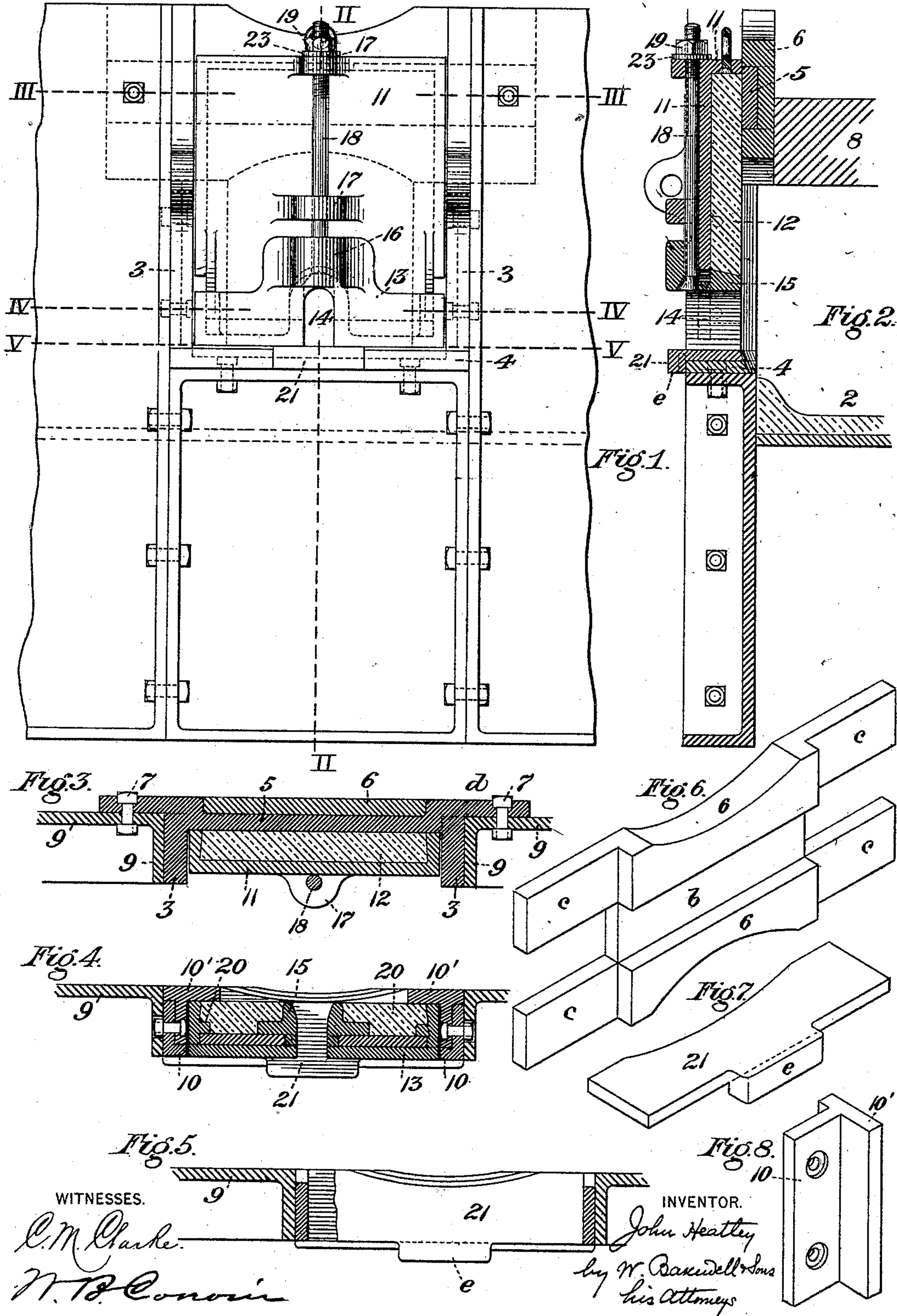


(No Model.)

