Nov. 27, 1923. 1,475,731

V. WINDETT

DOOR AND DOOR OPERATING MECHANISM FOR FURNACES AND THE LIKE

Filed March 6, 1920 2 Sheets-Sheet 1

Fig. 3.

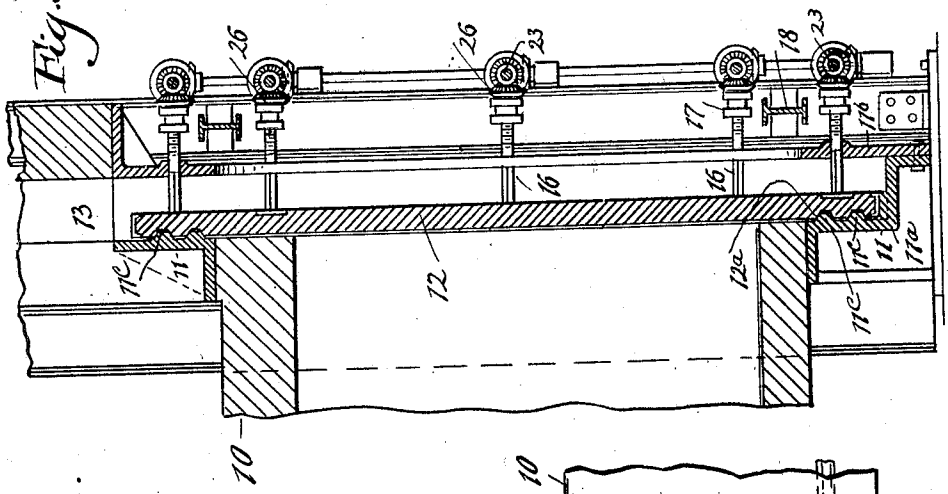


Fig. 1.

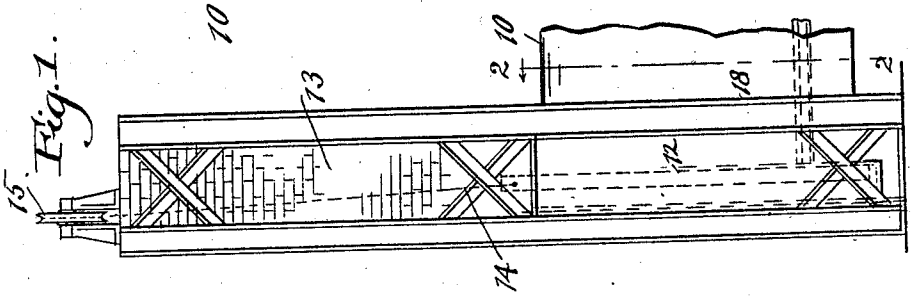
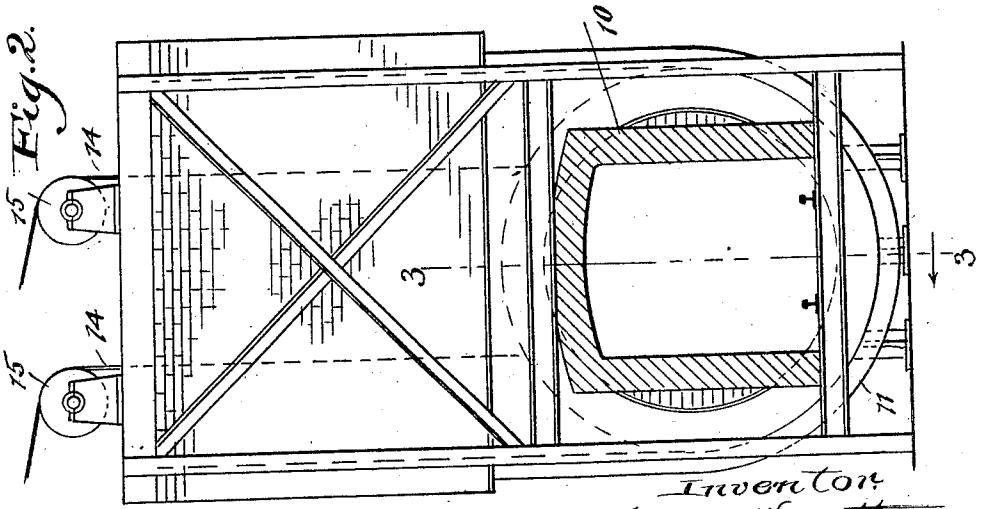


Fig. 2.



