

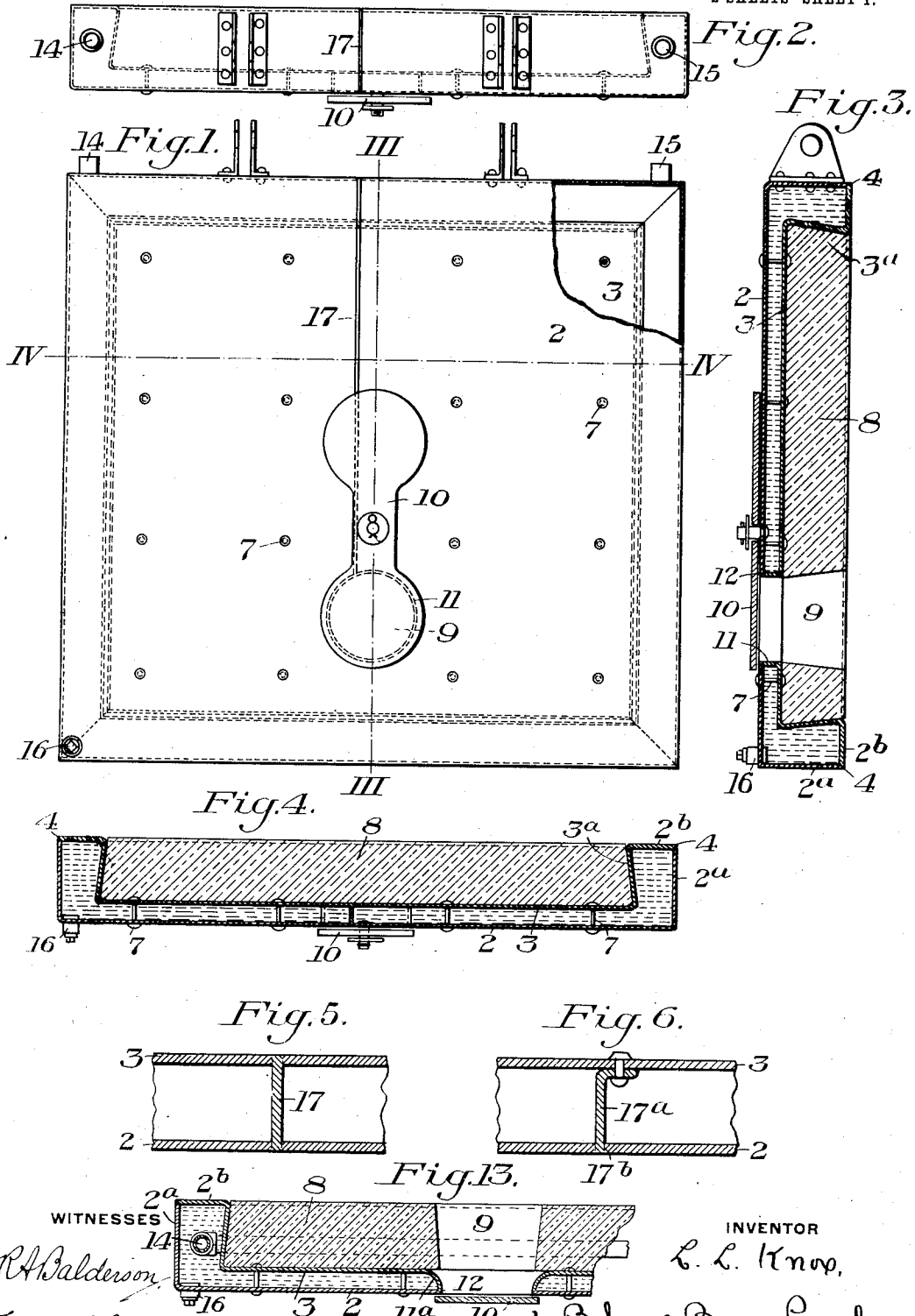
L. L. KNOX.
FURNACE DOOR.

