July 1, 1924. 1,499,424

I. D. THOMAS

DOOR SHIFTING MECHANISM

Filed July 12, 1920 3 Sheets-Sheet 1

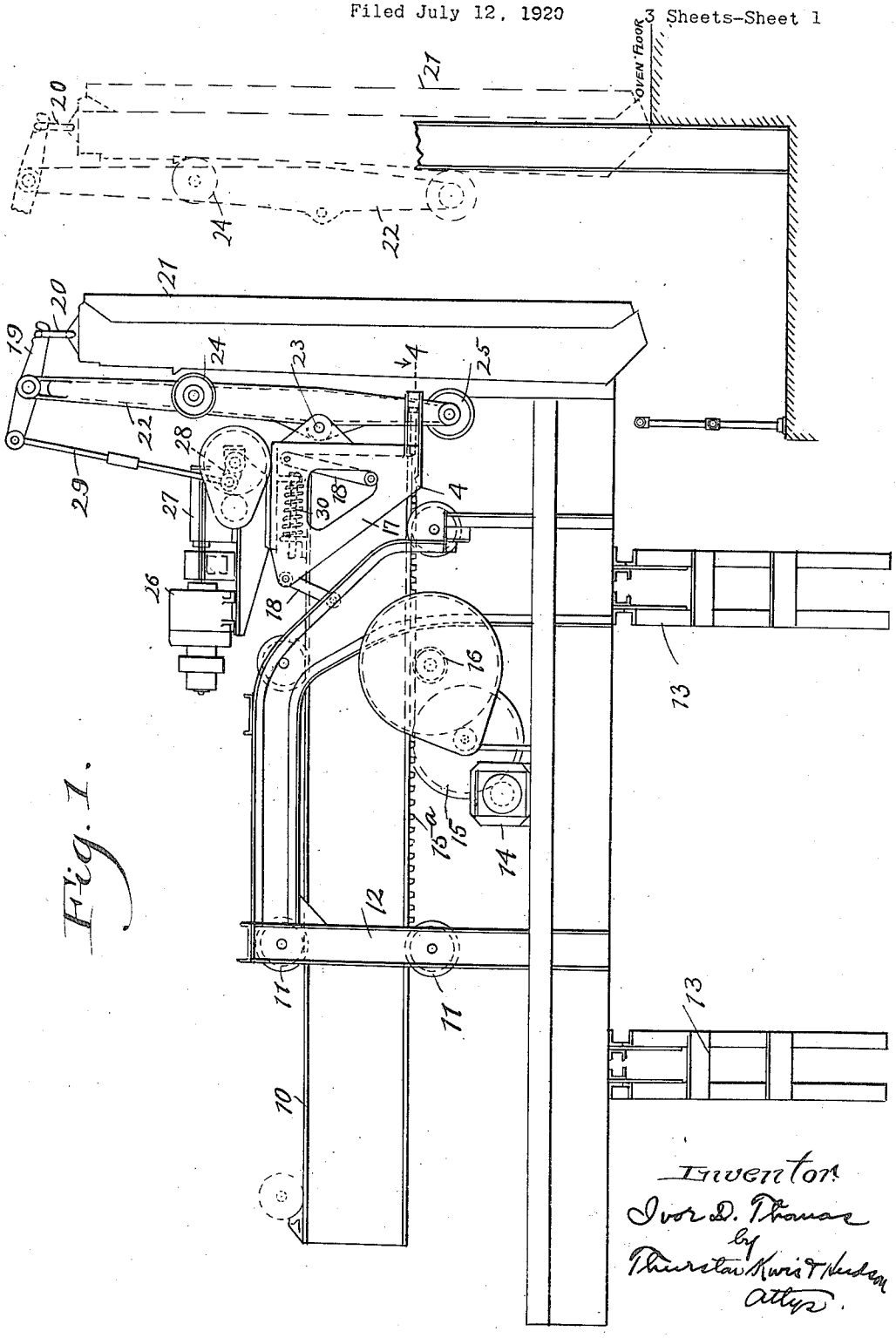


Fig. 1.

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Fig. 2.

