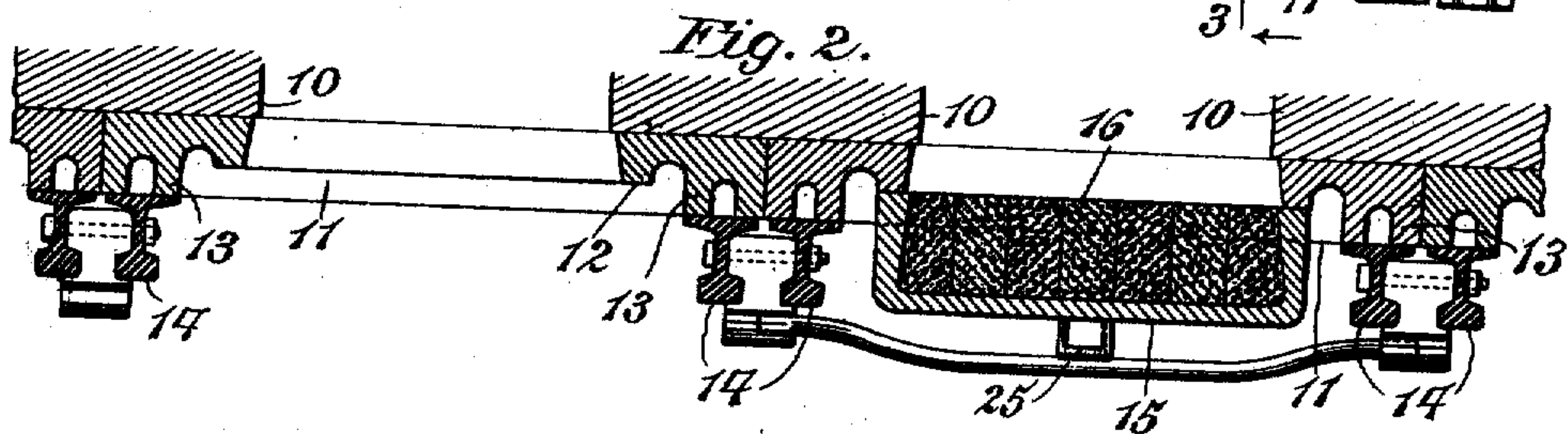
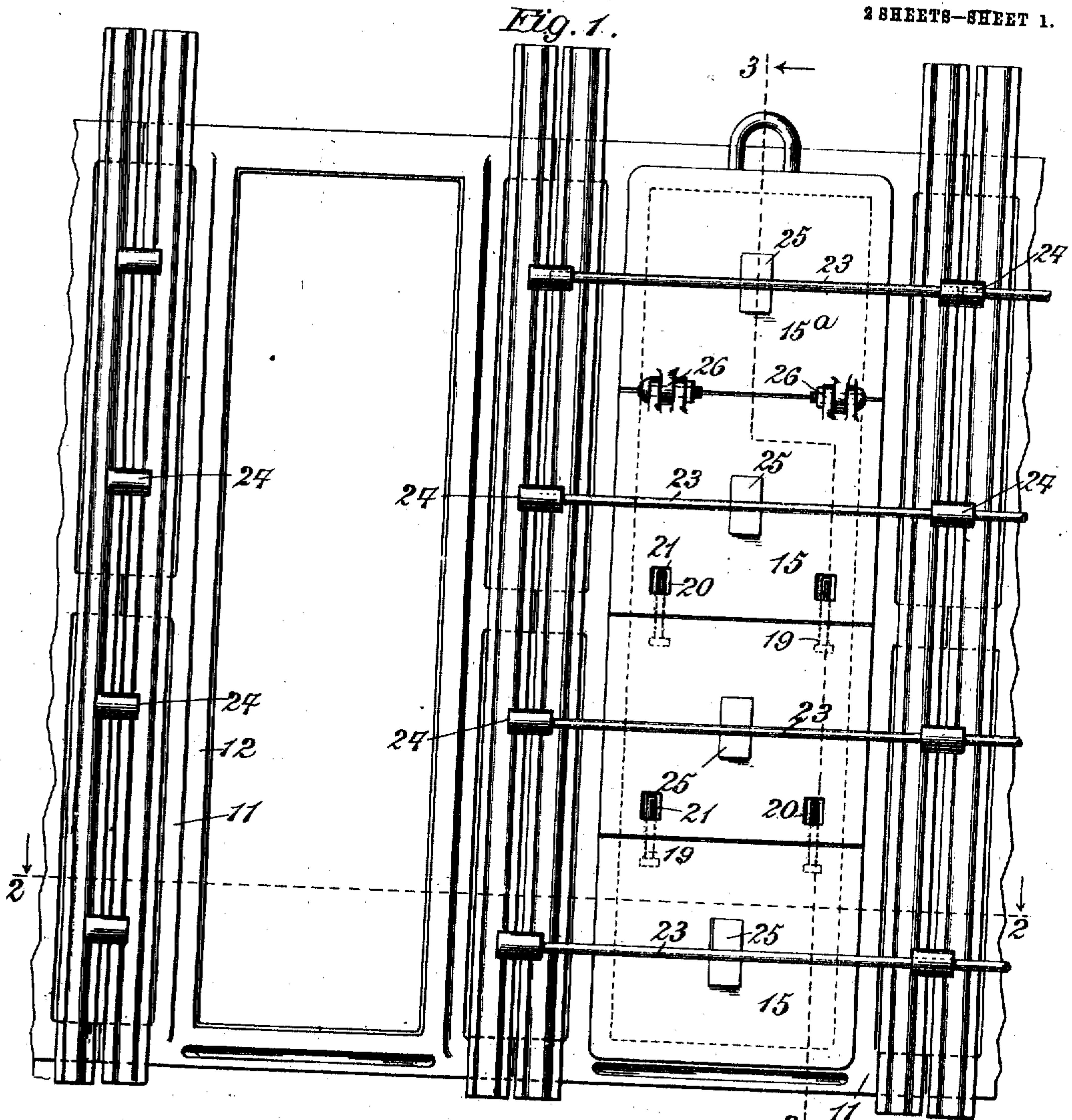


