J. B. McKENNAN, F. E. PARKS & S. W. GILLIN.

DOOR FRAME AND ROOF SKEWBACK FOR FURNACES.

APPLICATION FILED JULY 21, 1908.

918,356.

Patented Apr. 13, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

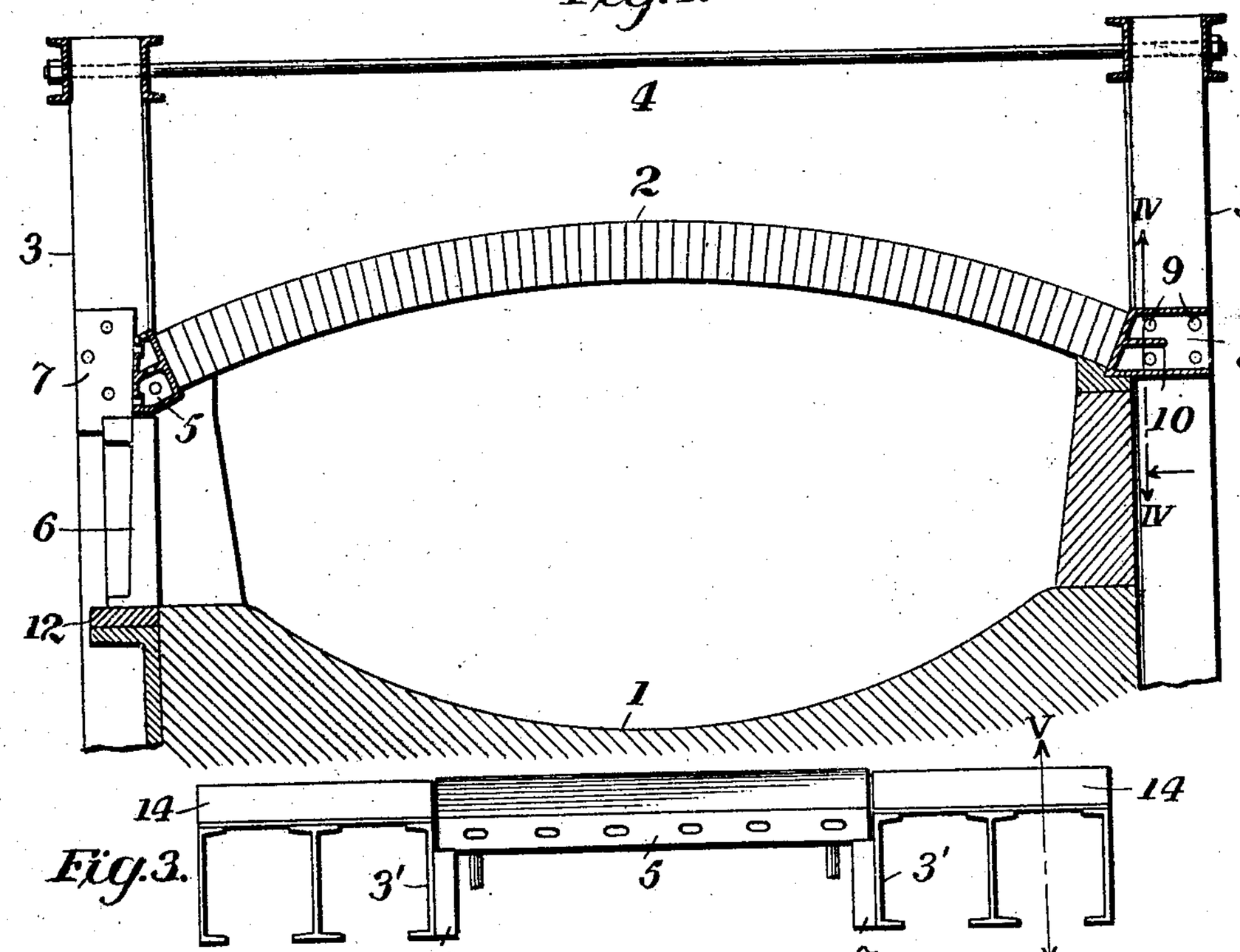


Fig. 3.