APPLICATION FILED MAY 12, 1910. RENEWED JULY 25, 1912.

1,037,778.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.



WITNESSES
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2 SHEETS—SHEET 2.

Fig. 9.

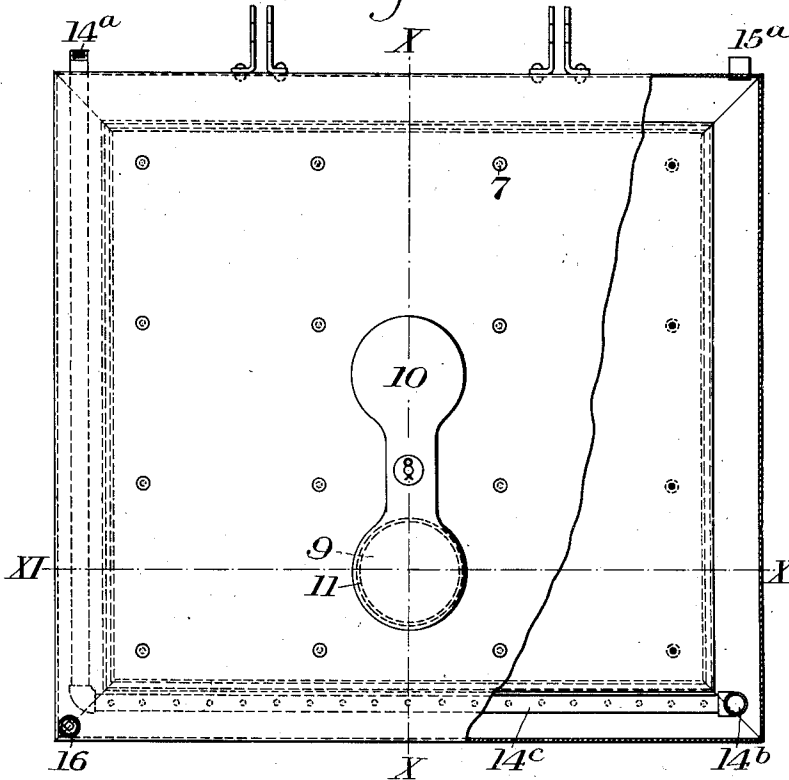


Fig. 10.

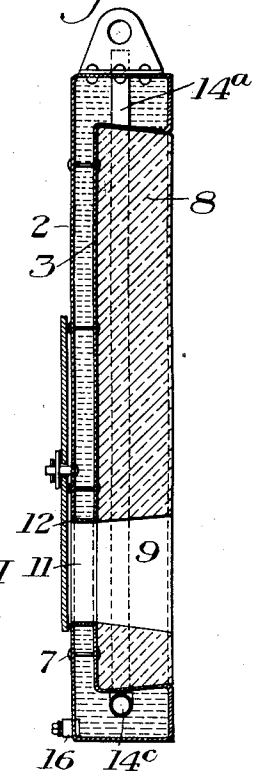


Fig. 11.

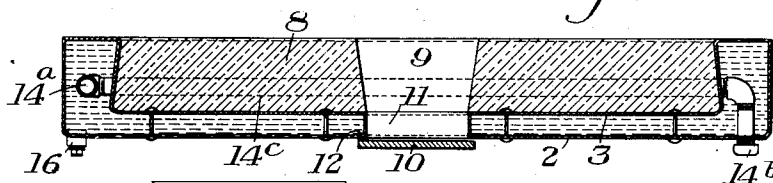


Fig. 7.

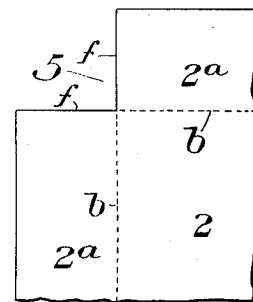


Fig. 8.

