July 24, 1934. F. B. BIGELOW 1,967,281

FURNACE WALL

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Fig 1.

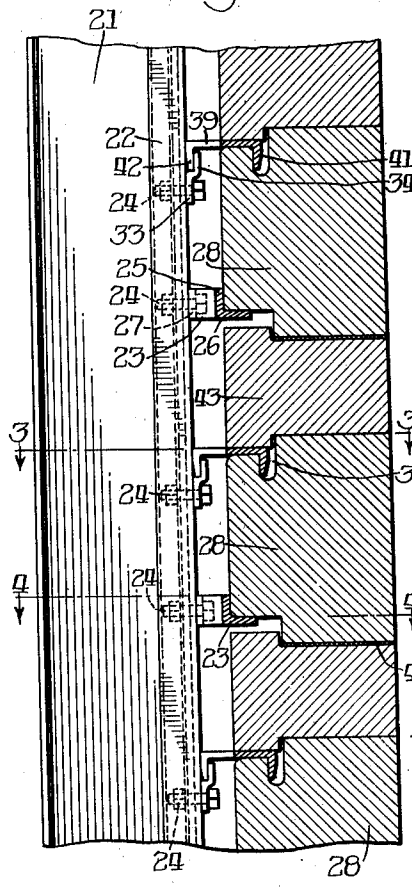

Fig 2

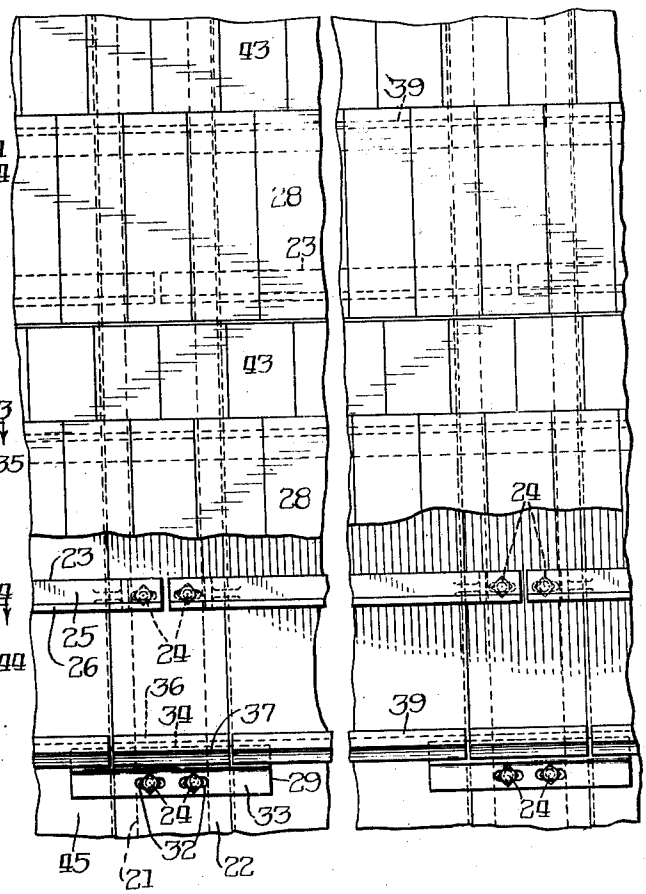

Fig 3

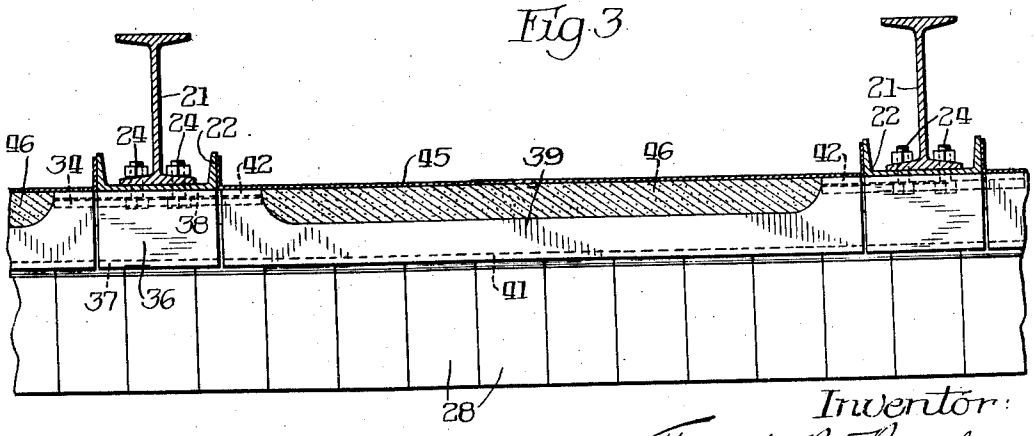

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Fig. 4.