Fig. 2.

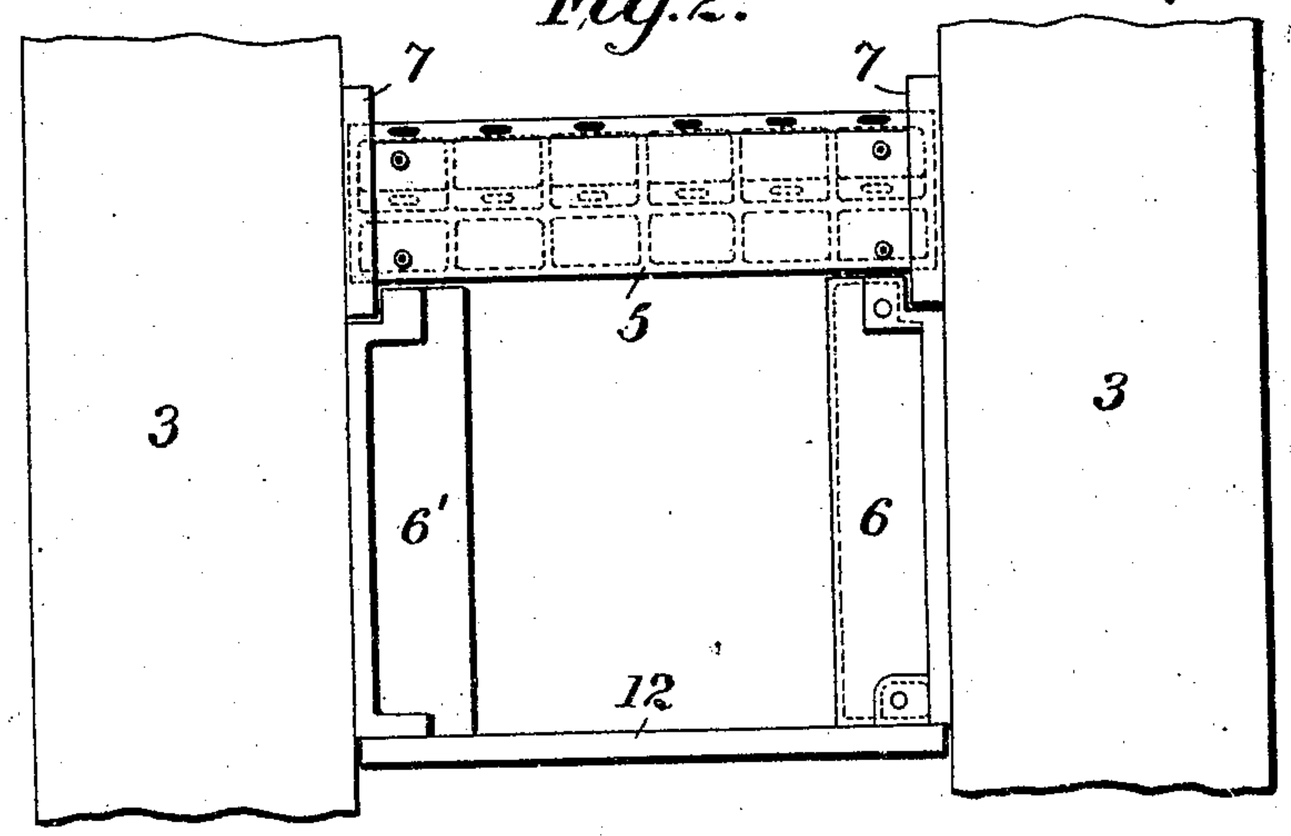
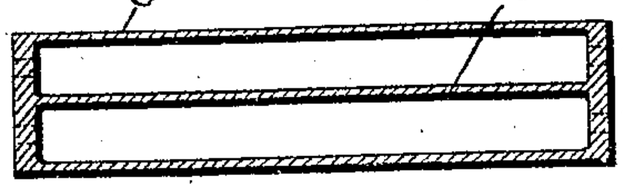