J. HEATLEY.  
FURNACE DOOR.

No. 412,884.

Patented Oct. 15, 1889.





# UNITED STATES PATENT OFFICE.

JOHN HEATLEY, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-HALF  
TO THOMAS R. VENNERS, OF SAME PLACE.

## — FURNACE-DOOR.

SPECIFICATION forming part of Letters Patent No. 412,884, dated October 15, 1889.

Application filed February 11, 1889. Serial No. 299,418. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN HEATLEY, of Pittsburg, in the county of Allegheny and State of 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 elevation of my improved furnace-door. Fig. 2 is a vertical section thereof on the line II II of Fig. 1. Fig. 3 is a horizontal cross-section on the line III III of Fig. 1. Fig. 4 is a similar section on the line IV IV of Fig. 1. Fig. 5 is a similar section on the line V V of Fig. 1. Fig. 6 is a perspective view of the reversible back plate. Fig. 7 is a perspective view of the fore plate. Fig. 8 is a perspective view of one of the cheeks.

Like symbols of reference indicate like parts in each.

In the drawings, 2 represents the bed or hearth of a puddling-furnace, and 1 is the cinder-plate.

The door-frame is composed of vertical side bars 3, a bottom piece 4, and a plate or cross-piece 5 at the upper end. The side pieces 3 are set against the masonry in the doorway of the furnace. The bottom piece 4 is bolted to the cinder-plate, and the cross-piece 5 fits within the groove *b* of a back plate 6. This back plate is of peculiar construction, and is represented in Fig. 6. At the ends it is provided with extending arms *c*, of less thickness than the ungrooved middle portion of the plate. The middle portion of the cross-piece 5 fits against the back of the groove *b*, and is provided with offset shoulders or projections *d*, fitting between the arms *c*. The shoulders *d* of the door-frame are secured to the iron plates 9, forming the facing of the furnace, by means of bolts 7, and the door-frame and back plate are backed with masonry 8, as clearly shown in Fig. 2. The plate 9 is provided with outwardly-projecting vertical flanges, which fit against the outer sides of the door-frame, as shown in Figs. 3, 4, and 5. The lower portion of the side pieces 3 of the door-frame are provided with lateral recesses, in which are set vertical cheek-pieces

10, as shown in Fig. 4, these cheek-pieces being made of T shape, having shanks which fit against the side pieces of the door-frame in said recesses, and having heads 10' on the interior of the furnace-wall which fit against the back edge of the door-frame and project inwardly beyond the same to form a backing for the door and to protect the edges of the frame from heat. The cheeks are secured to the door-frame and plates 9 by bolts, as shown in Fig. 3.

The door consists of a metal frame 11, having an inwardly-projecting marginal flange at the top and sides, thus forming a concave or scoop-like frame, in which the masonry backing 12, of fire-bricks, may be built. At the lower part of the door the lateral marginal flange is cut away, and the door is provided with an extensible foot-piece 13, which is flanged at the front and bottom, so as to fit over and to be capable of adjustment telescopically or extensibly on the lower portion of the door. The middle portion of the front of the extensible foot projects upwardly a considerable distance, as shown in Fig. 1, and is provided with an opening 14, and on the inner side of the foot, separated from the vertical portion thereof sufficiently to allow of the intervention of the front plate of the door, is a cast-iron block 15, which is secured to the bottom flange of the foot, and which forms the lining for the working-hole 14.