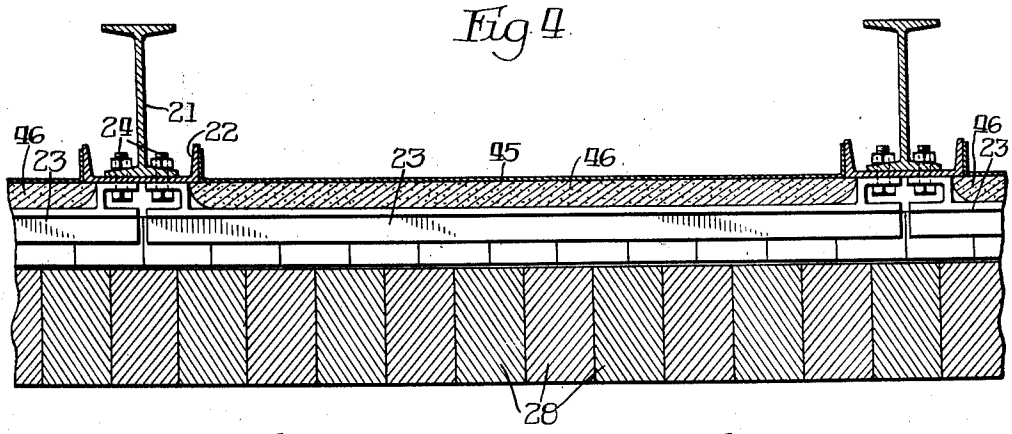

Fig. 9.

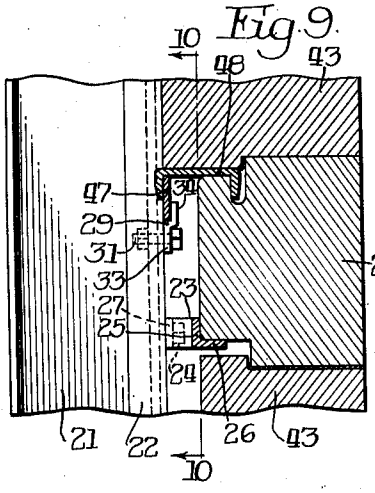

Fig. 10.

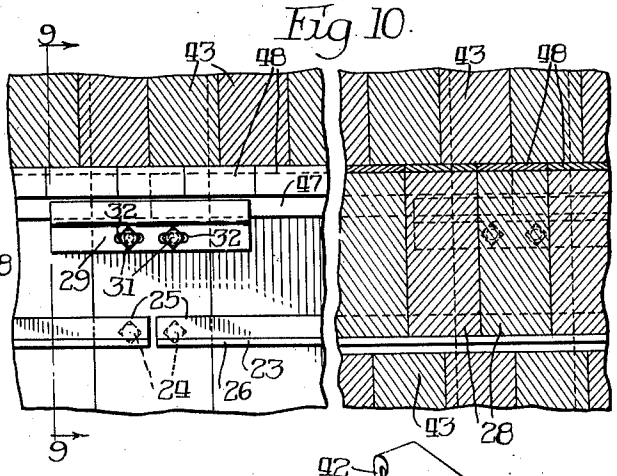

Fig. 5.

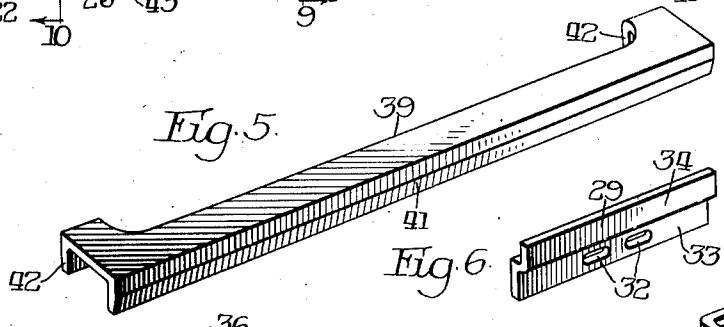

Fig. 6.

