June 30, 1942. F. W. STONE 2,288,495

WALL SUPPORT

Filed Feb. 12, 1940 2 Sheets-Sheet 1

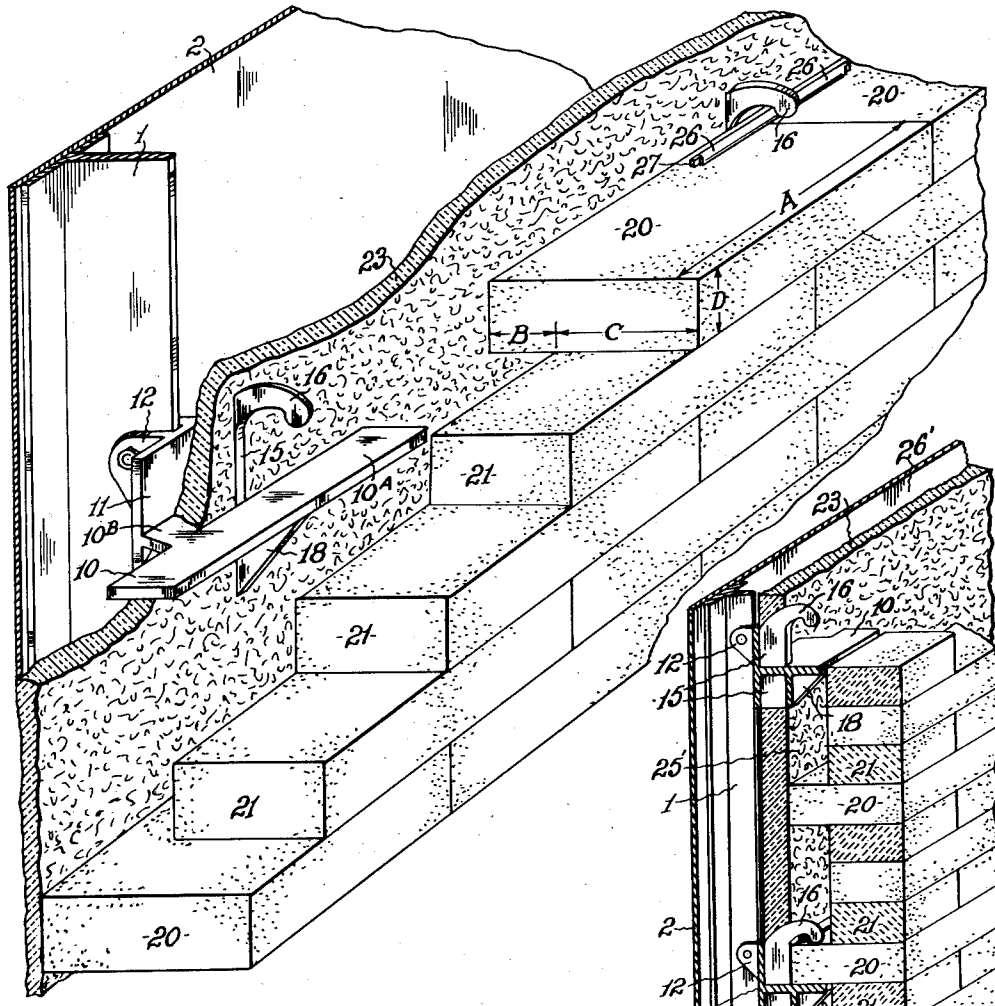

FIG. 1

FIG. 2

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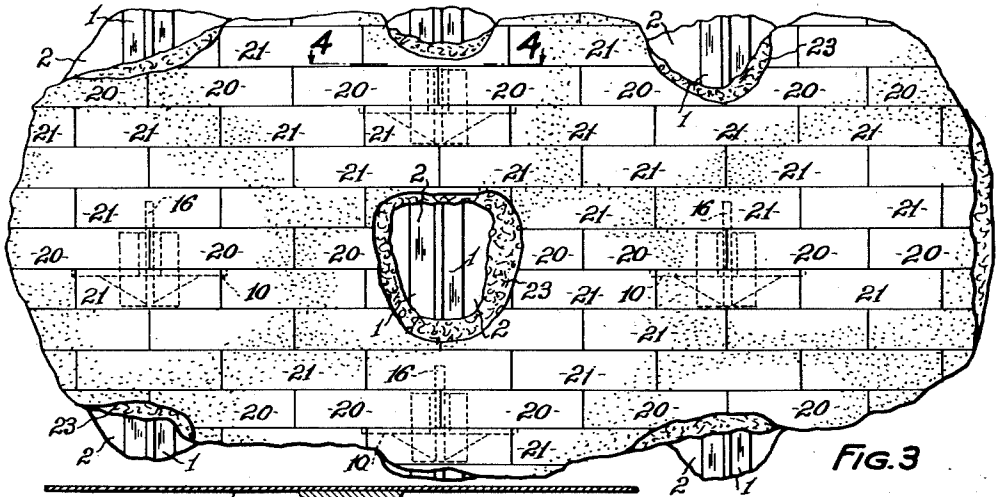

