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FURNACE WALL

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Fig. 1

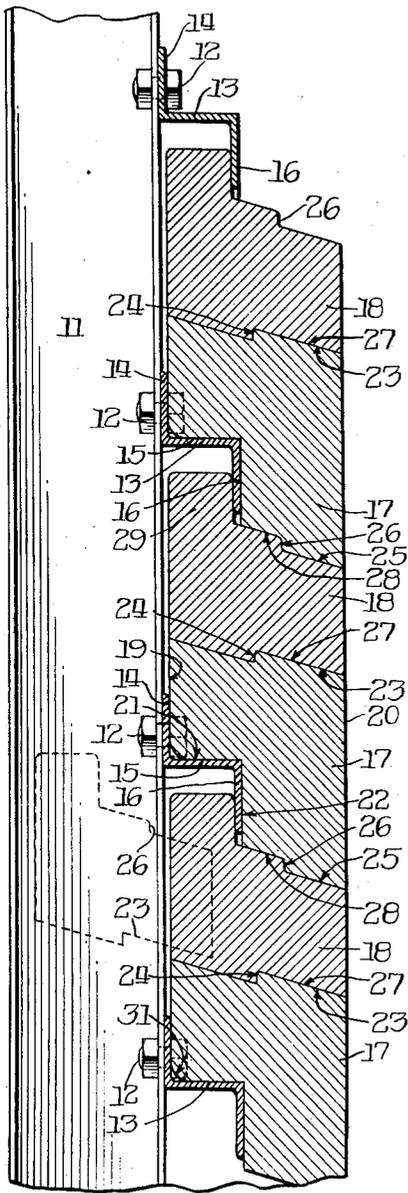


Fig. 2

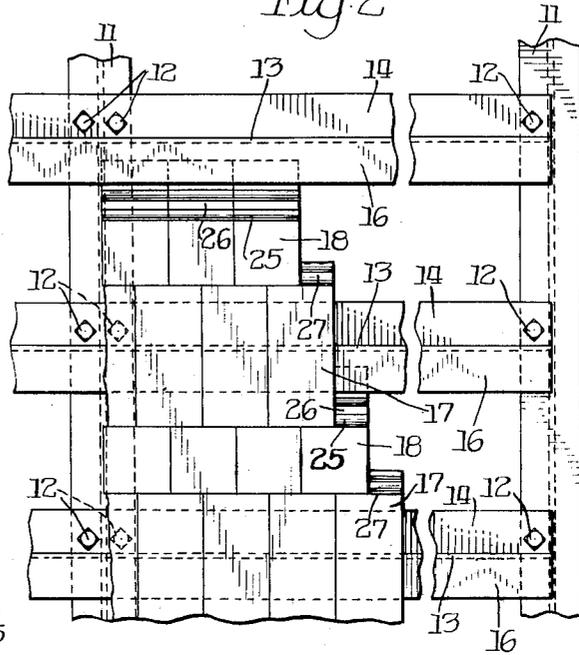
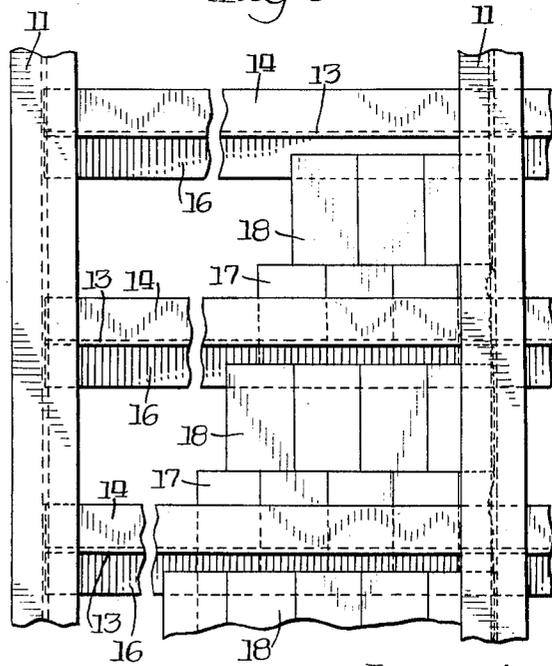


Fig. 3



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FURNACE WALL

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17 Claims. (Cl. 72-101)

My invention pertains to the refractory or heat-insulating walls of furnaces and the like, and relates more particularly to improved and novel means for supporting the refractory or insulating bricks or blocks on the sustaining metal framework in such a manner that they may be inserted in place and may be demounted from the outside of the wall.