C. G. ATWATER.
DOOR FOR FURNACES.
APPLICATION FILED NOV. 14, 1906.

929,534.

Patented July 27, 1909.
2 SHEETS—SHEET 1.



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Fig. 3.

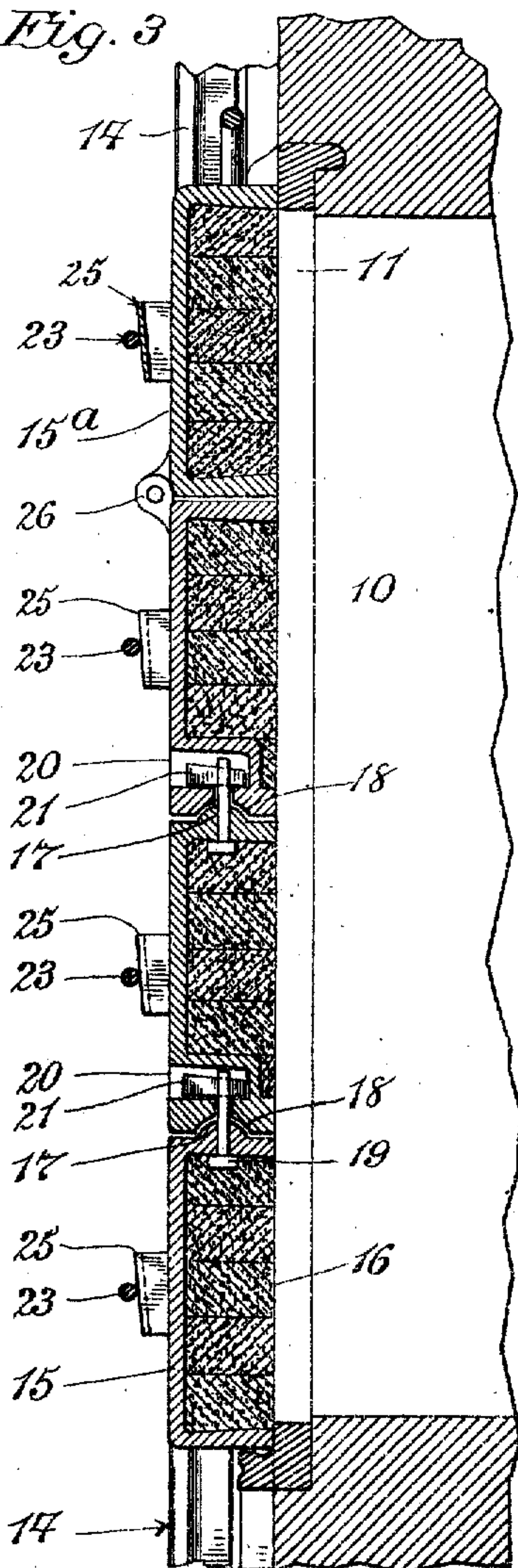


Fig. 4.