16 is a lug cast on the foot 13, and 17 are lugs cast on the door-plate in line therewith. A bolt 18 passes through the lugs 16 and 17, and by means of a nut 19 and washer 23 on this bolt the foot 13 and the door-plate 11 may be adjustably drawn together to compress the refractory lining 12 and to hold the parts of the door firmly together. In this way I am enabled, after the refractory lining has been built in place, to draw the parts of the door together, thus making it very compact and solid. In order to guide the parts of the door when they are thus drawn together and to preserve them in proper relative position, I prefer to provide the lateral marginal flanges of the foot 13 with guide ribs or lugs 20. (See Fig. 4.) At the base of the door, on the cross-piece 4 of the same, is a fore plate 21, provided with a downwardly-projecting flange or shoul-



der *e* at the front edge, which fits over the edges of the cross-piece and serves to hold the fore plate from backward displacement. It is prevented from forward displacement by  
 5 flanges *h* on the front edge of the cross-piece  
 4 of the frame.

The parts of my improved door are easily put together and built with the furnace and are very durable. One of the parts of the  
 10 furnace-door which is most liable to destruction by the heat is the back plate, and when this plate is made integral with the door-frame, as has been the practice heretofore, the whole door-frame must be removed and  
 15 thrown away, when the lower portion of the back plate is burned. In the use of my improved furnace-door the back plate may be taken out and reversed when its lower edge is burned, so that the destroyed or partially  
 20 destroyed lower edge shall become the top edge and that the uninjured top edge of the plate shall be at the bottom, which is the place of greatest heat.

The construction which I have described is  
 25 adapted for use in puddling-furnaces, where it is necessary to have a working-hole, through which the rabble of the puddler is inserted. When the door is used on heating-furnaces, this work-hole is unnecessary, and  
 30 the extensible foot may be made imperforate and without the block 15. In case the door is to be applied to the closing of openings of considerable width, two or more of the bolts  
 35 18 may be employed, in order to impart to the door sufficient strength and rigidity.

My invention is susceptible of other modifications in form, arrangement, and details of construction, such as will suggest themselves to those skilled in the art of furnace-building,  
 40 and its advantages will be appreciated by them.

The door is very strong and durable, and not apt to burn or warp with the heat. The fore plate, the cheeks, and the back plate may be renewed from time to time as they wear out.

45 I claim—

1. The furnace-door comprising the frame 11, an extensible foot, and an interposed backing 12, substantially as and for the purposes described.

50 2. The furnace-door comprising the frame 11, an extensible foot, an interposed backing

12, and a bolt connecting the frame and foot for drawing the same together, substantially as and for the purposes described.

3. The furnace-door comprising the frame 55 11, an extensible foot, an interposed backing 12, a bolt connecting the frame and foot for drawing the same together, and lugs 16 and 17, through which the bolt passes, substantially as and for the purposes described. 60

4. The doorway-frame having vertical sides and cross-pieces at the top and bottom, the cross-piece at the top being secured to the furnace-wall and the cross-piece at the bottom being secured to the cinder-plate, substantially as and for the purposes described. 65

5. The combination, with the doorway-frame having at the base a cross-piece flanged, as at *h*, of a fore plate which fits on the cross-piece and is provided with a projecting retaining flange or shoulder *e*, substantially as and for the purposes described. 70

6. The combination, with the doorway-frame having a cross-piece at the upper end thereof, of a reversible back plate having a 75 recessed portion *b*, which fits over the cross-piece, substantially as and for the purposes described.

7. The combination, with the doorway-frame having a cross-piece at the upper end 80 thereof, of a reversible back plate having a recessed portion *b*, which fits over the cross-piece and is provided with projecting arms *c*, substantially as and for the purposes described. 85

8. The furnace-door comprising the frame 11, an extensible foot, and an interposed backing 12, said foot being provided with guide ribs or lugs 20, substantially as and for the purposes described. 90

9. The furnace-door comprising the frame 11, an extensible foot, and an interposed backing 12, said foot being provided with a work-hole 14 and a lining-block 15, substantially as and for the purposes described. 95

In testimony whereof I have hereunto set my hand this 4th day of February, A. D. 1889.

JOHN HEATLEY.

Witnesses:

THOMAS W. BAKEWELL,  
 W. B. CORWIN.