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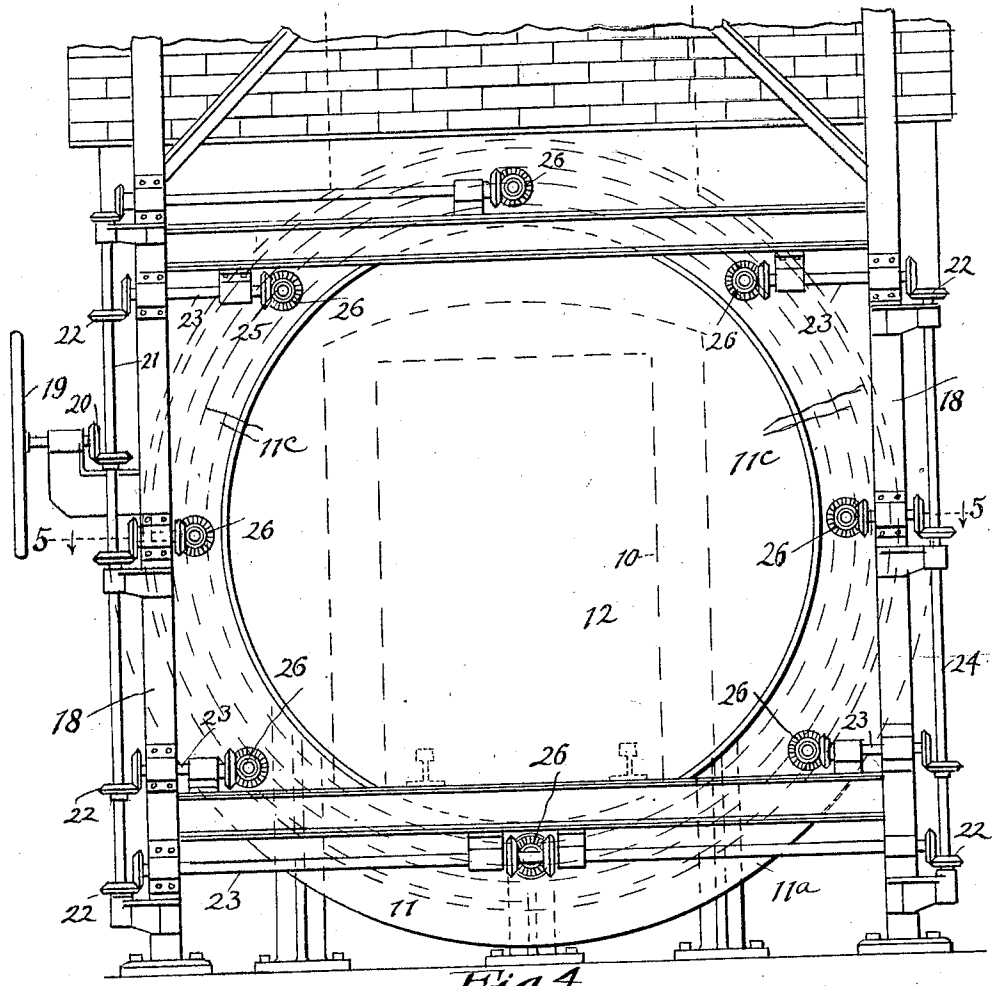


Fig. 4.

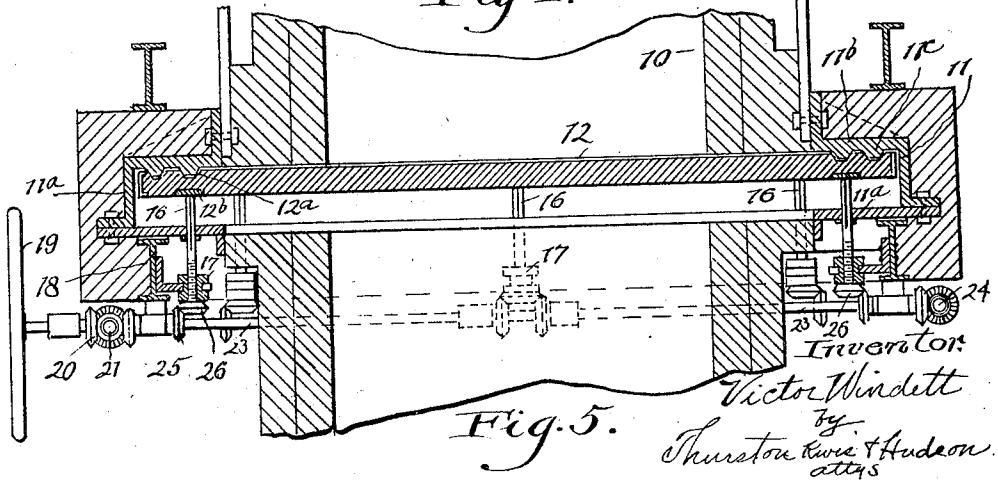


Fig. 5.

