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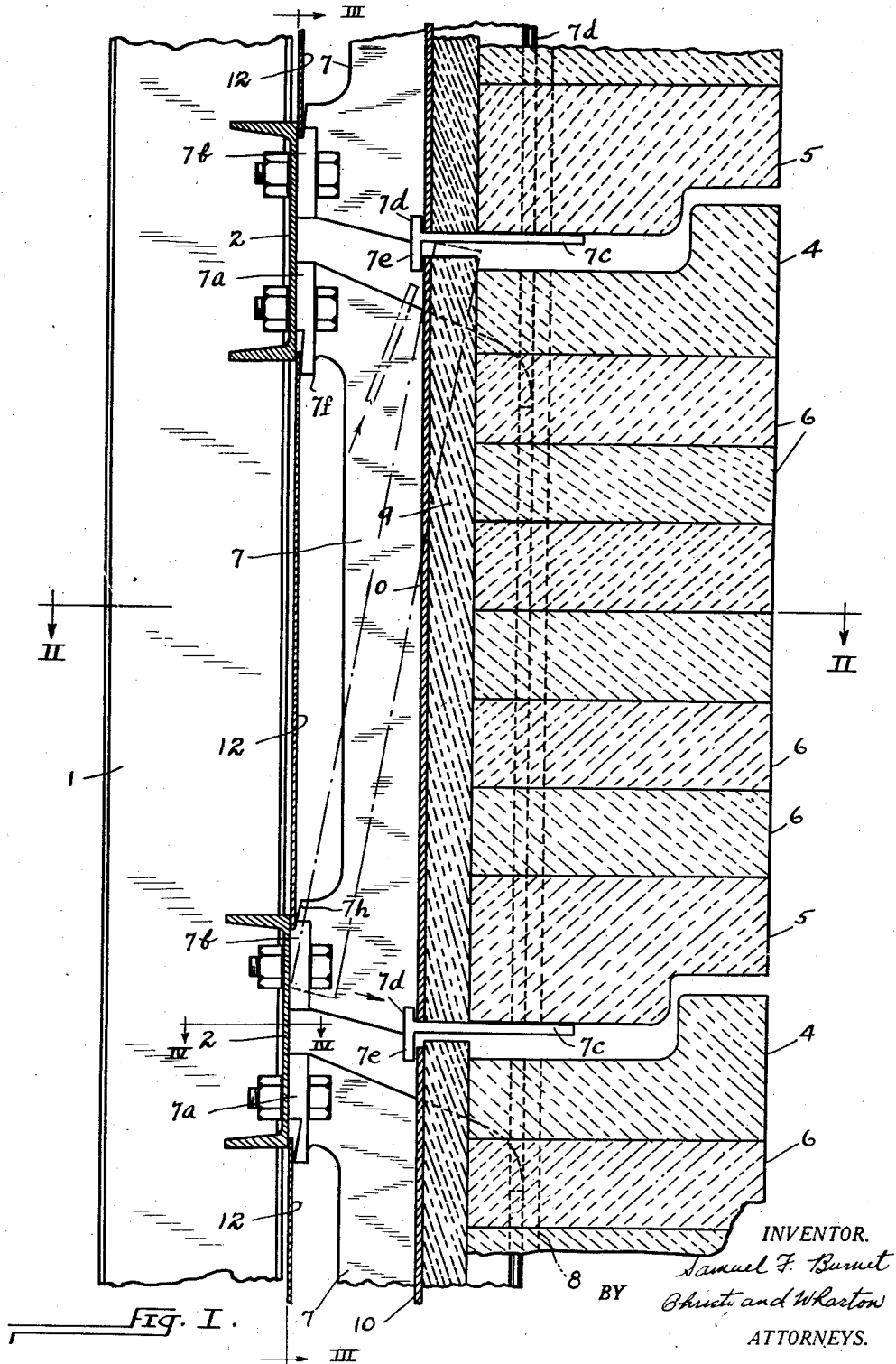
S. F. BURNET