FIG. 3

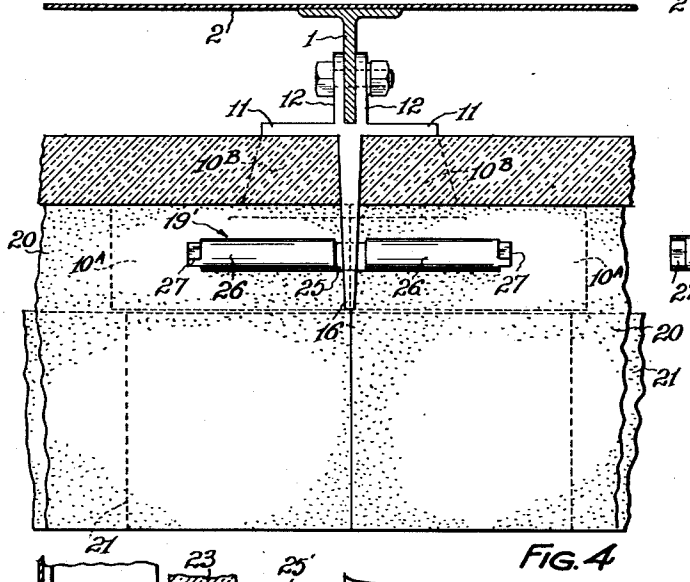

FIG. 4

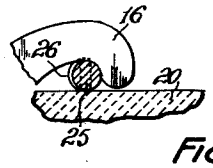

FIG. 6

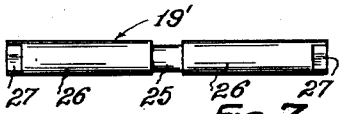

FIG. 7

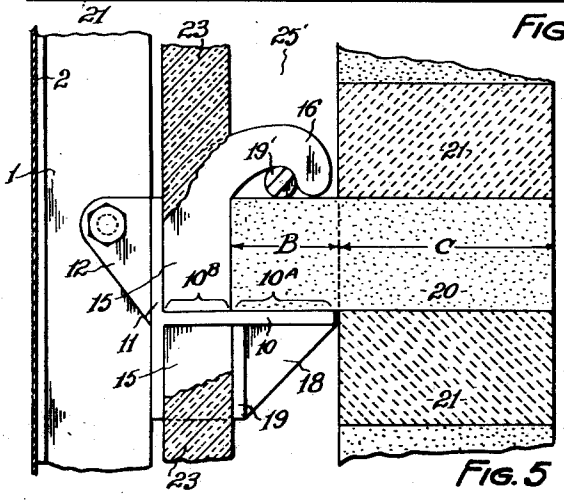

FIG. 5

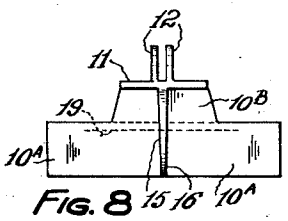

FIG. 8

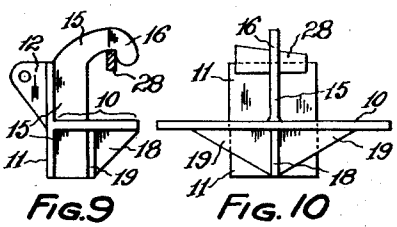

FIG. 9 FIG. 10

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UNITED STATES PATENT OFFICE

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WALL SUPPORT

Frederick W. Stone, Chagrin Falls, Ohio

Application February 12, 1940, Serial No. 318,415

6 Claims. (Cl. 72—101)

This invention relates to a suspended wall for furnaces, of the type wherein the brickwork is connected to and supported from a series of frames or buckstays which supply the principal structural strength of the wall, while the bricks constitute a lining which also protects the metal from the heat, so that no metal is exposed on the fire side of the wall, although metal brackets connect the fire wall and the buckstays. In more detail the present invention is directed to a bracket for such use and an arrangement of brickwork related thereto, whereby smooth-faced stock size rectangular refractory brick or tile can be used without cutting, chipping, grooving or any need of irregular surfaces, and there is no dependence upon the cement of the joints to protect the brackets. Such bracket support in effect divides the brick wall into vertical sections or panels only a few courses high, at each of which the weight is transferred to the steelwork.