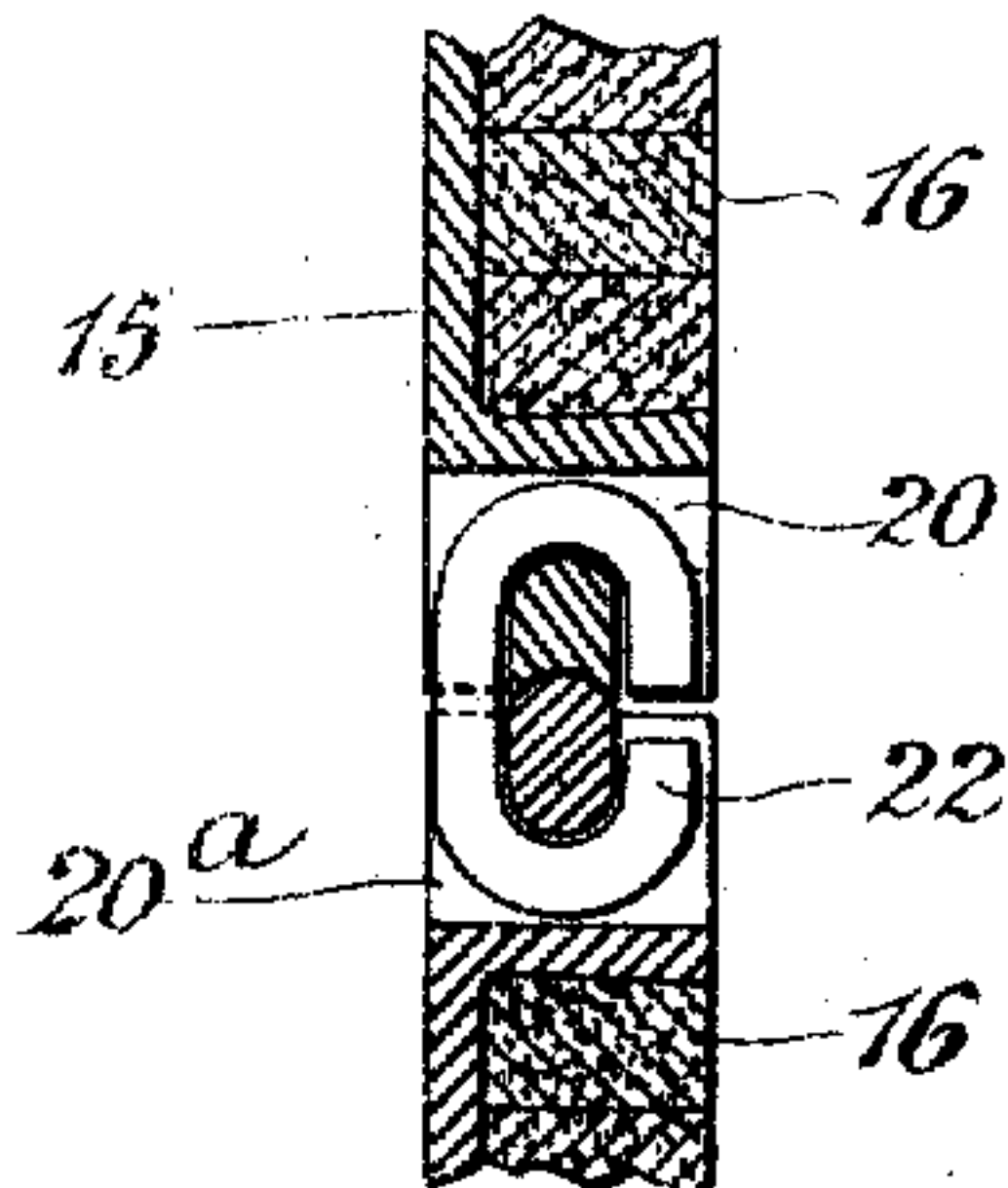