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WALL STRUCTURE

Filed Dec. 14, 1937

3 Sheets-Sheet 1



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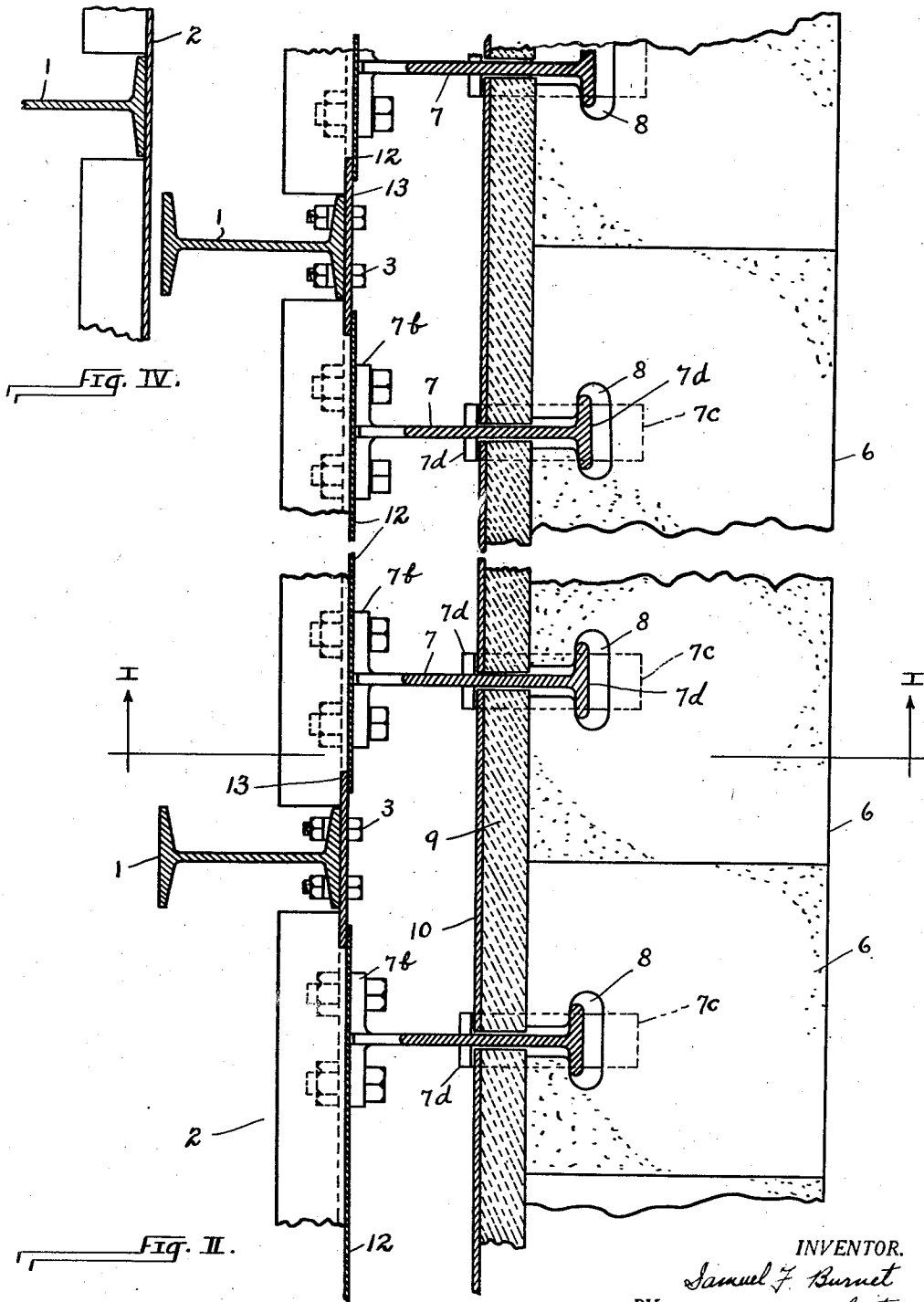
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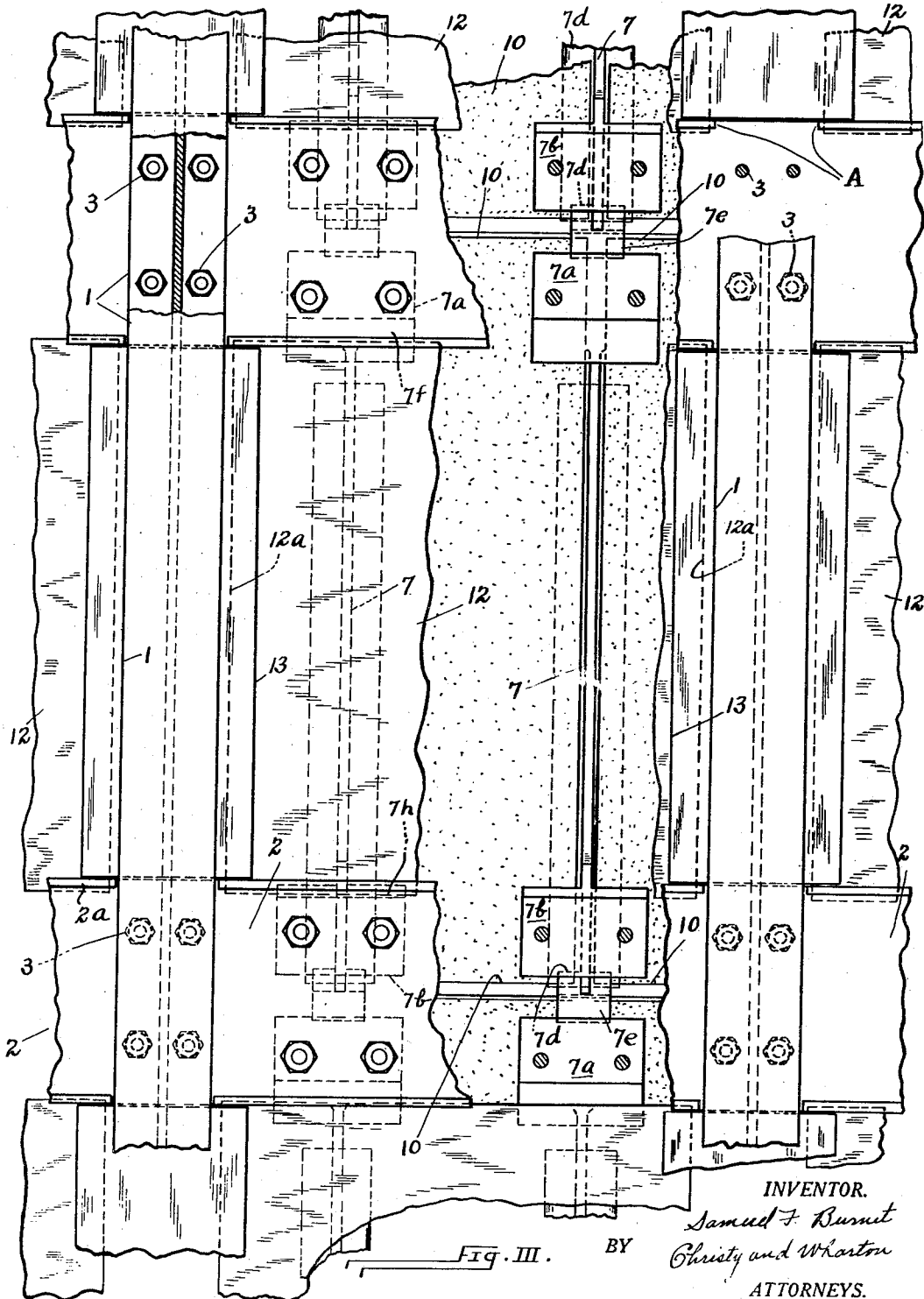
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UNITED STATES PATENT OFFICE

2,170,233

WALL STRUCTURE

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7 Claims. (Cl. 72-101)

This invention relates to wall structures, and finds practical application in furnace walls for steam boilers, oil stills, and other such industrial uses. The object in view is simplicity of structure and economy in building.