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

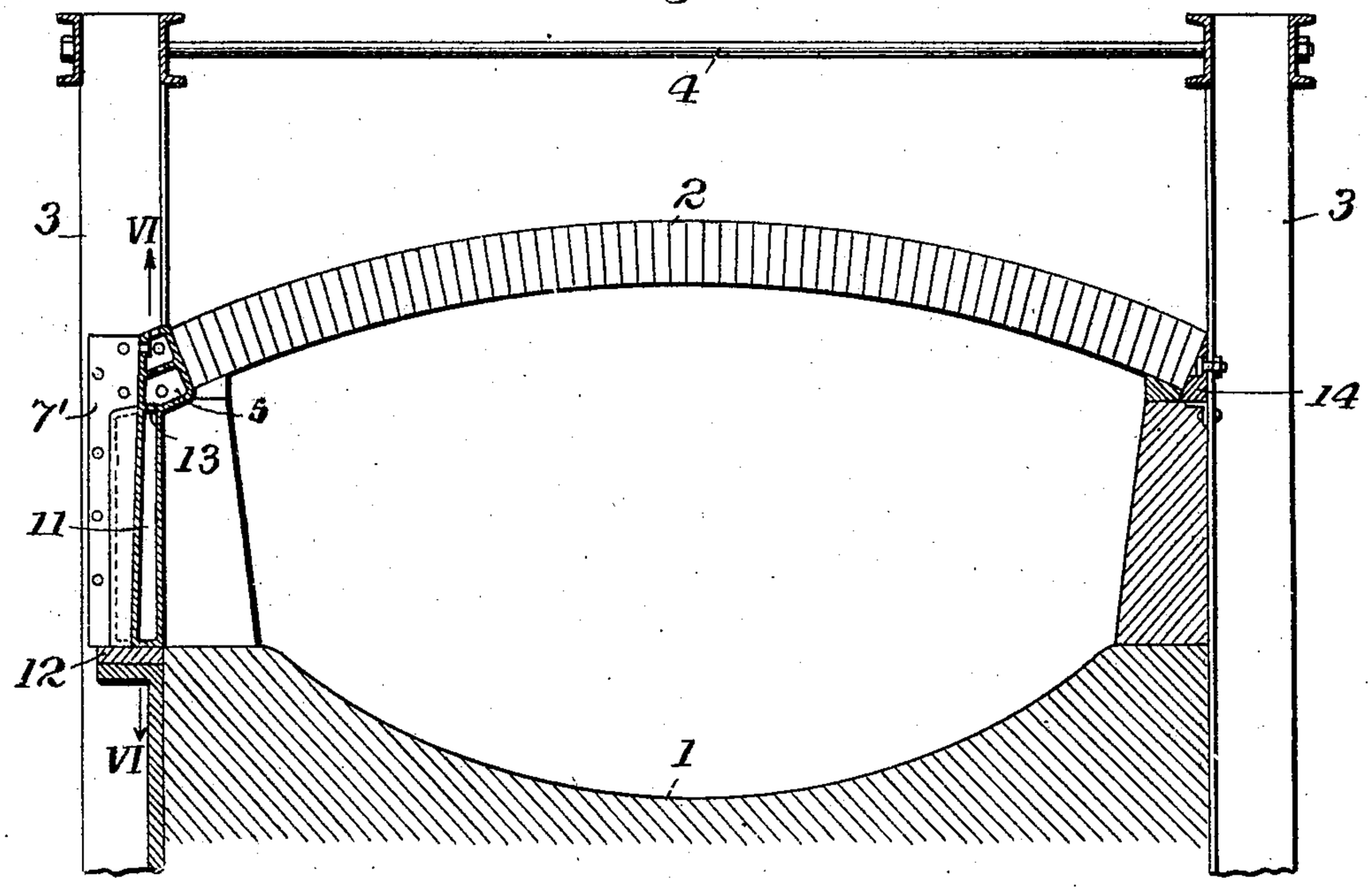


Fig. 6.