A further feature of my invention is that the same brackets carry the fire wall and also an insulating wall which is spaced between the fire wall and the steelwork. The brackets, and the brickwork arrangement which they make possible give front and rear positioning support to the intermediate insulating wall. Since the insulating wall and the brick wall are tied together at the brackets, their original spacing will be substantially maintained notwithstanding warpage, since the free panel areas between brackets are not large enough for serious warpage.

The use of smooth bricks, of stock sizes, and the use of the same bracket for both the inner and the intermediate walls result in economies of material and labor costs, as readily apparent. It will be understood by those familiar with this art that the air spaces in the wall may be used for circulation to cool the wall elements and heat incoming air, or may be dead air spaces.

In the specification and claims, the term "brick" is used to include brick, tile, refractory blocks, and all similar wall materials, and the illustrations of bricks in the drawings are to be similarly interpreted. Ordinarily such brick will be of fire-proof material, but the invention in its broader aspects is directed to the construction of a wall which, while primarily intended for situations exposed to extreme heat, such as linings for petroleum stills or furnaces, may be of general application.

In the accompanying drawings and following description, it will be understood that a preferred embodiment of my invention is shown, but that the details thereof may be modified, so long as the governing principles are applied, and that the description and drawings are for purposes of illustration rather than limitation.

In the accompanying drawings

Fig. 1 is an isometric view of a portion of a wall built according to my invention;

Fig. 2 is a smaller scale fragmentary isometric view including a transverse vertical section;

Fig. 3 is a face elevation from the fire side, with parts broken away;

Fig. 4 is an enlarged horizontal section of a portion of said wall on the plane 4—4 of Fig. 3;

Fig. 5 is an elevation from the left side of Fig. 4, with parts in section;

Fig. 6 is a fragmentary detail from Fig. 5 showing a method of clamping brick down on the bracket shelf;

Fig. 7 is a side view of a lock bar; and

Figs. 8, 9 and 10 are respectively a plan, a side elevation and a front elevation of the bracket alone, on a reduced scale, illustrating an alternative fastening in Figs. 9 and 10.

The supporting structure of the wall consists of vertical buckstays 1, herein shown as T-bars with web inward, and an outer shell such as casing plate 2. My bracket, best made as a single casting, includes a shelf 10, back 11, ears 12, and certain other parts. The shelf 10 includes a long front part 10A and short middle rear part 10B, strengthened below and above and tied to back 11 at mid-length by a vertical web 15 which extends forward above the shelf as a hook 16, and beneath as a diagonal brace 18 from which lateral braces 19 spring. The forward depth of web 15 is equal only to the width of 10B, so that 10B is divided thereby, but the hook 16 overhangs the shelf portion 10A, which is not divided. The vertical ears 12 extend rearward at right angles to the back 11, are laterally spaced to take the web of a buckstay 1, and perforated for an attaching bolt or rivet.

In constructing my wall I prefer to use two sizes of bricks, 20 being the wider and 21 the narrower, these bricks 21 being standard lightweight refractory brick. The following typical dimensions shown in Fig. 1 are examples of sizes in practical use, although my invention is of course not limited to specific dimensions:

A	9 inches (230 mm.)
B	2¼ inches (57 mm.)
C	4½ inches (115 mm.)
D	2½ inches (65 mm.)

When the brick wall is laid up with the fire side flush the wide bricks 20 overreach outwardly

the distance B, which just slightly exceeds the width of shelf portion 10A, so that the outer faces of the narrow bricks 21 slightly clear the front edges of hook 16 and shelf 10, as best seen in Fig. 5, and thus entirely protect the bracket. The brickwork is preferably laid with a complete course of the wide bricks 20, three complete courses of narrow bricks 21, above the wide course, another course of wide bricks, and so on, although it is not necessary that every brick 20 rest on a bracket. The brackets may be staggered, as in the diamond shaped formation of Figs. 2 and 3, or placed on close squares, as in Fig. 1 where two brackets are concealed. The frequency of the brackets, the number of courses between bracket-supported courses, and the possible use of narrow bricks 21 at positions in the bracketed courses which are not opposite the brackets, all all matters of choice depending on how strong the wall must be, and other factors.