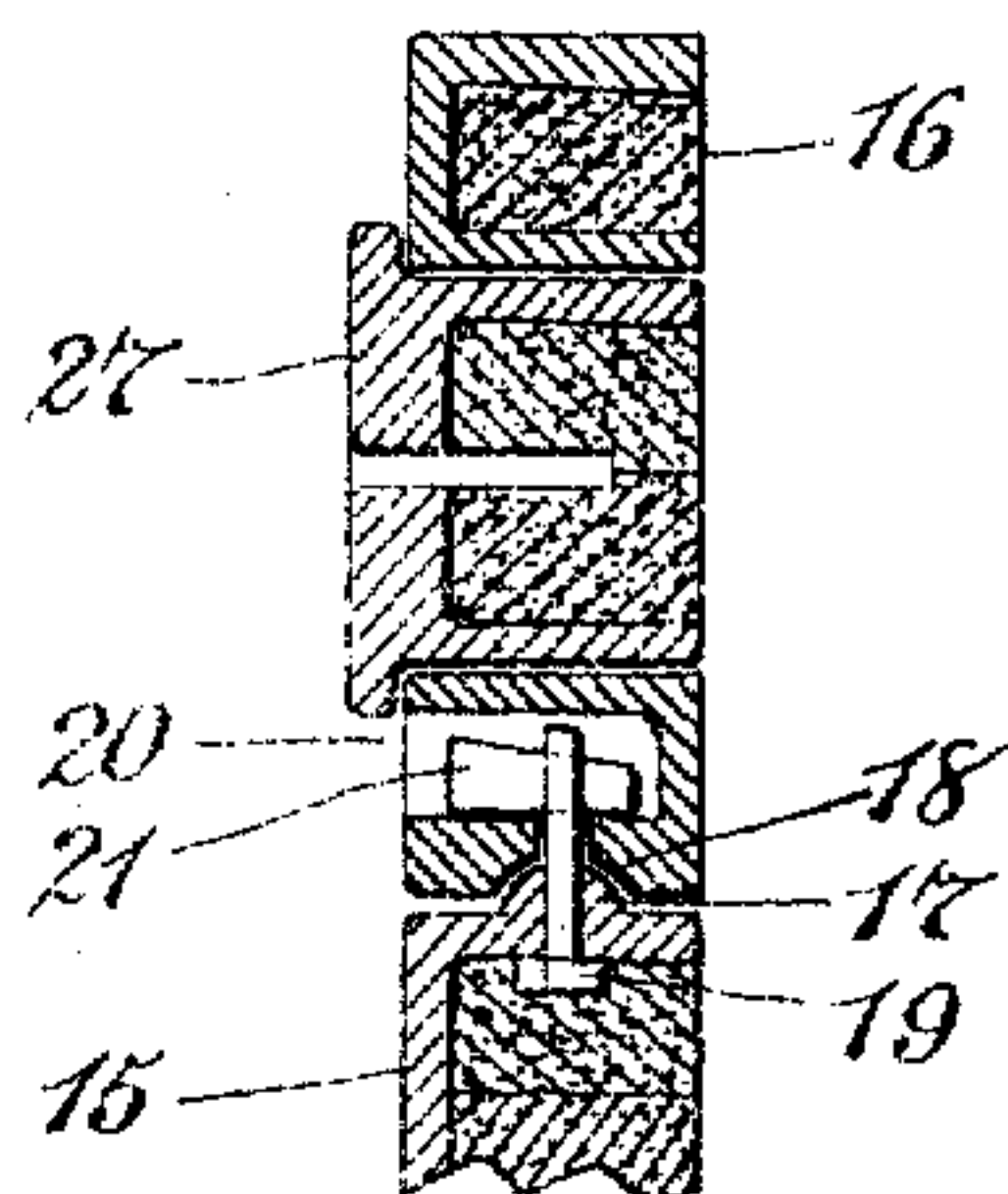
