

No. 829,438.

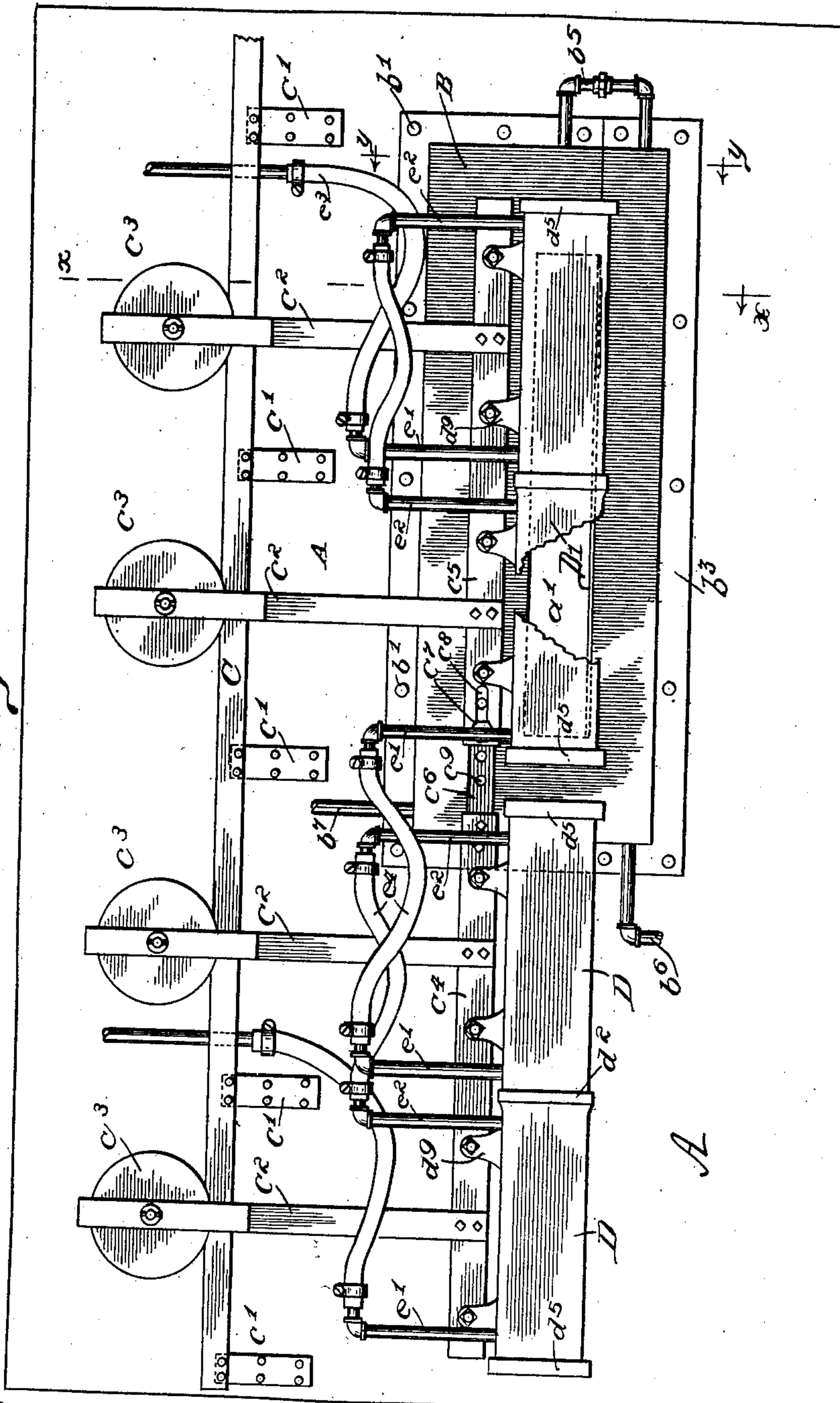
PATENTED AUG. 28, 1906.

G. W. SHEAR.  
FURNACE DOOR.

APPLICATION FILED JAN. 16, 1903.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.  
John Braunwalder.  
L. J. Snow.

