erection care is taken to see that the angle brackets 7 of consecutive carriers 4 in each two courses 5 bear against the two sides of a wall post 2. The length of the carriers 4 is cut accordingly so that a double row of upwardly pointing angle ends 8 of the angle brackets will project on the outside. By inserting the locking elements 9 from above in such a way that the rungs 11

are interposed between the angle ends 8 and the outsides of the wall posts 2 all the carriers 4 of the particular part of the structural wall are located and locked.

The carriers 4 are just as readily released by displacing the ladder-like locking element 9 upwards parallel to the wall posts 2 until the rungs 11 cease to engage behind the free angle ends 8 of the angle brackets 7 of the carriers 4. It is then easy to tip the released portion of the wall into the interior of the hearth. The locking elements 9 are released by pulling them upwards from above or by pushing them upwards from below. FIG. 4 illustrates a tool 12 fitted with ejectors 13 adapted to engage the undersides of the locking elements 9' in the form of individual bars. By pulling or pushing the tool 12 upwards all the locking elements 9' bearing against a wall member 2 can thus be lifted out at the same time.

The locking elements 9, 10, 11 may also be of composite construction, i.e., for instance according to the height of the wall two or more locking elements 9 may be associated the one above the other with one wall member 2. If the length of the carriers 4 is also suitably selected a wall can thus be easily subdivided into a plurality of separately locatable and releasable areas of brickwork.

In order to enable unequal expansion of the several brick 1 courses 5, which results in a change in the elevational position of the carriers 4, to be absorbed while the furnace is in course of use, and sufficient contact between the rungs 11 and the angle ends 8 to be retained, the length of the angle ends 8 is arranged slightly to exceed the thickness of the rungs 11.

Naturally a different form of construction of the bracket members 6, of the carriers 4 and of the locking elements could be envisaged.

The invention is applicable with particular advantage to electric furnaces. It has been the practice in the past to repair the higher rate wear in the phase region from inside the furnace. However, this always involves a number of difficulties. The proposed construction of the furnace chamber permits brickwork portions in the phase region where they have been subjected to higher rate of wear to be removed from the outside. For this purpose windows 15 are provided in the sheet

metal envelope 14 of the electric furnace in the region of the transformer phase. The bricks 1 in the region of the windows 15 are located by carriers 4, the angle ends 7 of fastenings elements 6 attached thereto and locking elements 9'. In order to ensure a firm anchorage of the carriers 4 the free ends of the locking elements 9' are welded to the outside of the sheet metal envelope 14 (FIGS. 5 and 6).

The brickwork in the region of the window 15 is released as already described by disengaging the locking elements 9' from the angle ends 7. The bricks 1 can then be pulled outwards and replaced by fresh bricks.

The angle ends 7 fitted to the sheet metal envelope 14 are of suitable size to permit variations in the level of the brick courses to be absorbed.

I claim:

1. A furnace wall, particularly for the rear wall and the like of an industrial furnace, comprising a furnace framing having wall posts, horizontal carrier rails elevationally slidably mounted on said wall posts for locating the wall-forming refractory bricks of each two consecutive courses of bricks, said bricks having complementary recesses cooperating to embrace said carrier rails, fastening members for said carrier rails, locking elements bearing against said wall posts releasably engaging said fastening members, one of said locking elements releasably locating a plurality of said fastening members on one of said wall posts.

2. A furnace wall according to claim 1 wherein said fastening members comprise angle brackets projecting externally beyond the thickness of said wall posts with upwardly pointing free angle ends, said locking elements comprising ladder-like locking-elements having at least one stringer and a plurality of transverse rungs mounted on the sides of said wall posts facing away from the furnace interior so that said rungs interpose themselves between said wall posts and said free angle ends in a vertical row.

3. A furnace wall according to claim 2 wherein the length of said free angle ends of said brackets exceeds the thickness of said rungs.

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