Dec. 15, 1931. E. WILLIAMS 1,836,784

FRAME FOR FURNACE DOORWAYS

Filed March 22, 1929

Fig. I.

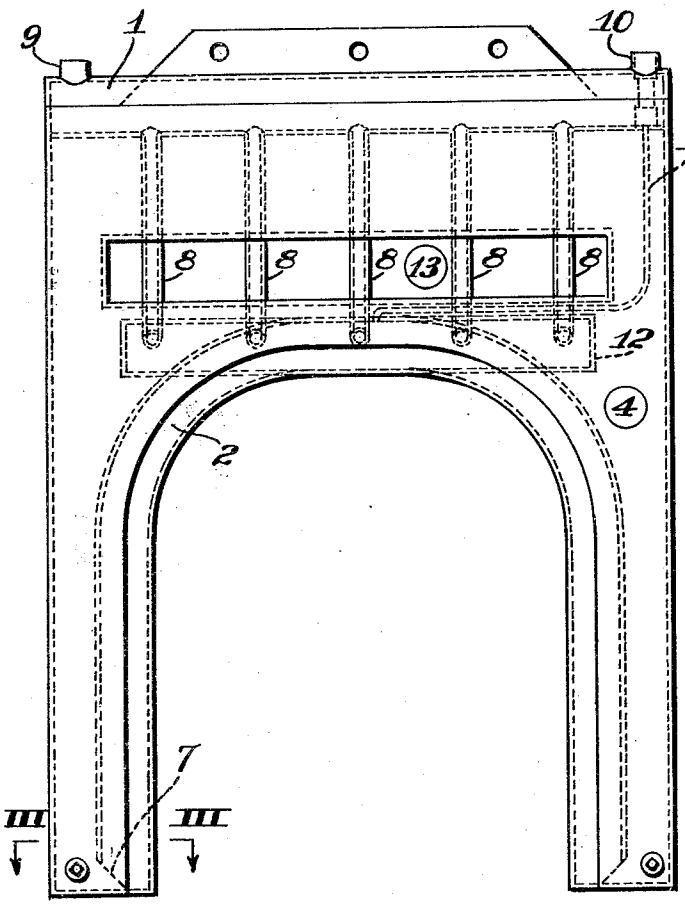


Fig. II.

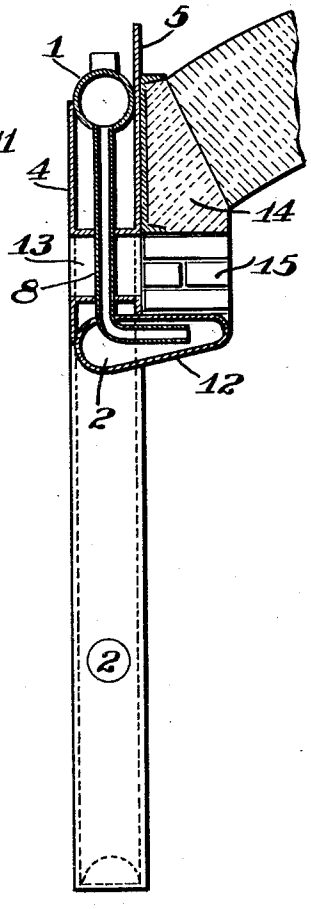
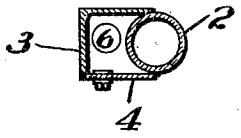


Fig. III.



WITNESS

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UNITED STATES PATENT OFFICE

EDWARD WILLIAMS, OF CHARLEROI, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO BLAW KNOX COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY

FRAME FOR FURNACE DOORWAYS

Application filed March 22, 1929. Serial No. 349,110.

My invention relates to frames for furnace doorways and, while not limited in applicability to the doorways of furnaces of any particular sort, the invention finds practical value in application to the frames for the doorways of open-hearth steel furnaces. It concerns a water-cooled frame, and, as I have developed it, it constitutes an improvement upon the frame of Letters Patent of the United States No. 1,580,187, granted me April 13, 1926.

In the accompanying drawings Fig. I is a view in rear elevation—that is to say, as seen from the outside when in place—of a frame embodying my present invention; Fig. II is a view in vertical section and in this figure adjacent portions of furnace structure appear; Fig. III is a view in horizontal section, on the plane indicated at III—III, Fig. I.