Fig. 8.

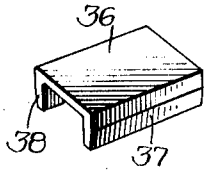

Fig. 7.

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UNITED STATES PATENT OFFICE

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FURNACE WALL

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Application March 26, 1932, Serial No. 601,319

12 Claims. (Cl. 72—101)

My invention pertains to furnace walls and analogous or similar structures incorporating a supporting framework on which the refractories or bricks are mounted and from which injured ones may be readily removed and new ones substituted therefor.

One object of the invention is to support such bricks in small groups to eliminate excessive expansion strains and to avoid the effects of cumulative loading.

Another aim of the invention in its present preferred form is to provide a wall construction of this character in which some of the main bricks are maintained in place on the metal framework by one or more detachable or demountable locking or holding members, which, in turn, are kept in locking relation with such bricks by associated filler-bricks which must first be removed to release the locking-members to free their bricks.

A further feature of a construction of such character in which the specified locks or holding clips are confined in position by the filler-bricks is the assurance that the demountable locks or hooks are in proper position and that the locked bricks are firmly held in place, as otherwise the filler-bricks cannot be properly placed.

An additional purpose of the invention is to supply a wall structure in which the bricks and supporting and holding members can be installed, renewed and replaced from the outside of the furnace, thus avoiding the necessity of entirely cooling the furnace to make the needed repairs.

Again, the new construction incorporating the novel and improved features of the invention is such that suitable insulation may be employed outside of the bricks, the supporting and holding brackets used being constructed in a manner to permit the accomplishment of this purpose.

In order to enable those skilled in this art to understand the invention fully, both from structural and functional standpoints, in the accompanying drawings, constituting a part of this specification, two present preferred embodiments of the invention have been illustrated in detail, and, for simplicity, like reference numerals have been employed throughout the several views to designate the same parts.

In these drawings:—

Figure 1 is a fragmentary, vertical cross-section through one embodiment of the improved and novel furnace wall;

Figure 2 is an elevation of the inner face of such wall with a portion of the bricks or refractories removed to more clearly illustrate the framework;

Figure 3 is a horizontal section on line 3—3 of Figure 1, the parts being viewed in the direction indicated by the arrows; an outer, insulating filling medium, which may or may not be used, as preferred, being shown in this view and also in Figure 4;

Figure 4 is a similar horizontal section on line 4—4 of Figure 1;

Figure 5 is a perspective view of one of the locking or hook elements which secures the bricks in place between the columns of the framework;

Figure 6 is a perspective view of one of the fastenings applied to the columns for supporting the brick retaining locks or hooks;

Figure 7 is a perspective view of one of the ledge members mounted on the framework columns and on which certain of the rows of bricks are supported;

Figure 8 is a perspective view of one of the locks or hooks for holding the bricks in place directly in front of one of the framework columns;

Figure 9 is a fragmentary view similar to that of Figure 1 showing a slightly modified construction, this section being taken on line 9—9 of Figure 10; and

Figure 10 is a vertical section on line 10—10 of Figure 9.

Referring to these drawings, and, at first, to Figures 1 to 4 and 5 to 8, inclusive, it will be perceived that the new structure includes spaced, vertical, I-beam columns 21, 21 to the inner faces of which reinforcing channel bars 22, 22 are secured.

Vertically-spaced, supporting ledge-bars 23, 23 extend from column to column and are fastened thereto by bolts 24, 24 which likewise secure the beams 22 and 21 together.

Each such ledge-bar, characterized as a whole 23, as shown more clearly in Figure 7, has a vertical back wall or flange 25 and an inwardly projecting ledge or shelf 26 along its lower margin, and, at each end, each such supporting bracket has an outwardly-spaced slotted ear 27 by means of which such end is fastened by the bolt 24 to the corresponding column or post 21, 22.

As is clearly presented in Figure 4, the ends of such brackets or ledge members are close together but not necessarily in end-abutting relation.

Bricks or refractories 28 of the form shown in Figure 1, or of any other appropriate shape, are mounted in horizontal, vertically-separated rows on such ledge-bars or supporting brackets 23 by

having their outer, lower corner or edge portions resting thereon.