Heretofore, it has been customary to make the construction such that the bricks or blocks are capable of insertion or removal inwardly of the furnace rather than outwardly from the wall, and such earlier structures necessitated the extinguishment of the fire in order to permit the required replacement of the damaged bricks, whereas my present improvement allows change or replacement of bricks while the furnace is in operation.

Other advantages of the improved and novel construction will become apparent to those skilled in this art from a consideration of the present, preferred embodiment of the invention illustrated in detail in the accompanying drawing forming a part of this specification, and to which reference should be had in connection with the following detailed description of the wall-structure shown.

In this drawing, like reference characters, for simplicity, have been employed to designate the same parts throughout the several views.

In this drawing,—

Fig. 1 is a fragmentary, vertical section through the furnace side wall;

Fig. 2 is a fragmentary view of a wall looking at it from the inside of the furnace; and

Fig. 3 is a fragmentary portion of the wall as viewed from the outside.

Referring to this drawing, it will be noted that, in this instance, the metal framework of the furnace wall comprises a plurality of parallel, upright I-beams 11, 11 suitably spaced apart as shown, and on these, by means of bolts 12, 12 or other suitable securing means, are mounted the required number of horizontally-arranged, vertically-separated Z-bars 13, 13, each having an outer, upstanding flange 14 bolted against the inner surfaces of the vertical posts or beams 11, 11 and an inwardly-projecting, horizontal web 15 forming a ledge or shelf equipped at its inner edge with a depending or downwardly-projecting flange or hook portion 16.

The refractory or heat-insulating bricks or blocks of the wall are of two types or styles 17 and 18, arranged in alternate, horizontal rows, the bricks 17 resting on the ledges or shelves

15 and the bricks 18 resting on the other bricks 17 and locking or securing them in place.

Each brick 17 has a flat, vertical, back surface 19 which may or may not bear against the flange 14, and a horizontal plane surface 21 of about the width of, and designed to bear on, one of the ledges or shelves 15.

It also has a vertical, lower, back or outer face 22 which may or may not rest against the inner surface of the downwardly-extended flange 16, and a smooth, inner, vertical surface 20 exposed to the heat of the furnace.

As is clearly shown, the top of the brick or block 17 has a downwardly, inwardly, sloping, stepped surface 23 with the intermediate shoulder 24.

That part of the brick inwardly of its supporting ledge has a bottom face 25 which inclines downwardly inwardly, and which is also stepped, having a shoulder 26.

Each brick 18 has a bottom, sloping, stepped or shouldered surface 27 complementary to, and interlocking with, the upper surface of the correlated brick 17, and it has a sloping, stepped, top surface 28 mating, matching and interlocking with the under surface of the companion brick 17 above.

Also, each brick 18 has an upward extension 29 adapted to fit beneath the adjacent ledge 15 and behind its retaining flange 16.

As is clearly illustrated, the inner surfaces of the bricks 18 are in alignment or register with the corresponding surfaces 20 of bricks 17.

As presented in Fig. 2, the bricks 17 of the several rows are staggered with relation to the bricks 18 of the other rows, so that the joints or slight spaces between the bricks are offset or arranged in broken relation.

Owing to the stepped or shouldered top and bottom surfaces of the bricks and the staggered disposition of the bricks in adjacent rows, adequate and effective protection is afforded to the metal work from the heat of the furnace.

The staggering or offsetting of the rows of bricks or blocks is not essential, and may be dispensed with if desired.