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UNITED STATES PATENT OFFICE.

VICTOR WINDETT, OF CLEVELAND, OHIO, ASSIGNOR TO THE WELLMAN-SEAVER-MORGAN COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

DOOR AND DOOR-OPERATING MECHANISM FOR FURNACES AND THE LIKE.

Application filed March 6, 1920. Serial No. 363,906.

To all whom it may concern:

Be it known that I, VICTOR WINDETT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Doors and Door-Operating Mechanism for Furnaces and the like, of which the following is a full, clear, and exact description.

This invention relates to a door and door operating mechanism for furnaces and the like, and has for its chief object to provide a structure by which the door may be firmly seated against the frame and readily moved laterally from the door opening.

The invention may be briefly summarized as consisting in certain novel details of construction, and combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheets of drawings, Fig. 1 is a side view of a portion of the furnace, or of a similar structure to be closed, equipped with my improved door and door operating mechanism; Fig. 2 is a sectional view substantially along the line 2—2 of Fig. 1, looking in the direction indicated by the arrows, or toward the rear of the door and door operating mechanism; Fig. 3 is an enlarged vertical sectional view substantially along the line 3—3 of Fig. 2, looking in the direction indicated by the arrows; Fig. 4 is an enlarged front elevation; and Fig. 5 is a sectional view substantially along the line 5—5 of Fig. 5, looking in the direction indicated by the arrows.

In the drawings, 10 represents a portion of a furnace, the vestibule of a furnace, or similar structure to be closed by the door. At the front of the structure 10, or at some point between its ends, if the structure is continued on both sides of the door as shown in Fig. 5, is a door frame or casing 11 adapted to accommodate the door 12, which is preferably circular in outline. The door casing 11 has front and rear walls 11^a and 11^b, spaced apart a distance greater than the thickness of the door. The space thus provided for the marginal portion of the door is closed at the bottom and sides, and at the top opens into an upper door receiving chamber 13 which may be of any suitable construction, but as here shown, is formed largely of brickwork. The door receiving chamber is shown at the top, for the reason that in this instance the door is moved upwardly to open it, though the term "lateral" is used in a broad sense to include a movement in substantially the plane of the door in some other direction such as sidewise, for I do not regard it essential to my invention in its broadest aspect that the door be elevated to open it.

On the wall 11^b of the door frame, a series of concentric ridges 11^c are provided, two such ridges being here shown, which ridges accommodate and extend into correspondingly shaped concentric grooves 12^a of the door 12 when the latter is fully seated, these interfitting ridges and grooves of the door frame and door preventing flow of gases in or out of the furnace when the door is closed.

The door is moved laterally or vertically in this instance to shift it to and from closed position by means of a pair of cables or chains 14, which at their lower ends are attached to the top of the door and extend upwardly through the chamber 13 around sheaves 15 positioned at the top of the chamber 13, and then to a winch or other suitable winding and unwinding mechanism (not shown). It will be noted by reference to Fig. 1, that the sheaves 15 are offset forwardly somewhat from the plane of the door when the latter is seated, and by reference to this figure and to Figs. 3 and 5 it will be observed that there is sufficient clearance between the outer face of the door and the wall 11^a of the door frame or casing that when the door is released by movement of the door seating devices to be referred to, it will, by reason of the offset location of the sheaves 15, swing by gravity away from its seat until the previously interfitting ridges and grooves are entirely clear of each other.

The door is seated by a plurality of axially movable plungers 16, which extend through, and have a bearing in the outer wall 11^a of the door casing, the door being provided on its outer surface with a metal ring 12^b which the inner ends of the plunger 16 engage. These plungers, which may be operated in different ways, in this instance engage nuts 17, and are moved in and out by a system of shafts and bevel gearing supported by a framework designated as a whole by the reference character 18, and erected as shown, at the front side of the door.