Obviously, such bricks or refractories must be locked in place on such ledge-bars, as otherwise they would fall off, and the following specified parts are employed for that purpose.

Rows of horizontally-aligned, offset, slotted clips or supports 29 (Figure 6), longer than the width of the upright columns so that they will extend or project beyond the edges of the latter, are fastened by bolts 31, 31, accommodated in the slots 32, 32 and holes in the columns, to the columns, as is clearly illustrated, each such bracket or support having a lower wall portion 33 which bears against the face of the column, and an upper, inwardly-offset section or flange 34 which is spaced inwardly away from the column, providing a gap between them.

These clips or brackets demountably or detachably support the hooks or locks which hold the bricks on their narrow supporting ledges.

The bricks 28 are grooved on their top faces at 35 in register, and the brick or bricks in front of each column is or are held in place on their ledge or shelf 26 by a relatively-short, channel-shaped lock or hook member 36 (Figure 8) whose inner, depending hook or flange 37 fits in the groove 35 of the brick or bricks and whose corresponding, outer, downwardly-extended flange 38 is demountably accommodated in the space between the flange 34 and the adjacent face of the column.

Obviously, if such locking or retaining member 36 is raised or lifted sufficiently, or detached from its supporting means, the one or more damaged bricks held in place thereby may be readily released and one or more new ones easily inserted in position.

The rows of bricks or refractories mounted on the ledges between the columns are demountably maintained in place by other longer locking means 39, one of which is depicted in Figure 5.

Each such bar 39, as shown in Figure 3, is of slightly less length than the distance between adjacent columns, so that it can be easily taken out of the wall between them.

Each such longer locking-bar 39 has an inner, depending hook or flange 41 throughout its full length, and a similar short flange 42 at each end of its outer edge, the part 41 fitting in the grooves 35 of the several aligned bricks 28 and maintaining them in supported position on their sustaining ledge or shelf 26, the flanges 42, 42 projecting down outside of or overlapping those portions of the flanges 34 of two different bars 29 which extend beyond the sides of their respective columns or posts.

Horizontal rows of filler or lock bricks 43, 43 of the shape shown in the drawings, or of any other convenient or appropriate form, are inserted between the spaced rows of bricks 28, each such brick 43 desirably, but not necessarily, overlying the corresponding lock element 36 or 39, as the case may be, which assures that the lock member must be in proper holding position for maintaining its brick 28 in correct manner before the filler brick can be inserted in place.

In this connection it is to be observed that the space between the top of brick 43 and the ledge or flange 26 directly above it is less than that required for the raising of the part 36 or 39 to free it from its supporting means or its retained brick.

Thus, any brick 43 cannot be introduced into place unless the corresponding locking member below it is correctly fitted in position to perform its ascribed function.

Any suitable cement or clay 44 may be used between the top surface of each row of bricks 43 and the under face of the next row of bricks 28 above.

If desired, easily demountable metal or other covers 45 may be used to close the spaces between the columns, and, if preferred, the space between the covers and the adjacent part of the framework and its bricks may be packed with any suitable material 46.

In case any one or more of the filler-bricks 43 become sufficiently injured to required replacement, the damaged one or ones may be easily withdrawn outwardly from the wall by first taking off the corresponding cover plate 45 and removing the filling 46, if these have been employed, and a new filler brick or bricks may be as readily put in the place of the one or more taken out.

In case any one or more of the bricks 28 in a row between the columns become sufficiently damaged to necessitate replacement, as in the previous instance, the plate 45 and packing 46 are removed if they have been used, the corresponding filler brick or bricks taken out, the lock-bar 39 raised and thus released, whereupon it may be withdrawn outwardly from the wall structure.

In this way the injured bricks are freed and they may be taken out and new bricks may be put in their places and locked in position by reversal of this operation.

If one or more of the bricks directly in front of a column require replacement, the parts previously specified having been removed, access to the filler-bricks in front of the column directly above the damaged brick or bricks, permits their removal, the demounting of the shorter lock 36 and the taking out of the injured bricks; an opposite course of procedure occurring during replacement with good bricks.

During such replacement operation it may be necessary to slide some of the bricks horizontally to remove them or to place them in position.

In the embodiment of the invention so far presented in detail, each locking member cooperates with more than one brick in the accomplishment of its securing or holding function, but, in some instances, it is desirable to lock each brick independently, and a structure for the accomplishment of this purpose is shown in Figures 9 and 10.