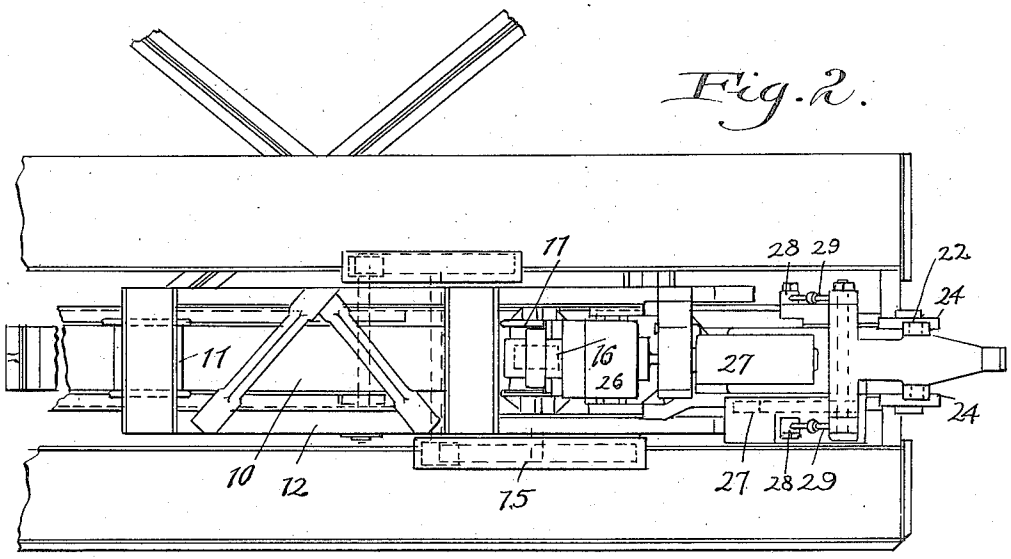
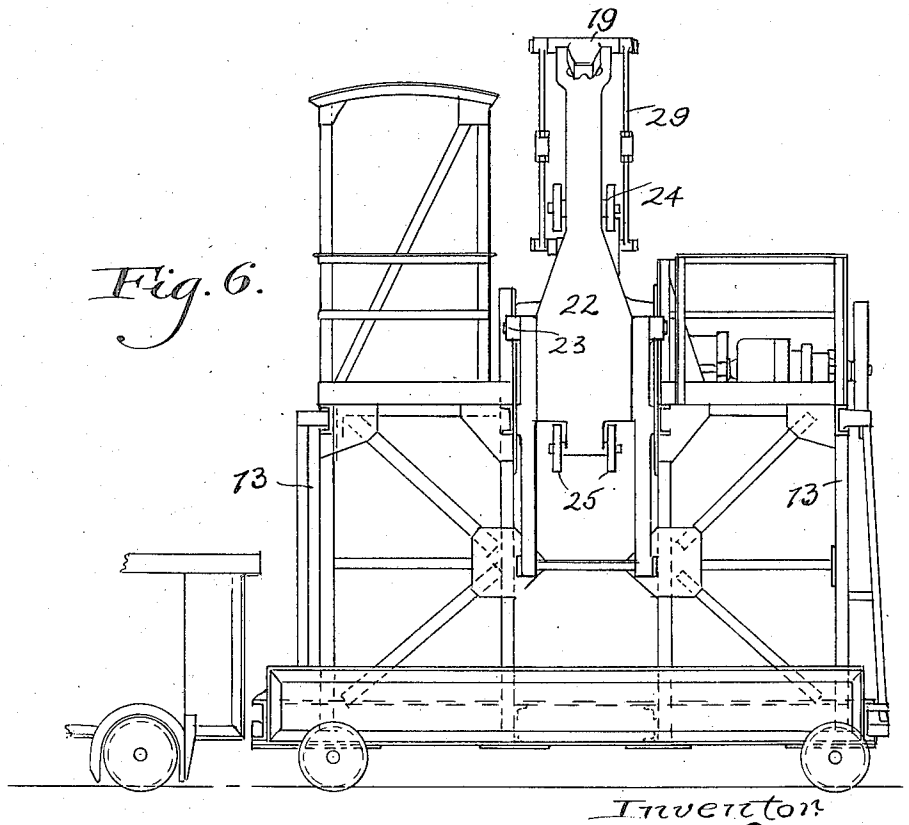


Fig. 6.



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DOOR SHIFTING MECHANISM

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Fig. 3.

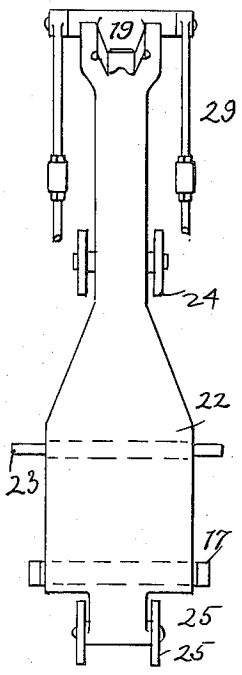


Fig. 4.