In the accompanying drawings, Fig. I is a fragmentary view, showing in vertical section a furnace wall in whose structure the invention is embodied; Fig. II is a view of the wall in horizontal section, the plane of section of Fig. I being indicated at I—I in Fig. II, and that of Fig. II at II—II in Fig. I; Fig. III is a fragmentary view, showing the wall, partly in elevation and partly in vertical section, on the plane indicated at III—III, Fig. I; and Fig. IV is a fragmentary view, showing in section, on the plane IV—IV of Fig. I, a detail in structure.

The wall is essentially a wall of refractory blocks, 4, 5, 6 built up and secured in a suitable framework. The framework includes a succession of I-beams 1, standing vertically and in alignment, and a succession of horizontally extending and vertically spaced channel-beams 2, properly secured to the I-beams. The I-beams stand with the planes of their mid-webs perpendicular to the general extent of the wall and with the faces of their flanges extending in common planes, and the channel-beams are mounted with their flanges extending outwardly. The flanges of the channel-beams are cut away at intervals to permit of assembly as shown and described. Thus on the inner face of the framework the bases of the channel-beams extend in a common plane. The centre-to-centre spacing of the I-beams may, in a particular and exemplary installation, be five feet; that of the channel-beams, three feet. It is a latticed framework, formed of vertically and horizontally extending sets of beams.

The framework is equipped with brackets, and the refractory blocks 4, 5, 6 etc., built up to form the wall that is the essential feature of the structure, are built upon these brackets, to the end that the wall of refractory blocks shall be supported and made secure by the framework. Each bracket consists of a plate-like body 7 that in the assembly extends in vertical plane perpendicular to the inner face of the framework, and that extends inward from the inner face of the framework. The bracket is formed at its upper and lower ends with feet 7a and 7b that in the assembly make surface-to-surface engagement upon the inner faces of adjacent channel-beams 2, and by these feet the brackets are secured to the beams. At the inner end the plate-

like body 7 of the bracket is formed with a T head 7d. The blocks 4, 5, 6 being provided, as shown in Fig. II, with corresponding vertically extending T-shaped recesses 8, the wall of refractory blocks is built up with manifest inter-engagement of these parts. Each bracket is formed at the lower end of the plate-like body 7 with an inwardly extending shelf 7c, upon which in assembly the lowermost of a succession of blocks, the block 5, immediately rests. The brackets are placed in succession along the channel-beams 2 at intervals corresponding to the spacing of the recesses 8 in the refractory blocks.

The wall structure is thus seen to consist of a vertical succession of belts or zones of masonry, severally mounted upon and borne by the framework. These belts or zones are spaced apart at proper narrow intervals. The adjacent blocks of the succeeding zones are shaped as shown in Fig. I, with overlapping steps or offsets, situated inward, beyond the ends of the shelves 7c; and by such overlapping the shelves are screened from the fire within the wall. The proportions are such that a space intervenes between the inner surface of the framework and the outer surface of the wall of masonry.

It is usual to close the spaces of the latticed framework, formed of the vertically standing beams 1 and the transversely extending beams 2, with panels. The panels are formed, ordinarily, of steel plate. Manifestly they may be formed of other material of sufficient strength—of sheets of Transite, for example—which consist of a preparation of asbestos and cement. These panels are added, not ordinarily to add to the strength and rigidity of the framework, but to enclose an air space, between framework and masonry wall, that shall have insulating and heat-conserving value. Such panels serve also to give a neat and finished appearance to the whole. These panels are usually secured in place by means of added steel angles, or clips with bolts or rivets or other means of attachment. These means of attachment make necessary the drilling of bolt holes or other fabrication of the panels themselves and of the adjoining steel members of the frame work and this extra material and fabrication and labor of assembly makes this form of casing difficult and expensive.