Further, the shouldered or stepped structure of the bricks or blocks may be omitted if preferred, and the degree of slope of the contacting surfaces of the bricks may be anything which the circumstances dictate, and the inclination of such brick faces may be done away with if found to be of benefit.

Assuming that all of the bricks are in their proper positions in the wall, it will be obvious

that one or more of the key or locking bricks or blocks 18 may be removed outwardly of the wall by merely sliding it or them, as the case may be, out of place, as shown, in one instance, in dotted lines in Fig. 1.

5 In case it is desired to demount one of the bricks 17 and the rows of bricks are in the staggered or offset arrangement shown in Fig. 2, the operator removes one of the two bricks 18 immediately above it, which gives access to the brick 17 in question, and then while holding the latter through the opening thus provided to prevent it from falling inwardly into the furnace, he takes out the other overlying brick 18, which operation then allows him to remove the brick 17 outwardly of the wall by first lifting it into the space provided by the removed bricks 18.

10 In mounting the bricks on the wall, the brick 17 is first placed in position on the frame from the outside of the wall, and then the one or more locking or retaining bricks is or are readily slid into place from the outside, and such overlying brick or bricks assures the prevention of inward displacement of the brick 17.

15 As will be readily understood, the bricks 18 cannot move inwardly beyond normal position by reason of the engagement of their portions 29 with the flanges 16, and the bricks 17 cannot shift inwardly because they are locked in place by the bricks 18.

20 From what precedes, it will be apparent that the novel and improved wall is of simple structure, and that the refractory or heat-insulating blocks or bricks may be easily mounted in position and as readily removed when occasion requires.

25 Although only one desirable embodiment of the invention has been illustrated and described, it should be borne in mind that the invention, as defined by the appended claims, is susceptible of a variety of embodiments differing more or less in details from the structure shown.

30 Whereas, in the drawing, I have shown one edge of the bricks 17 as rounded or curved at 31, it is to be remembered that, while this is a desirable characteristic, it is not essential to the satisfactory employment of the wall.

35 It might be noted in passing, that to remove the refractory shape or block opposite any one of the vertical supporting members, it is necessary to remove one or more of the adjoining bricks in the same row to provide clearance for the horizontal shifting of the brick or block to permit it to escape the vertical column during its subsequent removal from the wall.

40 The bricks 17 may bear against the flange or abutment 14 or 16, or both, and, in either case, they will be retained in proper position.

45 In many instances, the damaged or injured bricks, instead of being demounted or removed in the manner indicated, may be chipped or broken to pieces and disposed of in that way, thus providing space for the introduction of the new bricks in the manner stated.

50 In some cases, it may be desirable to cement together the bricks 17 and the bricks 18 above by a high-temperature cement which so unites such bricks as to form a unitary structure; and, obviously, in order to dispose of injured bricks in that instance, they would have to be broken away during removal, after which occurrence new bricks could be readily inserted in the way indicated hereinbefore.

55 I claim:

60 1. In a furnace wall, the combination of

spaced upright supports, horizontal vertically-separated ledge members and a like number of retaining means carried on said supports, horizontal rows of bricks resting on said ledges and having depending portions in front of the retaining means adjacent to the corresponding ledge, and intermediate horizontal rows of locking-bricks overlying said other bricks and having upward extensions accommodated under said ledges and outside of said retaining means, whereby the bricks may be inserted in place from the outside of the wall whereupon the locking-bricks may be similarly introduced into position.

2. A construction as set forth in claim 1 in which the locking-bricks rest on the other bricks.

3. A construction as set forth in claim 1 in which the retaining means are on and depend from the ledge members.

4. A construction as set forth in claim 1 in which the ledge members are Z-bars with their outer flanges upstanding and secured to the upright supports, their inner depending flanges forming the retaining means.