Inventor:  
George W. Shear.  
Frederick Benjamin.  
Att'y

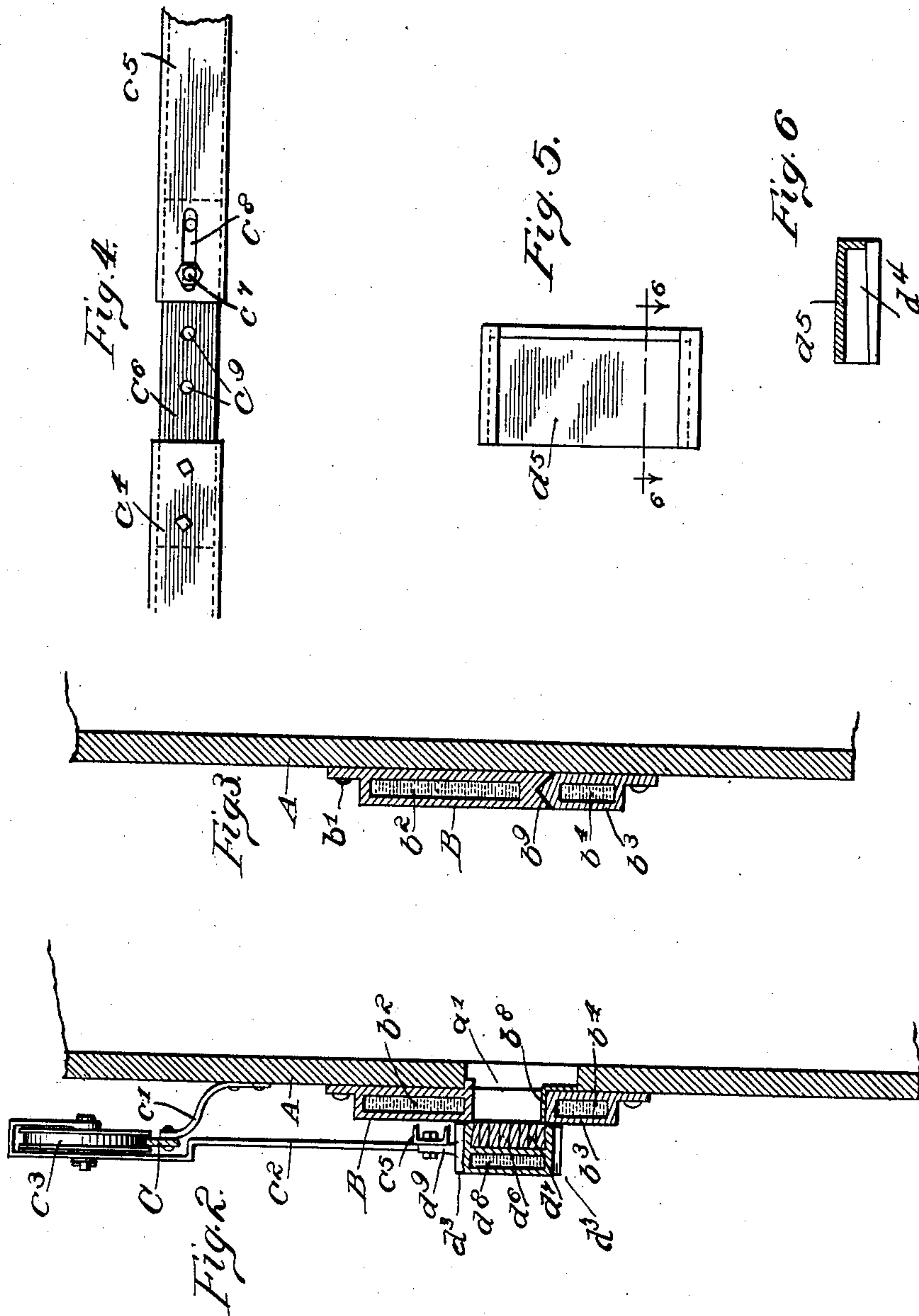
No. 829,438.

PATENTED AUG. 28, 1906.

G. W. SHEAR.  
FURNACE DOOR.

APPLICATION FILED JAN. 15, 1903.

2 SHEETS—SHEET 2.



Witnesses:  
John Braunwalder  
L. G. Snow

Inventor:  
George W. Shear,  
By Frederick Benjamin  
Att'y



# UNITED STATES PATENT OFFICE.

GEORGE W. SHEAR, OF JOLIET, ILLINOIS.

## FURNACE-DOOR.

No. 829,438.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed January 15, 1903. Serial No. 139,231.

*To all whom it may concern:*

Be it known that I, GEORGE W. SHEAR, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Furnace-Doors, of which the following is a specification.