The frame is a box-like structure, with interior arrangement to effect water circulation, and consists of a rim and face-plates. The rim includes two lengths of pipe 1 and 2, of which the upper is a horizontally extending length of, say 4½ inches in diameter, and the lower is a length of, say, 5¾ inch pipe, arched to define the door opening. The rim may be completed by vertically extending lengths of rolled angle 3, to which the ends of pipes 1 and 2 are welded. The two lengths of pipe extend with their axes in a common plane, or substantially so, and to them on opposite sides the face plate 4 and 5 are applied tangentially, or substantially so, and welded along the mid-lines of the two lengths of pipe, as the drawings show. The length of pipe 1 above is closed at its ends, it may be by webs of the angles 3. The frame at the lower ends of its two leg portions is closed by plates 6; and the length of pipe 2 at its lower ends is cut away, as indicated at 7 to afford communication of the stream of water from the pipe to the boxed-in chamber of the frame. A plurality of circulation pipes 8 of smaller size, of, say, 1½ inches in diameter extend from the upper length of pipe 1 to the lower length of pipe 2, or to the extension thereof presently to be described.

Through an inlet nipple 9 water enters and fills the upper pipe 1. From pipe 1 as from a header the water, having no other escape descends through the circulation pipes 8 (which, enveloped in water, are heat-insulated) and enters and fills the arched pipe 2, with its extension. Relatively cool water is thus brought to the crown of the arch of pipe 2, the place of maximum temperature. Through pipe 2 the water flows downward in two streams and escapes at the lower cut-away ends 7 of pipe 2, and there emerges to the outer space which is boxed-in by the face plates 4 and 5. Filling all this space the body of water affords heat insulation for the circulation pipes 8. From the boxed-in body space of the frame there is exit for the water through a nipple 10 which is prolonged through the header chamber of pipe 1. A vent pipe 11 of small size, say ½ an inch, leads from the crown of the arch of pipe 2, to the outlet, to afford escape for steam, should steam be formed.

Upon the arched pipe 2 at the crown of the arch an inward extension 12 is carried. This extension is a horizontal ledge or sill of depth sufficient to extend, when the frame is in place, through the opening in the furnace wall, as clearly seen in Fig. II. The extension is in vertical section of the shape shown in Fig. II. To the rear it is in open communication with the pipe 2 and forms an enlargement of the chamber of pipe 2. As appears in Fig. I, this ledge is prolonged to left and right, beyond coincidence with arched pipe 2, and in these prolongations the extension is on its rearward side closed, as it conveniently may be by plate 5. The circulation pipes 8, which at their lower ends are welded in orifices formed in pipe 2 to receive them, are prolonged and bent, so as to deliver their cooling streams immediately at the inner end of extension 12, as clearly seen in Fig. II.

Through the body of the frame a window 13 is formed. The lower horizontal edge of this window is tangent to, or substantially tangent to the arched pipe 2 at the crown of the arch, and coincident with, or substantially coincident with, the upper surface of ledge 12, and the window extends throughout the breadth of the frame, so far as is consistent

with rigidity of the whole. The circulation pipes 8 extend across the window space, and in that portion of their extent they are air-cooled.

When the frame is in place, as shown in Fig. II, the ledge 12 extends through the opening in the furnace wall and with an interval between, underlies the skew back 14 of the vault of the furnace roof. The window 13 affords access to this space interval, and into this space interval a body of masonry 15 may be built. This body of masonry 15 rests on the ledge 12; it may be built in snugly, filling all the space, and may be so made to protect the skew back and its supporting channel from out-licking tongues of flame; and through window 13 it is accessible for replacement and repair, without removal of the frame from its position.

I have illustrated and described a present preferred embodiment of the invention. It will be understood, however, that it is not limited to the form shown but may be otherwise embodied within the scope of the following claims.

I claim as my invention:

1. A water-cooled frame for furnace doorways including in its structure an upper header, a lower doorway-rimming header, circulation pipes extending between said headers, face-plates applied to said headers and boxing-in a chamber within which said circulation pipes extend, a hollow ledge extending laterally from said lower header, the frame being provided with a window opening through it, above said ledge, the said circulation pipes extending across the window space.

2. In a furnace structure a roof beam, the furnace wall beneath the roof beam being provided with a door opening, a frame facing the furnace wall around such door opening, the frame being provided with a ledge extending into the door opening at an interval beneath the roof beam, and a body of masonry resting on said ledge and filling the space between ledge and roof beam, said frame being provided with a window opening, through which such body of masonry is accessible.

3. A frame for furnace doorways including a water-cooled body having depending legs, a ledge projecting from the body above the opening defined by the body and the legs, the ledge being adapted to extend toward the interior of a furnace to which the frame is applied and to support brick-work thereon, and a window through the body above the ledge.

4. A frame for furnace doorways including a water-cooled body having depending legs, a ledge projecting from the body above the opening defined by the body and the legs, the ledge being adapted to extend toward the interior of a furnace to which the frame is applied and to support brick-work thereon, a window through the body above the ledge, and circulation pipes lying partly within the body but in part extending across said window opening.

In testimony whereof I have hereunto set my hand.

EDWARD WILLIAMS.