5. In a furnace-wall, the combination of spaced upright supports, horizontal vertically-separated ledge members and a like number of retaining means carried on said supports, horizontal rows of bricks resting on said ledges and having depending portions in front of the retaining means adjacent to the corresponding ledges, each of said bricks having a downwardly, inwardly, sloping top surface and a similar bottom surface for its said depending portion, and intermediate horizontal rows of locking-bricks overlying said other bricks and having upward extensions accommodated under said ledges and outside of said retaining means, each of said locking-bricks having top and bottom downwardly, inwardly, sloping surfaces conforming to the bottom and top surfaces of the first bricks, whereby the bricks may be inserted in place from the outside of the wall whereupon the locking-bricks may be similarly introduced into position.

6. A construction as set forth in claim 5 in which the locking-bricks rest on the other bricks and in which the ledge members are Z-bars with their outer flanges upstanding and secured to the upright supports, their inner depending flanges forming the retaining means.

7. In a furnace-wall, the combination of spaced upright supports, horizontal vertically-separated ledge members and a like number of retaining means carried on said supports, horizontal rows of bricks resting on said ledges and having depending portions in front of the retaining means adjacent to the corresponding ledges, each of said bricks having a top stepped surface and a bottom stepped surface for its depending portion, and intermediate horizontal rows of locking-bricks overlying said other bricks and having upward extensions accommodated under said ledges and outside of said retaining means, the top and bottom surfaces of said locking bricks being stepped to conform to the stepped surfaces of the other bricks below and above them, whereby the bricks may be inserted in place from the outside of the wall whereupon the locking-bricks may be similarly introduced into position.

8. A construction as set forth in claim 7 in which the locking-bricks rest on the other bricks and in which the ledge members are

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Z-bars with their outer flanges upstanding and secured to the upright supports, their inner depending flanges forming the retaining means.

9. In a furnace-wall, the combination of spaced upright supports, horizontal vertically-separated ledge members and a like number of retaining means carried on said supports, horizontal rows of bricks resting on said ledges and having depending portions in front of the retaining means adjacent to the corresponding ledges, each of said bricks having a stepped inwardly, sloping top surface and a similar stepped inclined bottom surface for its said depending portion, and intermediate horizontal rows of locking-bricks overlying said other bricks and having upward extensions accommodated under said ledges and outside of said retaining means, each of said locking-bricks having stepped, inwardly, sloping top and bottom surfaces conforming to the adjacent surfaces of the bricks immediately below and above them, whereby the bricks may be inserted in place from the outside of the wall whereupon the locking-bricks may be similarly introduced into position.

10. A construction as set forth in claim 9 in which the locking-bricks rest on the other bricks and in which the ledge members are Z-bars with their outer flanges upstanding and secured to the upright supports, their inner depending flanges forming the retaining means.

11. A construction as set forth in claim 1 in which the vertical joints between the locking bricks and those between the other bricks are horizontally offset.

12. A refractory or heat-insulating block having front and back upright substantially-par-

allel surfaces, a top surface at practically right angles to and directly adjacent to said back surface, an intermediate upright surface directly connected with the inner margin of said top surface and at substantially right angles to said top surface, a sloping surface at an obtuse angle to said intermediate and front surfaces and connecting the lower margin of said intermediate surface and the upper margin of said front surface, and a sloping bottom surface connecting said back and front surfaces and at an obtuse angle to said back surface.

13. A block as specified in claim 12 in which the first-mentioned sloping surface is stepped.

14. A block as specified in claim 12 in which the second-mentioned sloping surface is stepped.

15. A refractory or heat-insulating block having front and back upright substantially-parallel surfaces, a sloping top surface at an obtuse angle to said front surface and connecting said front and back surfaces, and a bottom face composed of a surface intermediate the height of the block at right angles to, and extended toward said front surface from said back surface, an upright surface substantially parallel to said front and back surfaces and joining the inner margin of said intermediate surface, and a sloping surface at an obtuse angle to said intermediate surface and connecting the lower margin of said last-mentioned upright surface and the lower margin of said front surface.

16. A block as specified in claim 15 in which the first-mentioned sloping surface is stepped.

17. A block as specified in claim 15 in which the last-mentioned sloping surface is stepped.

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