In this case, instead of using the parts 36 and 39, flat bars 47, 47 are held in alignment by the clips or brackets 29 and they extend from about the center of one column to the middle of the next.

A narrow, channel-shape locking-member 48 hooks over such bar for each grooved brick and it fits in the groove of only one such brick 28.

This does not mean, however, that any single brick can be replaced without disturbing others, because all of the locking hooks on any one bar must be removed therefrom and the bar 47 raised from its supports and tilted enough to permit its outward withdrawal between the columns, as will be readily understood, to allow the brick replacement action to be completed.

Nevertheless, by proportioning the parts somewhat differently, it would be possible to effect a replacement without removing the bar 47.

Although I have herein illustrated and described two desirable embodiments of the inven-

tion, it is to be understood that the invention, as defined by the appended claims, is not limited or restricted to these particular embodiments and many minor mechanical changes may be incorporated in such structures without departure from the heart and substance of the invention and without the sacrifice of any of its benefits or advantages.

The narrow, channel-shaped locking-member 48 which hooks over the bar 47 may be arranged for holding each individual grooved brick or it can be designed or located so that one such locking part will engage and cooperate with two or more grooved bricks.

As shown in Figure 10, the bricks 28 and 43 are in staggered relation, but, if desired, they may be arranged directly one above the other so that the outward withdrawal of one brick 43 will permit release of its locking-member 48, thus enabling the next lower brick 28 to be removed inwardly of the furnace.

I claim:

1. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from the brackets, said locking-members cooperating with said rows of main bricks to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of said main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks.

2. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from the brackets, said locking-members cooperating with said rows of main bricks to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of said main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks overlying said locking-members and underlying said ledge-members and requiring that said locking-members shall be in proper position to lock said main bricks in place before said filler-bricks can be fully inserted between said locking-members and said ledge-members.

3. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from said brackets, said locking-members each extending from the bracket of one column to a bracket on the next column and cooperating with said rows of main bricks to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of said main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks.

4. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from said brackets, said locking-members each extending from the bracket of one column to a bracket on the next column and cooperating with said rows of main bricks to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of said main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks overlying said locking-members and underlying said ledge-members and requiring that said locking-members shall be in proper position to lock said main bricks in place before said filler-bricks can be fully inserted between said locking-members and said ledge-members.

5. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from said brackets, said locking-members each extending from the bracket of one column to the corresponding bracket of the next column and cooperating with said rows of main bricks between said columns to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of the corresponding main bricks from the outside of the wall, independent locking-members in front of said columns and supported by said brackets and detachable from the brackets by merely lifting said independent locking-members from said brackets, said independent locking-members cooperating with the main bricks in register with them to hold such bricks in position on said ledge-members, the detachment of said independent locking-members from said brackets permitting replacement of their main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks.

6. In a furnace-wall structure, the combination of a metal framework including upright metal columns spaced apart and horizontal vertically-spaced metal ledge-members carried by said columns, horizontal vertically-spaced rows of main bricks mounted on said ledge-members, brackets on said columns, locking-members supported by said brackets and detachable therefrom by merely lifting the locking-members from said brackets, said locking-members each extending from the bracket of one column to the corresponding bracket of the next column and cooperating with said rows of main bricks between said columns to hold the latter in position on said ledge-members, the detachment of said locking-members from said brackets permitting replacement of the corresponding main bricks from the outside of the wall, independent locking-members in front of said columns and supported

by said brackets and detachable from the brackets by merely lifting said independent locking-members from said brackets, said independent locking-members cooperating with the main bricks in register with them to hold such bricks in position on said ledge-members, the detachment of said independent locking-members from said brackets permitting replacement of their main bricks from the outside of the wall, and rows of demountable filler-bricks between said rows of main bricks overlying said locking-members and underlying said ledge-members and requiring that said locking-members shall be in proper position to lock said main bricks in place before the corresponding filler-bricks can be fully inserted between said locking-members and said ledge-members.

7. The structure presented in claim 1 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

8. The structure presented in claim 2 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

9. The structure presented in the claim 3 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

10. The structure presented in claim 4 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

11. The structure presented in claim 5 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

12. The structure presented in claim 6 in which said main bricks extend inwardly of the furnace beyond said ledge-members and in which said filler-bricks overlie said locking-members and portions of said main bricks inwardly of the furnace beyond said locking-members.

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