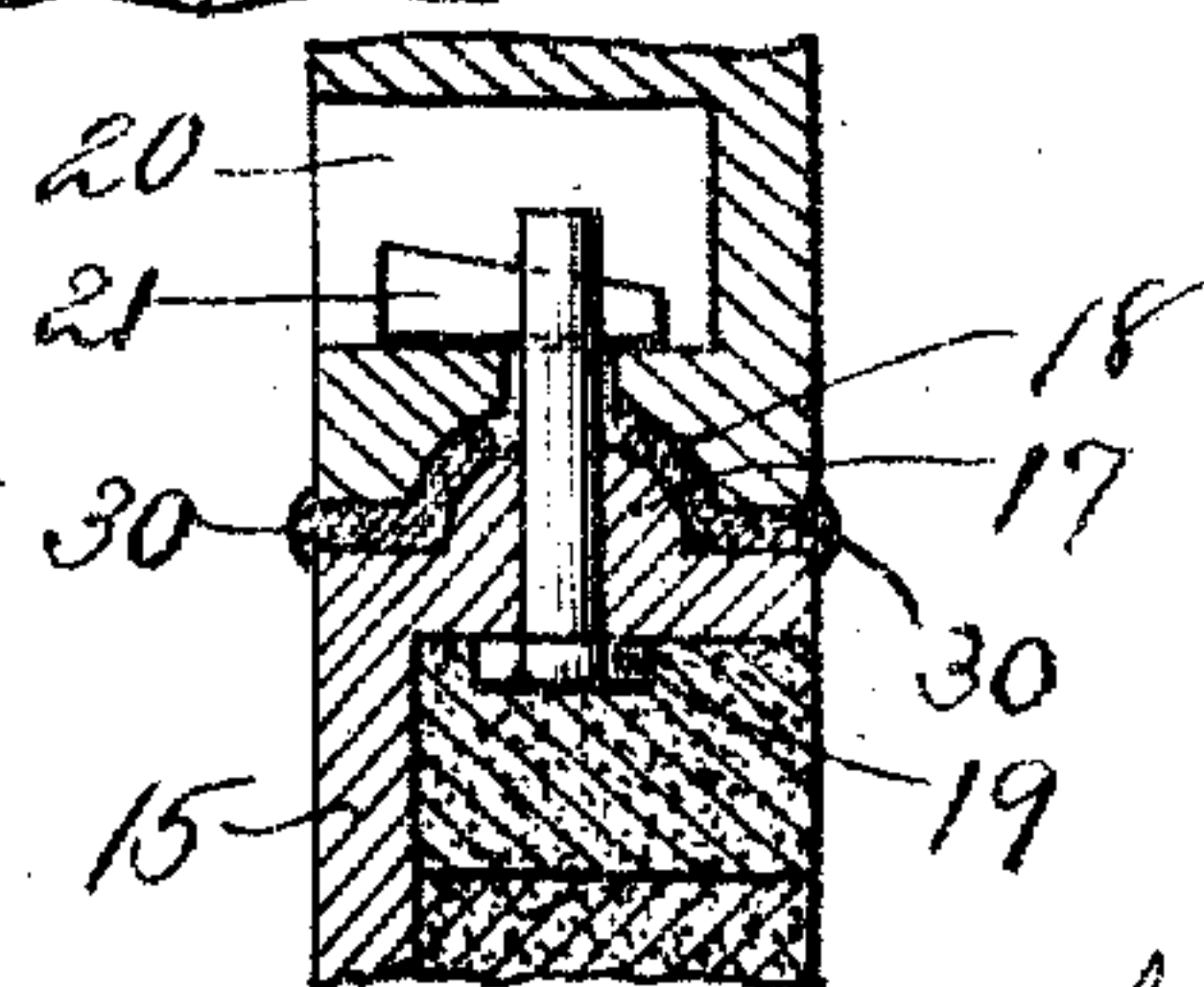