This invention relates to improvements in the construction and arrangement of metallurgical furnaces of that type in which bars or plates of metal are heated for tempering, annealing, or other treatment.

The chief objects sought by these improvements are to provide a door or closure that may be easily opened and closed, that will permit the minimum escape of heat when the products are being placed in the furnace or withdrawn from same, that will hug closely the front of the furnace at all times, thus conserving the heat under all conditions, that will not be liable to warp from the heat to which it is subjected, and that permits adjustability in the size of the opening to the doorway. In carrying out these and other objects of general novelty and utility I have designed the furnace illustrated in the accompanying drawings, which form a part of this application, and in which—

Figure 1 is a front elevation of a furnace equipped with my improvements. Fig. 2 is an enlarged cross-section on the line  $x x$  of Fig. 1. Fig. 3 is an enlarged cross-section on the line  $y y$  of Fig. 1. Fig. 4 is a detail, partly in section, showing the manner of adjusting the size of the opening in the door. Figs. 5 and 6 are details of one of the wearing-plates used on the ends of the door-sections.

Referring to the drawings in detail, A represents the front of a furnace or so much of the front as is necessary to show to properly illustrate my invention. Through the front is the usual oblong doorway  $a'$ , through which the products are placed in or withdrawn from the furnace. Around the doorway is a frame B, which is secured to the front of the furnace by bolts  $b'$  and is formed with a hollow chamber  $b^2$ , which extends across the top of the frame and part way down both ends. The bottom portion  $b^3$  of the frame is made separate from the upper part, has a separate water-chamber  $b^4$ , and constitutes the fore-plate or sill of the doorway. Water-pipes  $b^5$  connect the water-chambers  $b^2$   $b^4$ , and inlet and outlet pipes  $b^6$  and  $b^7$ , respectively, serve to

conduct water to and lead it from said chambers, whereby a continuous circulation of water may be maintained through said chambers. The portion of the fore-plate immediately in front of the doorway is reinforced by an angle-plate  $b^8$  to protect it from the wear of the tongs or other tools used by the operator, while the portions on each side of said doorway are formed with a double bevel, as shown in Fig. 3, which fit into correspondingly-grooved portions of the ends of the frame, thus centering or dovetailing the two sections of the frame together to resist any tendency to warp or pull away from the front of the furnace which either section might have.

Extending across the front of the furnace and above the frame is a track C, which is supported from the furnace by brackets  $c'$ , bolted to the front of the latter. From this track are supported by hangers  $c^2$  and pulleys  $c^3$  the doors D D', to be described, which are bolted to the adjustable beams  $c^4$   $c^5$ , the latter being secured to the lower ends of the hangers  $c^2$ . The beams  $c^4$   $c^5$  are formed from channel-iron, have their adjacent ends spaced apart and connected by a sleeve  $c^6$ , also formed of channel-iron. One end of this sleeve is bolted rigidly to the beam  $c^4$  and is provided with a series of threaded openings  $c^6$ , into any one of which may be screwed a stud-bolt  $c^7$ , the shank of which extends through a slot  $c^8$  in the beam  $c^5$ . The beam  $c^5$  is adapted to slide on the sleeve to the extent permitted by said slot, and it will be apparent that by changing the position of the bolt on the sleeve the distance between the adjacent ends of the beams  $c^4$   $c^5$  may be controlled, it being understood that the shank of the bolt will strike against the outer end of the slot when the beam  $c^5$  is pushed away from the beam  $c^4$  and against the other end of the slot when the beams are pushed toward each other.

Each of the doors D D' is preferably made in two sections, one of which is formed with a flange  $d^2$ , which overhangs the adjacent end of the other complementary section, thus forming a tight joint therebetween. The outer ends of the door-sections are formed with a wedge-shaped lug  $d^3$  on their upper and lower sides, which slide into and fit tightly correspondingly-shaped grooves  $d^4$  in the wearing-plates  $d^5$ , which cover the ends of the doors and protect same from wear and in-



jury resulting from the tongs or other tools of the operators. If desired, these plates may be positively secured to the ends of the doors; but under ordinary conditions the method of securing same which I have shown will prevent displacement and at the same time will permit the quick removal of a worn-out or broken wearing-plate and the substitution of a new one.