In the preferred construction illustrated two wide bricks 20 are placed sideways on a shelf portion 10A, with joint opposite the web 15 and under the hook 16. The lockbar 19' is applied, with its neck 25 under the hook and one eccentric cylinder 26 over each brick. The bar 19' is then turned by a wrench on a squared end 27, camming the bricks down on the shelf, as shown at successive positions in Figs. 6 and 5.

The insulating wall 23 rests on the shelf portions 10B, is retained against outward movement by the bracket back 11 and against forward movement by the outer edges of the wide bricks 20, as apparent in Fig. 2.

This arrangement leaves air spaces 25' between the fire wall and the insulation 23, and air spaces 26' between the insulation 23 and the casing 2. The bracket is not buried in the brickwork, and not buried in the insulation, but is fully protected by the brickwork. To remove or repair the brickwork it is only necessary to remove enough bricks to get to one of the hooks 16, and then the tie bricks 20 can be freed by turning the lockbar 19'.

Modifications in detail may be resorted to; such as supporting a single brick instead of a pair of bricks on the shelf 10, as indicated by the section lining of Fig. 4; using narrow bricks laid as headers with inner projecting portions on shelf 10A instead of broad bricks thus the brick 20 of Fig. 5 might be considered a brick such as 21 but laid transversely of the fire wall; using a wedge such as 28, Figs. 9 and 10 instead of a cylindrical lockbar, and so on.

The brick wall is laid up with bonding cement, following the usual practice in building refractory walls. Bonding cement may be used or omitted upon the shelf faces 10.

A preferred embodiment and certain modifications having been disclosed by way of illustration of the principles of my invention, reference is made to the claims for its scope.

I claim:

1. A bracket for attaching a composite wall to a buckstay, said bracket comprising a member adapted to engage a buckstay, a shelf adapted to receive a projecting end of a brick, a hook overlying said shelf, and a cam adapted to bear directly upon said projecting end and thereby clamp said projecting end between said shelf and said hook.

2. A bracket of the character described comprising in combination a back with a shelf, a forward vertical web, and rearward ears, all extending from said back; said shelf extending horizontally forward at an intermediate height of said back and including a long inward portion and a short outward portion at midlength of the long inward portion; said web dividing said short outward portion and extending as a hook over said long inward portion.

3. A composite wall supporting means comprising in combination a bracket, a shelf included in said bracket, a hook included in said bracket and overlying said shelf, brick having a portion resting upon said shelf and under said hook, and a camming element bearing upwardly against said hook and downwardly against said brick.

4. A composite wall comprising in combination a supporting frame, shelves attached thereto and pressure clamping elements over said shelves, a brick wall spaced from said frame, said clamping elements being at a height such that when not in clamping position a brick can be placed on the shelf below the clamping element and that when clamped the clamping element will bear upon the top of such brick, said clamping elements comprising an arm overlapping said shelf and horizontal bar lateral to said arm, said bar having a cam surface bearing on the under side of said arm and cylindrical surfaces adapted to bear on a brick when said bar is turned on its exis, and certain of the bricks in said wall including inward extensions resting on said shelves and pressed down thereon by said clamping elements.

5. A composite wall structure including in combination an inner wall of bricks, an intermediate wall, an outside wall, and brackets carried by said outside wall vertically and horizontally spaced with respect to the intermediate and inner walls to support both said intermediate and inner walls against movement in all directions, lateral web elements in said brackets spaced in the direction of the thickness of the wall structure and adapted to engage a portion of said intermediate wall between them, elements in said brackets bearing against the outer face portion of said intermediate wall, and bricks of said inner wall on said brackets bearing against a portion of the inner face of said intermediate wall opposite said back elements.

6. A dual wall structure comprising in combination inner and outer walls and a supporting frame external to the outer wall, shelves of greater front-to-rear dimension than the thickness of one of said walls secured to said frame and passing through the outer wall, the outer of said walls including portions resting upon those portions of said shelves which pass through said wall and the inner of said walls including bricks in said inner wall which include extensions projecting outwardly of the outer face of said wall and which rest on said inner portions of said shelves constituting the immediate supporting means for the inner wall.

FREDERICK W. STONE.