No. 806,381. PATENTED DEC. 5, 1905.

J. F. WELLER.

FURNACE DOOR FRAME AND MEANS OF COOLING.

APPLICATION FILED AUG. 15, 1905.

Fig. 1.

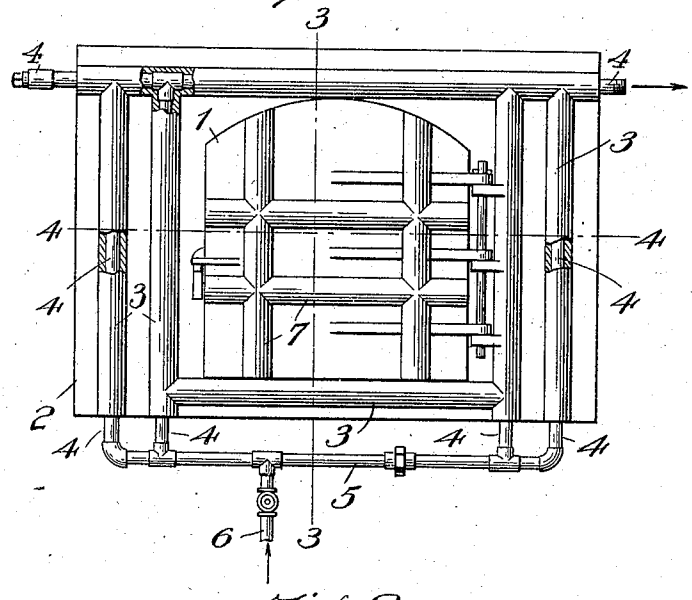


Fig. 2.

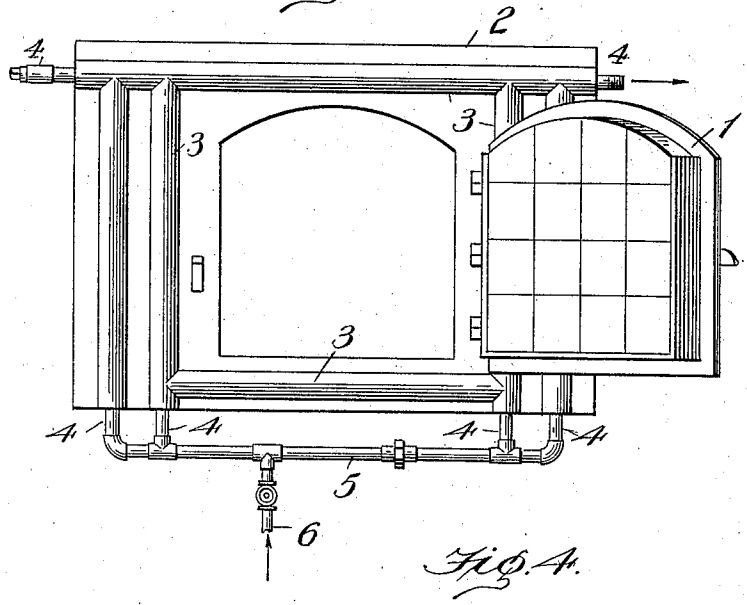


Fig. 3.

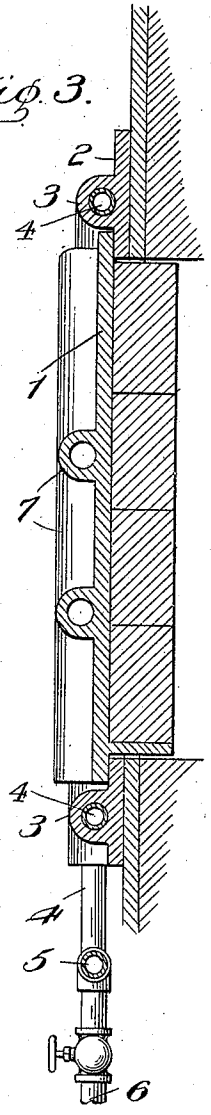
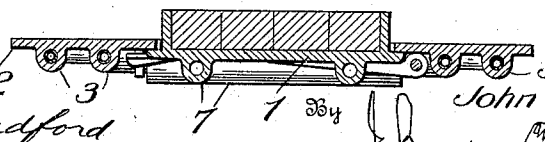


Fig. 4.



Witnesses

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FURNACE-DOOR FRAME AND MEANS OF COOLING.

No. 806,381. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed August 15, 1905. Serial No. 274,299.

To all whom it may concern:

Be it known that I, JOHN FRANKLIN WELLER, a citizen of the United States, residing at Charlestown, in the county of Jefferson and State of West Virginia, have invented certain new and useful Improvements in Furnace-Door Frames and Means of Cooling; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Burning lime requires a continuous operation under a high heat and in which frequent explosions occur, which drive the heat against the charging-door, the edges of its supporting-plate, and its supporting-wall. From the heat and the explosions this front wall and door-plate in time become burned off at the edges bounding the charging-opening and the plate becomes warped and cracked and fails to give proper support to the door in its closing function.