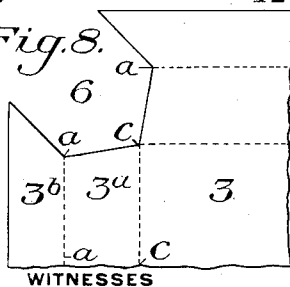
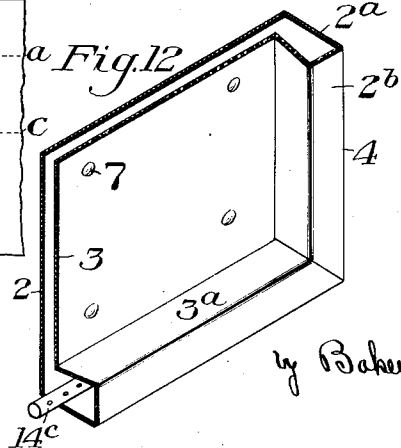


Fig. 12.



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UNITED STATES PATENT OFFICE.

LUTHER L. KNOX, OF AVALON, PENNSYLVANIA, ASSIGNOR TO THE KNOX PRESSED & WELDED STEEL COMPANY, OF NILES, OHIO, A CORPORATION OF OHIO.

FURNACE-DOOR.

1,037,778.

Specification of Letters Patent.

Patented Sept. 3, 1912.

Application filed May 12, 1910, Serial No. 560,855. Renewed July 25, 1912. Serial No. 711,574.

To all whom it may concern:

Be it known that I, LUTHER L. KNOX, of Avalon, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Furnace-Doors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view partly broken away of a door embodying my invention; Fig. 2 is a top plan view; Fig. 3 is a section on the line III—III of Fig. 1; Fig. 4 is a section on the line IV—IV of Fig. 1; Figs. 5 and 6 are detail sectional views showing different ways of providing the baffle; Fig. 7 is a detail plan view showing a corner portion of the blank from which the outer frame plate of the door is made; Fig. 8 is a similar view of a corner portion of the blank for making the inner plate of the door frame; Fig. 9 is a view similar to Fig. 1, but showing a modification; Fig. 10 is a section on the line X—X of Fig. 9; Fig. 11 is a section on the line XI—XI of Fig. 9; Fig. 12 is a perspective view of a corner portion of the frame of the door; and Fig. 13 is a view showing a modified construction of the peep-hole.

My invention has relation to furnace doors, and more particularly to water-cooled doors; and is designed to provide a door having a sheet metal frame which can be readily constructed, together with means for cooling the same.

The nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction without departing from the spirit and scope of my invention as defined in the claims.

Referring first to that form of my invention shown in Figs. 1 to 4, inclusive, the door consists of a hollow sheet metal frame, composed of an outer plate member 2 and an inner plate member 3. Each of these members is preferably formed from an integral sheet of metal, the two sheets of metal being practically integrally connected on the line 4 by welding.

In constructing the door, the blank 2 for the outer frame member is shaped at its

corners in the manner shown in Fig. 7, the corner portions being cut away as shown at 5. The blank is then bent at substantially right angles on the dotted lines *b* to form the edge portions 2^a of the frame. The blank 3 for the inner frame member is shaped at its corners as shown in Fig. 8, these corners being cut away as shown at 6. The blank is then bent on the dotted lines *a—c* and *c—c*, the portions outside of the line *a—c* forming the inner edges 2^b of the inner frame member, and which are welded to the free edges of the portions 2^a of the outer frame member. The corner cuts between the ends of the lines *a—c* and *c—c* are made at an angle to each other, somewhat greater than ninety degrees, so that when the edges *a—c* are brought together and welded, the portions 3^a of the frame will have a dovetail or undercut as shown. The edges *f* of the blank 2 are brought together and welded to form the corners of the outer frame member. The two frame members are held in proper relation to each other by means of a plurality of spacing rivets 7.

8 designates the refractory lining of the door, which is retained in place by the undercutting or dovetailing of the portions 3^a of the inner frame member.