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

CHRISTOPHER G. ATWATER, OF FLUSHING, NEW YORK, ASSIGNOR TO THE UNITED COKE AND GAS COMPANY, A CORPORATION OF NEW JERSEY.

DOOR FOR FURNACES.

No. 929,534.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed November 14, 1906. Serial No. 343,469.

To all whom it may concern:

Be it known that I, CHRISTOPHER G. ATWATER, a citizen of the United States, residing in Flushing, in the State of New York, have invented a certain new and useful Improvement in Doors for Furnaces, of which the following is a specification.

This invention has relation to an improved form of door for use in closing any kind of furnace wherein very high temperatures are developed, and more particularly for by-product coke ovens, wherein the problem of providing a tight door without great expense is important to be solved.

Even when protected to some extent by a lining of fire brick, iron doors used on coke ovens invariably become distorted and warped after a relatively short exposure to the intensely hot gases developed within the ovens. In the bee hive ovens and similar structures having small openings, this warping or twisting is not fatal to successful operation. The doors being small, the openings due to the distortion in question are narrow and easily kept stopped by fire clay. Indeed in many cases temporary leakages stop themselves, as the escaping gas leaves a sooty and tarry deposit in the interstices which ultimately closes them completely. In by product coke ovens and similar structures, however, the size of the opening is so great that, when the doors become distorted by heat, the resulting gaps are altogether too wide to be remedied either by deposit from escaping gas or by wet fire-clay. Great sums of money have been unsuccessfully expended in the attempt to prevent these results and much has been lost in the constant renewals necessitated by the conditions above described.

It is the object of this invention to provide a relatively inexpensive form of door capable of use in closing by-product coke ovens and the like, which will remain tight for an indefinite period and is at the same time simple in operation and construction.

The invention is illustrated in a preferred form in the accompanying drawings in which—

Figure 1 is a front elevation of two coke

oven doors one of which is closed; Fig. 2 is a horizontal section of the same on the line 2—2 in Fig. 1; Fig. 3 is a vertical section on the line 3—3 in Fig. 1; Fig. 4 is a section of a modified form of test hole and Fig. 5 is a sectional view of a modified form of flexible connection and Fig. 6 is a slightly enlarged view similar to Fig. 4 and illustrating a scheme for preventing the leakage of gas from the coke oven.

In the drawings the door openings are supposed to be the full width of the ovens, the spaces within which are separated by the refractory walls 10. The front of each door opening is surrounded by an iron or steel frame 11 having an inner ridge 12 whose face forms a bearing for the door and preferably provided with two outer and deeper ridges 13 which carry the railway rails 14 attached to them.

The door proper is composed of a number of sections preferably of cast iron and preferably shaped substantially as shown, at 15, with an interior hollow adapted to receive the lining 16 of fire brick or other refractory material. The door sections 15 are preferably made as wide as the opening and their edges bear flat upon the outer faces of the ridge 12 on each door frame. The door as a whole is made up of a plurality of these lined sections placed one over the other, as shown, and connected by appropriate means which permit a certain limited amount of relative movement between successive sections. As a result of this construction, the distortion by heat of each section is limited to that section only and corresponds in extent to the size of the section. In consequence there is no cumulative twist from top to bottom creating gaps of inordinate width around the door opening. A variety of flexible fastening means may be used in this connection, all of which are within my invention. In illustration of this fact I have illustrated two different forms in the accompanying drawings. As shown in Fig. 3, the top of each section 15 is provided with a transverse convex ridge 17, which loosely fits a corresponding transverse channel 18 in the lower edge of the section immediately

above. These are arranged to permit a certain limited rocking movement as well as a limited relative movement across each other of the edges of successive sections. The doors are held together by bolts 19, whose heads are placed in the interior recesses of the sections, the shanks projecting through the convex ridges 17 and passing quite loosely through holes in the bottom of the channels 18 and into chambers 20 in the faces of the next sections above. Within these chambers are securing wedges 21 which are driven through appropriate slots in the ends of the bolts 19.