Though the shafting and gears could be

motor operated if desired, in this instance they are operated by a hand wheel 19, connected by bevel gears 20 to a vertical shaft 21 which is connected by bevel gears 22 to horizontal shafts 23 which operate part of the plungers, and also to a second vertical shaft 24 which is on the opposite side of the door from the vertical shaft 21 and is connected by similar sets of bevel gears 22 to horizontal shafts 23 which operate the remainder of the plungers. The inner ends of the shafts 23 have bevel gears 25 which engage and rotate bevel gears 26 which are connected to and turn with the nuts 17 which engage threaded portions of the plungers 16. The nuts 17 and bevel gears 26 are journaled in suitable portions of the framework as indicated in Fig. 5, and are, of course, held from longitudinal movement relative to the plungers.

It will be obvious that when the hand wheel 19 is turned, all the plungers 16, which as here shown are eight in number and are uniformly spaced around the door, will be actuated simultaneously, and that when the hand wheel is turned in one direction, these plungers will engage the ring 12^b on the outer face of the door and press the door firmly against its seat. Likewise when the hand wheel is turned in the reverse direction, the plungers will be simultaneously backed away from the door which will then automatically swing outwardly from its seat by reason of the offset position of the upper sheaves 15, and may then be elevated by winding in the cables 14 which are attached to and support the door.

The door 12 may be constructed in any suitable manner, but preferably it will be composed of an outer frame carrying a heavy screen, and with both inner and outer faces covered with a heat resisting cement which is baked on the door, and is preferably fire, acid and waterproof. The circular grooves on the inner face of the door are preferably ground in place.

A door constructed as above described, will answer all requirements with respect to durability, and at the same time is non-warping.

Having described my invention, I claim:

1. The combination with a door frame of a furnace or the like, of a door adapted to be shifted laterally with respect to the door frame, and a plurality of circumferentially spaced axially movable members engageable with the door for pressing the door against the frame, or for releasing the same.

2. The combination with a door frame of a furnace or the like, of a door adapted to engage the frame with means connected to the door for elevating it and lowering it with respect to the frame, and a plurality of circumferentially spaced axially movable members engageable with the door for pressing the door against the frame and for releasing it.

3. The combination with a door frame of a furnace or the like, said frame having a door seat, of a vertically movable door, interengaging ridges and grooves on said door and door seat, means for suspending the door so that it may swing toward and from the seat, said means serving to raise and lower the door, and separate means for pressing the door against the seat.

4. The combination with a door frame of a furnace or the like, said frame having a door seat, of a vertically movable door, interengaging ridges and grooves on said door and door seat, means for suspending the door so that it may swing toward and from the seat said means serving to raise and lower the door, and axially movable members separate from said means for pressing the door against the seat and for releasing it.

5. The combination with a door frame of a furnace or the like, said frame having a door seat, of a vertically movable door, means for suspending the door so that it may swing toward and from the seat, said means serving to raise and lower the door, a plurality of plungers for engaging spaced points of the door, and means for simultaneously actuating the plungers.

6. The combination with a door frame of a furnace or the like, said frame having a seat, of a door, the door and seat having interfitting ridges and grooves, means for pressing the door against the seat and for releasing the same, and means separate from the first named means for shifting the door laterally with respect to the seat.

7. In combination with a door frame of a furnace or the like, the frame having a seat, of a door movable toward and from the seat when in line therewith, and also movable laterally with respect to the seat, axially movable devices for pressing the door against the seat and for releasing the door, and means separate from the said devices for supporting the door so that when released by said devices it will move clear of the seat whereby it may then be moved laterally with respect thereto.

8. The combination with a door frame of a furnace or the like, the frame having a seat, of flexible means for supporting the door so that it may be swung toward and from the seat and may be shifted laterally with respect thereto, and a plurality of axially movable plungers engaging the door for pressing the door against the seat or for releasing the same.

9. The combination with a door casing of a furnace or the like, said casing having a seat, a door adapted to engage the seat, cables connected to the top of the door and extending therefrom out of the plane of the door whereby the door may swing away

from the seat and may be elevated, and a plurality of axially movable plungers supported in front of the door, and means for moving them simultaneously so as to press the door inwardly against the seat, or to release the door so that it may swing clear of the seat.

10. The combination with a door casing having a seat, a door adapted to engage the seat, flexible suspending means connected to the door and extending therefrom out of the plane of the door whereby the door may be swung away from the seat and may be elevated, and separate means for pressing the door against the seat when the door is in line with the seat.

In testimony whereof, I hereunto affix my signature.

VICTOR WINDETT.