9 designates the usual peep-hole, and 10 the pivoted cover plate therefor. This peep-hole may be formed by inserting and welding in place a short tube section or nipple 11, as shown in Figs. 3 and 10, or the edge portions surrounding the hole in the inner frame member may be bent outwardly as shown at 11^a in Fig. 13, and their edges welded to the edge portions of the hole in the outer member as indicated at 12 in said figures.

The hollow space between the inner and outer frame members is kept filled with water by means of a water supply pipe 14, which preferably enters the door frame at the top at one side, a discharge pipe 15 being connected to the top at the opposite side. 16 designates a clean-out plug, which may be provided at the lower portion of the door.

In order to cause the relatively cold water entering the door to flow downward to the bottom thereof, and thence upwardly to the discharge connection 15, I provide a suitable interior arrangement of baffles. In

Fig. 1 I have shown a single vertical baffle plate 17, which extends downward from the top edge of the door to the peep-hole. This baffle may be formed by welding the edges of a strip into slots cut in the inner and outer frame members, as shown in Fig. 5; or an angle strip 17^a may be used, as shown in Fig. 6, this strip having its short flange riveted to one of the frame members, and the free edge of its longer flange welded in a slot at 17^b to the other frame member.

Figs. 9, 10 and 11 show a modification in which the general construction is the same as that before described, but the inlet pipe 14^a for the cold water is carried downwardly through one side of the door, and is then bent horizontally across the lower portion thereof, its end being plugged at 14^b. The plug is detachable, to provide means whereby the pipe may be readily cleaned. The horizontal arm of this pipe has a plurality of discharge perforations 14^c, through which the cold water is discharged against the lower inner portion of the door and thence rises as it becomes heated to the discharge connection 15^a. This is the hottest part of the door, being directly exposed to the heat of the furnace.

My invention provides a furnace door having a frame which can be constructed of sheet metal at a relatively low cost, and which is well adapted to withstand the heat to which it is subjected in service, particularly when water-cooled in the manner described. The welding operations for uniting the inner and outer frame members can be performed rapidly and at a relatively small cost by modern welding methods well known in the art.

Prior to my present invention, it has been usual to construct cooling frames of this character of integral castings. It has been found, however, that such castings will crack in service, and soon become worthless; and although various metals and alloys have been tried for the castings, this difficulty has not been satisfactorily overcome.

My present invention, by providing a welded sheet metal structure, avoids the difficulty.

What I claim is:—

1. A furnace door having a cooling chamber therein, and a water supply pipe extending downwardly into said chamber, and having an arm which extends transversely across the lower portion of the chamber and which has a plurality of discharge openings; substantially as described.

2. A furnace door comprising a hollow structure formed of shaped plates or sheets of metal having substantially parallel body portions and edge portions at an angle to the body portions, said edge portions being shaped, and united at the edges thereof to form hollow side, top, and bottom, portions which project inwardly from the body portion, and open into the hollow body portion; substantially as described.

3. A furnace door, formed from two generally rectangular metal plates or sheets, having flat body portions separated from each other to form a hollow door body, and all four of their edges bent inwardly at an angle, and shaped and united to form inwardly projecting hollow side, bottom, and top, portions communicating with the space between the body portions of the sheets and inclosing a liquid receiving pocket; substantially as described.

4. A sheet metal furnace door comprising a hollow body portion and hollow side, top and bottom portions, the chambers of said side, top, and bottom, portions all forming extensions of the chamber of the body, and providing a continuous space for a cooling fluid; substantially as described.

5. A furnace door having a cooling chamber therein, and a pipe extending into said chamber and having a plurality of discharge openings, said pipe having its discharge end extending outwardly through the wall of the door and provided with a detachable closure; substantially as described.

In testimony whereof, I have hereunto set my hand.

LUTHER L. KNOX.

Witnesses:

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GEO. H. PARMELEE.