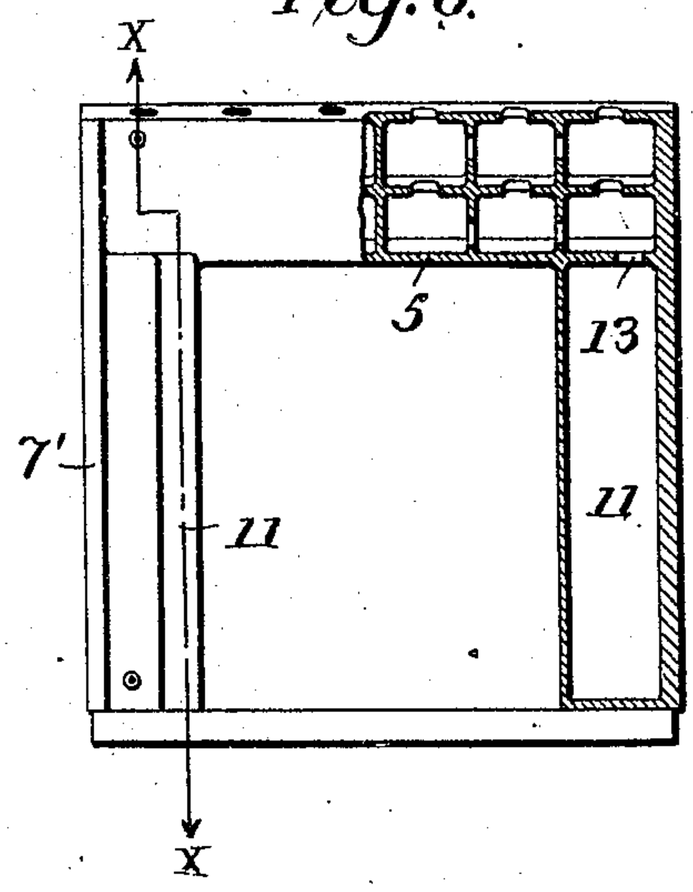
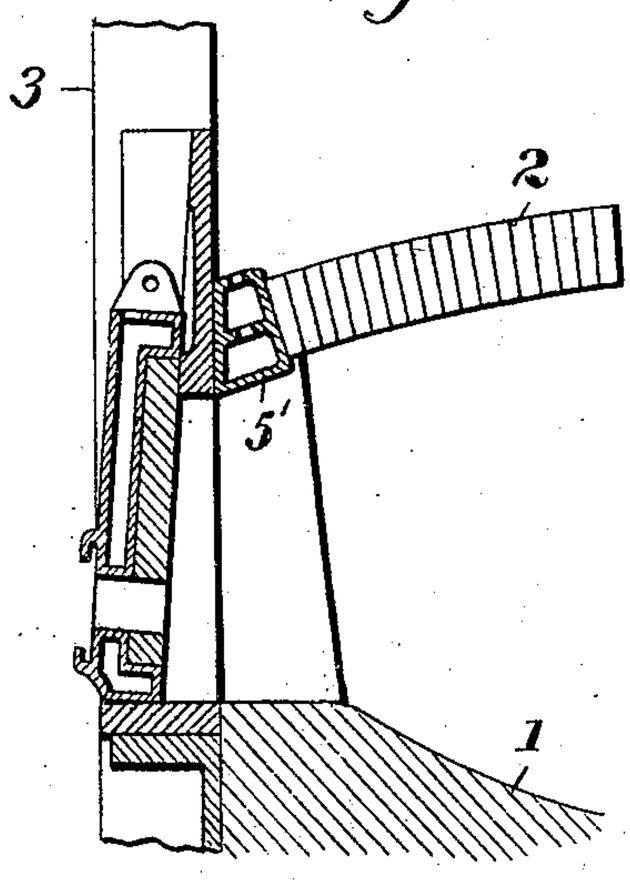


Fig. 7.