15 Another form of flexible connection equally within my invention is shown in Fig. 5 and involves a chamber contiguous to the ridge 17 at the top of a section as well as a chamber near the chamber 18 at the bottom of the next section. In this modification each chamber 20 surrounds an isolated portion of the section-edge on three sides. Instead of a bolt 19 another form of securing means is used which enters both chambers 20, 20^a. This is a link 22 of wrought iron or mild steel bent around the isolated edge portions as shown in Fig. 5.

When the door as a whole has been placed in position as shown in Figs. 1, 2 and 3, it is secured by a separate cross bar 23 for each section. The ends of these bars are passed through appropriate holes in the sockets 24, which are in turn bolted between the pairs of railway rails 14 on each side of each door. Wedges 25 are then driven in between each bar and the door-section behind it, and closure of the door is completed.

To permit inspection of the contents of the oven and passage of tools for leveling etc. without opening the entire door and releasing the charge, I prefer to secure the top section 15^a to the one beneath it by means of hinges 26 permitting said section to tilt outward at will. It is thus very easy to gain access to the oven by simply removing the wedge 25 and bar 23 which serve to secure the top section alone. In Fig. 4 I have shown a modified form of opening which may be used if desired for this purpose. Here the top section, instead of being hinged to its neighbor, is pierced to receive a plug 27, made preferably in the form of a hollow casting, as shown, and filled or lined with fire brick.

55 Where a fire door is made as thus described, in sections connected so as to permit limited relative movement, it will be very easy to keep the door permanently tight by the use of wet fire clay daubed into the joints as shown at 30, Fig. 6 and, when necessary around the edges. The total distortion due to heat being divided up among a number of sections, the resulting gaps will be small and will either fill up automatically as above

described, or can be quickly stopped up by small quantities of soft clay.

Various changes can be made in this device without departing from my invention and I am not to be limited to the details herein shown and described.

What I claim is—

1. A furnace door comprising a plurality of sections; means for connecting said sections together to thereby form a single unitary door, said connecting means being loose to thereby permit a limited relative movement of said sections with reference to one another; a frame for said door; and means for securing each of said sections to said frame.

2. A furnace door comprising a section with a transverse channel along its lower edge, a second section having a corresponding transverse convex ridge along its upper edge, loosely fitting said channel and means connecting said sections and permitting limited relative movement between them, substantially as described.

3. A furnace door comprising a number of sections connected together edge to edge by means permitting a limited rocking movement of one upon the other, a frame for said door, and means for securing each of said sections to said frame, substantially as described.

4. A furnace door comprising a plurality of sections each having a hollow or recess adapted to receive refractory material; means for loosely connecting said sections together to thereby form a single unitary door, whereby said connections permit a limited relative movement of said sections with reference to one another; a frame for said door; and means for securing each of said sections to said frame.

5. A furnace door comprising sections having a hollow interior filled with refractory material and having a transverse convex ridge on one edge and a corresponding transverse channel on the opposite edge, said sections being fastened together with the ridge of one loosely fitting the channel in the next, substantially as described.

6. A furnace door comprising two sections set edge to edge a chamber near the edge of one section, a bolt extending from the other section into said chamber and securing means engaging said bolt within said chamber, said bolt being of such a length that the sections are loosely connected together whereby they may move with reference to one another, substantially as described.

7. A furnace door comprising two sections set edge to edge, a chamber near the edge of one section, a bolt having a slot in its end extending from the other section into said chamber and a wedge in said chamber driven

into the slot in the end of said bolt, said bolt being of such a length that the sections are loosely connected together whereby they may move with reference to one another,
5 substantially as described.

8. A furnace door comprising a number of sections set edge to edge, connected means

between them permitting limited relative movement and fire clay in the joints between said sections, substantially as described.

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