My invention consists in the provision of lugs or shoulders, suitably shaped and arranged relatively to the beams of the framework and to one another, adapted to receive the panel slid edge-wise to position and to retain the panel securely

in place. These lugs or shoulders are conveniently formed upon or otherwise made integral with the brackets already described.

Referring to Figs. I and III, the upper foot 7a of the bracket will be seen to be provided with a downward projecting lug or flange 7f, that in the assembly extends beyond the lower edge of the adjacent channel-beam 2; and it presents to the opposed face of the channel-beam a downwardly and outwardly inclined surface. The proportions are such that the lower edge of the flange 7f is spaced inwardly from the plane of the face of the channel-beam at an interval that is substantially equal to, or even slightly less than, the thickness of the panel to be inserted. The lower foot 7b of the bracket is provided with an upwardly receding surface 7h that forms with the upper edge of the channel-beam (the next lower channel-beam) a downwardly tapering pocket. This pocket at its upper edge is of a width somewhat greater than the thickness of the panel, and tapers to a width of substantially that of the thickness of the panel, or somewhat less.

The panel 12, already cut to proper dimensions, is applied by inserting its upper edge between flange 7f and the adjacent edge of the channel-beam, and shifting the panel upward and edgewise until its lower edge will clear the upper edge of the next lower channel-beam, then swinging the lower edge of the panel inward until it meets the inclined face 7h, then moving the panel downward (it will so move, ordinarily, of its own weight) until the lower edge rests in the tapered pocket, while its upper edge is still held by and between the flange 7f and the edge of the adjacent channel-beam. If the spacing of the flange 7f with respect to the plane of the face of the channel-beam be nicely adjusted, the in-swung panel may be put under stress at this point, and so the more firmly secured in place.

It will be observed that the brackets so particularly shaped and equipped form with the channel-beams 2 of the framework pairs of opposed slots; that the slots of each pair open toward one another; that the space interval between the edges of the pair of slots is less, and the space interval between the bottoms of the pair of slots is greater, than the width of the panel that in the manner described is secured by and between them.

When the panels have thus been secured at their horizontally extending upper and lower edges, the spaces between their vertical side edges and the beams 1 may be closed by plates 13, of a width equal to the space between adjacent channel-beams 2, slipped laterally to place between successive channel-beams 2, across the face of I-beam 1, and to a position overlapping the vertical edges of two adjacent applied panels 12.

The construction described eliminates all of the cost of extra means of attachment such as the angles, clips, bolts, rivets, etc.; also eliminates the extra cost of fabrication of the panels and the surrounding steel work, and also eliminates most of the cost of assembly of these parts. This saving in cost is very important. As a matter of fact, it actually cuts the cost of the outside casing or covering to less than one-half.

It is common practice in building such walls to apply upon the outer surface of the wall of refractory blocks 4, 5, 6, etc. a coating 9 of insulation, formed either of plastic shaped in situ or of blocks built to place. The coating is commonly