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UNITED STATES PATENT OFFICE.

JACOB BOWMAN McKENNAN, FRANK E. PARKS, AND SAMUEL W. GILLIN, OF PUEBLO, COLORADO.

DOOR-FRAME AND ROOF-SKEWBACK FOR FURNACES.

No. 918,356. Specification of Letters Patent. Patented April 13, 1909.

Application filed July 21, 1908. Serial No. 444,668.

To all whom it may concern:

Be it known that we, JACOB B. McKENNAN, FRANK E. PARKS, and SAMUEL W. GILLIN, citizens of the United States, residing at Pueblo, in the county of Pueblo and State of Colorado, have invented certain new and useful Improvements in Door-Frames and Roof-Skewbacks for Furnaces, of which the following is a specification.

Our invention relates to metallurgical furnaces, and more particularly to the door-frame and roof skewback for furnaces; and its object is to provide a construction more convenient of first installment, more durable, and more readily repaired than the corresponding parts of furnaces now generally used. We accomplish these objects by the construction shown in the accompanying drawings, in which:—

Figure 1 is a transverse section of an open-hearth furnace, taken between sets of buck-stays, and showing our improvement applied thereto at both front and back of the furnace; Fig. 2 is a partial front view of the furnace-door frame of Fig. 1; Fig. 3 is a partial plan view of the same, also showing the preferred modification of the skewback opposite the buck-stays; Fig. 4 is a section on line IV—IV through the rear skewback of Fig. 1, looking in the direction of the arrow; Fig. 5 is a second transverse section on line X—X of Fig. 6, of a furnace showing a modified door-frame construction, and at the right-hand thereof a construction at the back of the furnace corresponding to a section on the line V—V of Fig. 3; Fig. 6 is a front view, partly in section, of the water-cooled door-frame of Fig. 5, the section being taken along the line VI—VI of Fig. 5; and Fig. 7 is a partial transverse section showing a further modification adapted as either a sectional or a continuous skewback, located inside the buck-stays, and forming lintel-members wherever door-openings are desired in the furnace side walls which makes it necessary to maintain masonry arches over the door openings.

The general practice in constructing furnaces of this type is to support the roof by providing special skewback brick, which fit into and are supported by longitudinally arranged steel "channels" which are fastened inside the buck-stays; the channels at each side of the furnace being usually made in one, or in a few pieces, each of which is secured to a plurality of such buck-stays. This construction renders repairs to the roof supporting skewback and channels difficult, and also necessitates a masonry arch above the furnace doors to protect the channels, whereas, by our improved construction, any desired front skewback, intermediate the buck-stays, may serve as a door lintel, and is readily replaceable in case of damage thereto. Such combined skewbacks and lintels are preferably water-cooled; or the entire door-frame may be cast integral, as shown in Fig. 6, and water-cooled; or the skewback, door-frame, and foreplate may be cast integral and water-cooled.

Referring to the drawings, in which like reference numerals indicate like parts, 1 represents the hearth of the furnace, 2 the roof, 3 the buck-stays, and 4 the tie-rods.

In Figs. 1, 2, and 3, 5 represents a water-cooled, combined skewback and door-frame lintel, located between the outer vertical channels 3′ of adjacent sets of buck-stays, being supported upon and transmitting the lateral thrust of the roof-arch to hook-plates 7, suitably secured to the buck-stays. The sides or jambs of the door-frame may be either hollow and water-cooled, as shown at 6, or a solid, preferably cast-steel side, as shown at 6′. In the former case, suitable supply and discharge connections (not shown), are provided for the cooling fluid.

The rear skewback, intermediate the buck-stays, is shown at 8, Fig. 1, and in Fig. 4. It preferably bears, across substantially its entire ends, against the lateral faces of the buck-stays and is suitably secured thereto, as at 9; being also provided with an intermediate stiffening rib 10. As it is exposed throughout a large proportion of its surface to the atmosphere, and shielded by masonry from the direct heat of the furnace, it is not essential that it be water-cooled.