Each of the door-sections is formed with lugs or ears  $d^9$  on its top, which are bolted to the beams  $c^4$   $c^5$ , and has extending there-through on the side toward the furnace a channel  $d^8$ , into which are laid fire-brick  $d^7$ . The upper and lower walls of the channel are slightly thicker toward the opening, thus contracting the mouth of the channel, and thereby preventing the brick from falling out, it being understood that the brick are cut to fit said channel and pushed into it before the wearing-plates are in position. The back walls of the door-sections are preferably formed hollow to provide a water-chamber  $d^8$ , which is complete in each section and has communicating therewith an inlet water-pipe  $e'$  and an outlet-pipe  $e^3$ . These pipes extend upwardly from the tops of the doors, and the upper end of the first inlet-pipe in the section at the left-hand end of the door is connected with a pipe  $e^3$ , leading to a suitable source of supply. The outlet-pipe for said section is connected by pipe  $e^4$  with the inlet-pipe  $e'$  of the complementary section, the outlet-pipe of which is in turn connected with the inlet-pipe  $e'$  of the opposite section of the door  $D'$  when the arrangement of pipes and connections is repeated, thus providing for circulation of water through the chambers in said door-sections. The connecting-pipes are flexible and made long enough to provide for the movements and adjustability of said sections.

The door-sections included in the part  $D$  are hung from the beam  $c^4$ , to which they are rigidly secured in the manner described, while the sections composing the part  $D'$  are likewise rigidly hung from the beam  $c^5$ , so that the relative positions of said beams govern the corresponding positions of the door elements  $D$   $D'$ . It follows, therefore, that the opening between the adjacent ends of the door-sections  $D$   $D'$  is controlled by the adjusting of the beam  $c^4$  on the sleeve  $c^6$ . During firing and until the furnace is brought to the desired heat the doors  $D$   $D'$  are together and completely cover the doorway; but when it is desired to operate the furnace the adjacent ends of said doors are separated, thereby forming an opening to permit access to the doorway, which opening is moved across the doorway from left to right to permit the insertion of the products and the withdrawal of same. Thus at no time is the doorway uncovered for a greater distance than the width of the opening between the ends of the sec-

tions  $D$   $D'$ . When the entire doorway has been traversed in this manner, the operator pushes both sections back to their initial position and the operation is repeated.

By lining the door-sections with brick and by placing therein water-chambers I effectively provide against the warping of the doors and am thus able to maintain a close fit between the inner face of the doors and the door-frame.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace-door, a channeled section having open ends and sides and adapted to hold fire-brick in its channel, and plates removably attached to the ends of said section and forming closures therefor, said plates having wedge-shaped grooves fitting corresponding projections on the sections.

2. In a furnace, door-sections having their adjacent ends interlocked and having an open channel extending throughout said sections adapted to receive fire-brick, and the walls of said channel being contracted toward the open side, and plates slidably mounted on the outer ends of the sections.

3. In a furnace, a door having an open channel in the side next the furnace, wedge-shaped lugs on the ends of the door, and wearing-plates adapted to fit on said lugs and to form the ends of the door.

4. In a furnace, a door formed in sections having interlocking ends, each of said sections formed with a channel adapted to receive a lining of fire-brick, and wearing-plates removably secured to said door-sections and forming the outer ends thereof.

5. In a furnace, a double door each part of which is formed of sections fitted together and each section lined with fire-brick, and the two door members adapted to have their adjacent ends adjusted relatively to each other, whereby the opening therebetween may be increased or diminished, substantially as set forth.

6. In a furnace, a horizontally-slidable door formed in two parts having a slidable relation to each other, and each of said parts formed in interlocking sections provided with channels in their sides next the furnace, with fire-brick lining said channels, and each of said sections having a water-chamber therein.

7. In a furnace, a horizontally-slidable door formed in two parts having a slidable relation to each other, and each of said parts formed in sections fitted together, and wearing-plates removably secured to the outer ends of said sections.

8. In a furnace, a horizontally-slidable door formed in two parts having a slidable relation to each other, and means from which said doors are hung said means having slidable and adjustable relations, substantially in the manner set forth.

9. In a furnace, a horizontally-slidable  
door formed in parts having a slidable rela-  
tion to each other, means supporting said  
doors, said means consisting of beams having  
5 a slidable relation to each other, and suitable  
hangers for said beams, substantially as de-  
scribed.

In testimony whereof I affix my signature  
in presence of two witnesses.

GEORGE W. SHEAR.

Witnesses:

JOHN HULSIZER,  
F. BENJAMIN.