secured to the wall of refractory blocks by means of wires or netting; and sometimes it is covered externally with a hard cement finish. It is a feature of my invention, with economies such as I have indicated, to apply to the structure a sheathing 10. This sheathing may, like panels 12, be formed of metal, or of other rigid material, such as Transite. Similarly as the panels 12 are secured between lugs or abutments formed upon the brackets and the faces of the channel-bars 2, the sheathing 10, being formed in panels or plates, may be secured between lugs 7e and 7d formed upon the brackets and the outer surface of the blanket 9. These panels may be cut to fit snugly between the plate-like bodies 7 of laterally adjacent brackets, and, accordingly, there will be no spaces to be closed at the vertical side edges of the panels. A comparison of the lugs 7e and 7d, as seen in Fig. I with the lug 7f and the shoulder 7h, will make the structure plain. The mode of application is the same. The wedging effect of inclined surfaces has not here been provided for, but, manifestly, it might be. The coating 9 also is formed in panels, and is applied and secured upon the blocks 4, 5, 6 in the pockets formed by and between the outer face of the said blocks and the flanges 7d, 7e. The panels 9 are first applied in the manner described with respect to the panels 12, and then the panels 10 in turn. In Fig. I in broken lines, diagrammatic showing is made of the mode of application.

I claim as my invention:

1. A structure of the class described including a framework of structural steel, a wall of refractory blocks, and brackets carried by said framework and engaging and supporting the blocks in said wall, and a coating of insulation applied in the form of rigid panels to said wall, said brackets in the assembly forming with the wall of refractory blocks pairs of opposed slots, the slots of each pair opening toward one another, the space interval between the edges of the slots of each pair being less and the space interval between the bottoms of the slots of each pair being greater than the width of the panel, whereby the panel may be secured in the assembly by displacement in the plane of its extent.

2. In a furnace including a framework of structural steel, a wall of refractory blocks, and brackets carried by said framework and engaging and supporting the blocks in said wall, the combination of a coating of insulation applied to said wall, and an assembly of sheathing panels covering said coating, said brackets being provided with means marginally engaging and securing said panels.

3. In a furnace including a framework of structural steel of lattice construction, a wall of refractory blocks, and brackets carried by said framework and engaging and supporting the blocks in said wall, the combination of an assembly of panels closing the interstices of said latticed framework, said brackets including seats receiving the edges of said panels by vertical displacement of the panels, and a second assembly of panels providing a sheathing upon the wall of refractory blocks, said sheathing including a plurality of sheets marginally secured to said brackets.

4. In a furnace-wall structure including a latticed framework equipped with masonry-carrying brackets and a wall of masonry borne by said brackets, slots formed by and between the framework and the brackets and arranged in pairs

opening toward one another and a panel arranged in an opening of the latticed framework, of a width greater than the space interval between the edges of such a pair of slots and less than the space interval between the bottoms of the pair of slots and secured in the pair of slots, a second set of slots formed by and between the brackets and the said wall of masonry and arranged in pairs opening toward one another, and a sheathing panel lying upon the outer face of the wall, of a width greater than the space interval between the edges of a pair of slots of the second set and less than the space interval between the bottoms of the slots of such pair, and extending at its opposite edges into the two slots of such pair.

5. In a furnace-wall structure that includes a framework equipped with masonry-carrying brackets and a wall of masonry borne by such brackets, slots formed by and between the brackets and the outer surface of the wall of masonry and arranged in pairs opening toward one another, and a sheathing panel lying upon the outer face of the wall of masonry, of a width greater than the space interval between the edges of a pair of the said slots and less than the space interval between the bottoms of the slots of the

pair, and extending at its edges into the two slots of such pair.

6. In a furnace including a framework of structural steel, a wall of refractory blocks, and brackets carried by said framework and engaging and supporting the blocks in said wall, the said brackets forming with the adjacent structure opposite pairs of slots opening toward one another, one of the slots of each pair tapering in width from base to rim, and panels removably borne in the assembly and engaged along opposite edges each in a pair of the said slots, the panel being of a width less than the distance between the bottoms of opposite slots and of a thickness substantially that of the tapered slot at its rim.

7. In a furnace including a framework of structural steel, a wall of refractory blocks, and brackets carried by said framework and engaging and supporting the blocks in the said wall, the combination of an outer casing assembled over said wall, said casing including a plurality of steel sheets carried by said framework and marginally engaged by said brackets and secured to the framework, together with plates assembled over the adjacent edges of companion sheets in the assembly.

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