In the modification shown at 11, in Fig. 5, the door-frame sides or jambs, lintel, and skewback form an integral, water-cooled structure, carried by the sill or fore plate 12, and transmitting the lateral thrust of the roof to the buck-stays. In this structure, suitable circulating orifices 13, best shown in Fig. 6, permit the efficient cooling of the entire frame and skewback from a single set of fluid supply and discharge connections, (not shown). This same figure shows at 14, a solid skewback piece lying opposite or inside

the buck-stays (see Fig. 3), to act as a continuation of the support 8, located between said stays.

In the modification shown in Fig. 7, the skewback 5′ may be continuous from end to end of the furnace, or may be in sections and supported by the buck-stays, as will be readily understood; but in either case will act both to transmit the thrust of the roof arch and to replace the ordinary masonry arches heretofore deemed necessary above the door openings.

In all the modifications illustrated, the skewbacks are roof-supporting, that is, they constitute the sole support for the roof-arch and transmit the thrust to the buck-stays; the side walls of the furnace are built up under the skewbacks and roof, flush with the sides of the door openings; as will be apparent to those skilled in the art.

In case of accident, or failure, the skewbacks or lintels 5 of Fig. 1 can be replaced without disturbing either the hook plates or side-frames, by removing the necessary roof brick back of them so as to form an arched opening from one buck-stay to the other, on each side of the door. In this manner, the entire frame of Fig. 6 may be replaced; while obviously, the door-sides 6 or 6′, of Fig. 2, may be readily replaced without disturbing any of the other members. This may become necessary, from time to time, with the form shown at 6′; but the repair cost for this item is small, while the water-cooled leg or frame 6 is permanent, unless injured by accident.

The hook-plates, being removed from the heat of the furnace and in contact with the buck stays and water-cooled bodies, will rarely, if ever, require renewal; but if, for any unforeseen reason, it becomes necessary to replace them, this can be done without any difficulty by wedging up between the skewback and the door-frame sides and temporarily carrying the lateral thrust of the skewback by jacks, while the hook-plates are replaced.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a metallurgical furnace, a roof supporting sectional metal skewback, having sections between the buck-stays removably secured thereto.

2. In a metallurgical furnace, a roof supporting sectional water cooled metal skewback having sections between the buck-stays removably secured thereto.

3. In a metallurgical furnace, a roof supporting water cooled metal skewback, combined with a door lintel.

4. In a metallurgical furnace, a sectional metal door frame, partly water cooled, comprising a roof supporting skewback unprotected by a masonry door arch.

5. In a metallurgical furnace, a water cooled metal door frame integral with a roof supporting skewback.

6. In a metallurgical furnace, a water cooled metal door frame and fore-plate constituting an integral structure with a roof supporting skewback.

7. In a metallurgical furnace, a metal skewback having removable sections laterally secured between the buck-stays of the furnace.

8. In a metallurgical furnace, a water cooled metal door-frame comprising a roof-supporting skewback, unprotected by a masonry door arch.

9. In a metallurgical furnace, a roof supporting skewback comprising metal sections secured inside the buck-stays and removable water cooled sections laterally secured between said stays and constituting a portion of the furnace-door frames.

10. In a metallurgical furnace, a roof supporting structure comprising buck-stays, hook-plates secured to the lateral sides of said stays, and a combined water cooled metal door-lintel and skewback removably supported by said hook-plates.

11. In a metallurgical furnace, a roof supporting structure comprising buck-stays, hook-plates secured to the lateral sides of said stays, and a water cooled metal door-frame structure supported by said hook-plates and comprising a combined door-lintel and roof supporting device.

In testimony whereof we affix our signatures in presence of two witnesses.

JACOB BOWMAN McKENNAN.
FRANK E. PARKS.
SAMUEL W. GILLIN.

Witnesses:
T. J. Brown,
James H. Robinson.