My improvement is directed to novel means for the protection of the door-supporting frame and the door against the destructive effects of the heat and also for utilizing this means for reinforcing and thereby increasing the durability of the frame and the door of a furnace and preventing both from warping and cracking and keeping them both relatively in working condition for a longer time than would otherwise be possible. For these purposes my improvement is designed for use with a single-plate door-frame and door each cast with integral surface reinforcing and cooling tubes with the advantage of utilizing the surface frame-tubes as housings for pipes for the circulation of a cooling medium on the outer front wall, and in the claims appended hereto I will point out the parts and combinations of parts which constitute my invention.

The accompanying drawings represent so much of a furnace as illustrates my invention, and in which—

Figure 1 shows in front view the charging-door and its mounting-frame, the door being closed and both embodying my invention. Fig. 2 shows in front view the door-frame, the door being in open position and illustrating the frame reinforcing and cooling means on its front wall. Fig. 3 is a vertical section taken through the charging-door of the furnace and showing my improved door-frame and door, the section being on the line 3 3 of Fig. 1. Fig. 4 is a horizontal section of the frame and the charging-door, the latter being closed and the section taken on the line 4 4 of Fig. 1.

The furnace may be of any suitable construction adapted for calcining or for metallurgical purposes; but my invention is more particularly designed for limekilns, the charging-door 1 of which is preferably hinged to a door-frame 2, bolted upon the front wall, and is cast of steel or other suitable metal with a charging-opening. Cast integral on the outer wall of this frame are tubes 3, surrounding the charging-opening, so that said tubes project from said wall and strengthen and reinforce it, rendering it more rigid and increasing the durability of the frame. I utilize these integral wall-tubes as the means for supporting and inclosing small pipes 4, which form conduits for a cooling medium, preferably air, which is forced through them for preventing the undue heating of the frame, and thereby prevent its warping and cracking. For this purpose I prefer to cast the surface-tubes upon the air-conducting pipes in the casting of the frame, and thereby give economy of construction. These separate air-conducting pipes enter the lower open ends of the frame-tubes and are connected by a pipe 5 below the frame, and with which a pipe 6 connects and extends to the source of the air-supply, (not shown,) but which may be an air-pump, so that the air will pass from the supply up through the pipes in the surface-tubes into the upper horizontal air-pipe and out one or both ends, imparting a cooling effect to the surface-tubes and to the frame, and thereby preventing it from warping and cracking by undue heat. The vertical and horizontal branches of the embedded air-pipes may be connected by couplings.

The inner wall of the door is protected from contact with the heat by fire-resisting material, while its outer wall has integrally-cast tubes 7, projecting from its surface and which may be in intersected relation and of any form, with their ends preferably open to allow communication through them, with the air as a cooling medium, so that the fire-resisting lining on the inner side and the reinforcing-tubes on the outer side render the door safe from warping and keep it in joint-forming condition with the frame.

As limekilns are provided with a plurality

of charging-openings, each is provided with a frame and door, as above stated.

An important feature of my invention is the casting of the door-frame with outer wall-tubes inclosing separate pipes, whereby the surface-tubes serve to reinforce the frame and to inclose pipes, which in the operation of casting the frame serve as cores for casting the frame surface-tubes, thus saving cost in time and labor and producing a door-frame the outer wall of which has tubular projections, the functions of which are twofold and both advantageous as means for preventing the destruction of the door-frame and keeping it in working condition with the door. Obviously the reinforcing surface-tubes may be cast with the door-frame and the air-pipes inserted within the tubes; but in either case the surface-tubes will be reinforced by inner pipes, so that the two together will be effective in protecting a single plate from the warping and cracking effects of the heat.

A plurality of vertical wall-tubes may be used as in Fig. 1, and each may inclose an air-pipe connected with and opening into the upper inclosed air-pipe, or the air-pipes may be dispensed with, leaving the tubes open at their ends for the circulation of the air.

Looking at Fig. 1, it will be noticed that the lugs for the door-hinges are cast on the wall-tubes, so that the tubes do not interfere with the opening of the door.

I claim—

1. In a furnace, the frame of the charging-door cast with reinforcing-tubes projecting from its outer wall around the charging-opening.

2. In a furnace, the frame of the charging-door cast with reinforcing-tubes projecting from its outer wall each tube inclosing a conducting-pipe for a cooling medium.

3. In a furnace, the frame of the charging-door cast with reinforcing-tubes projecting from its outer wall each tube cast with and inclosing a conducting-pipe for a cooling medium, the frame, its wall-tubes and air-pipes constituting a unitary.

4. In a furnace, the door cast with reinforcing-tubes projecting from its outer wall and open at their ends.

5. In a furnace, the combination with a door-frame cast with reinforcing-tubes projecting from its outer wall around the charging-opening, with the door cast with reinforcing-tubes projecting from its outer wall and open at their ends.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN FRANKLIN WELLER.

Witnesses:
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ANNE B. JOHNSON.