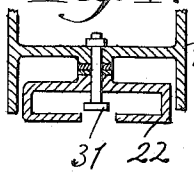


Fig. 5.

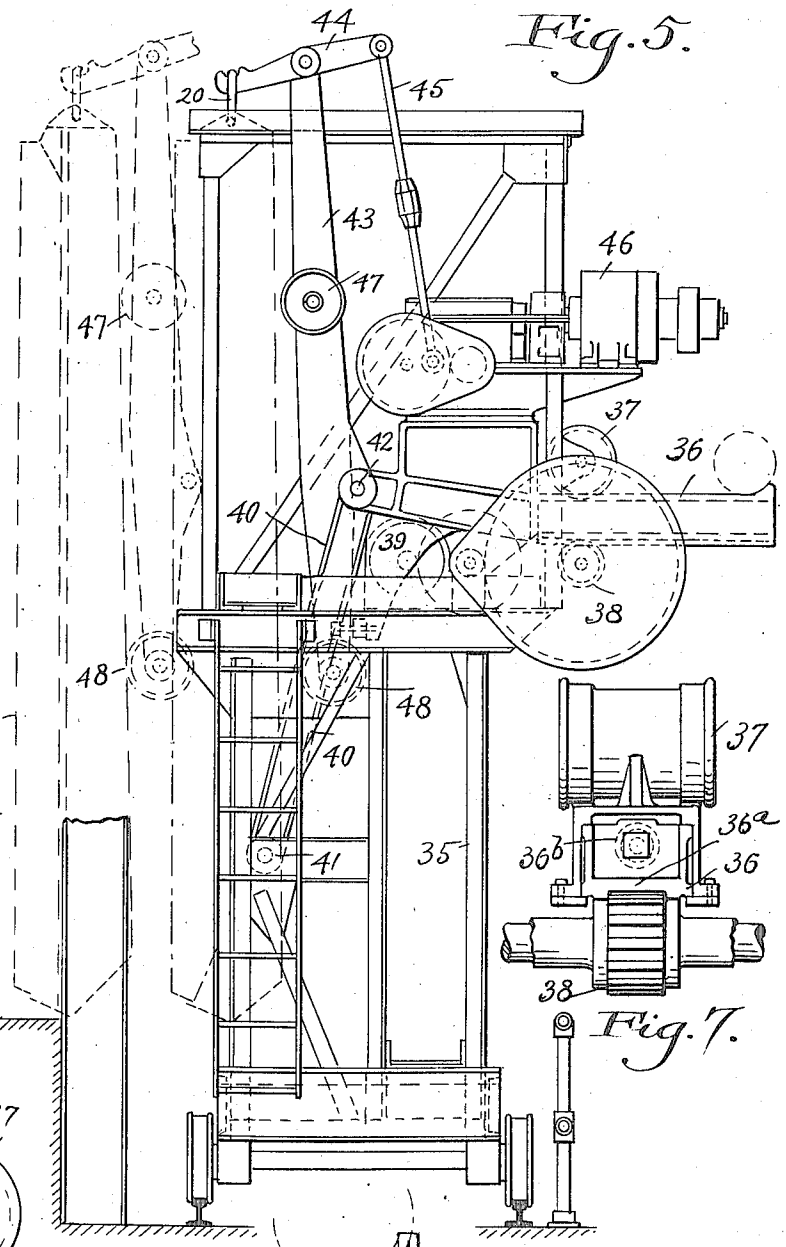


Fig. 7.

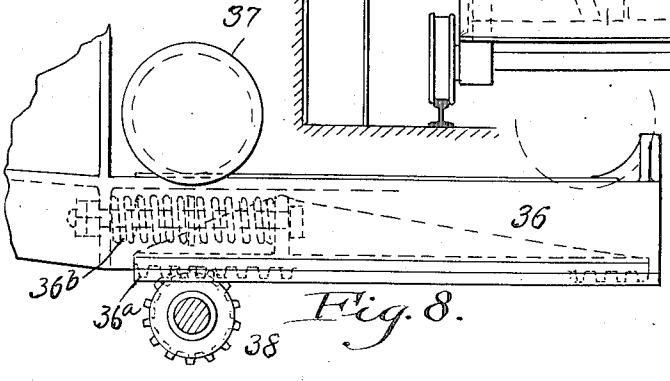


Fig. 8.

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Patented July 1, 1924. 1,499,424

UNITED STATES PATENT OFFICE.

IVOR D. THOMAS, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR TO THE WELLMAN-SEAVER-MORGAN COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

DOOR-SHIFTING MECHANISM.

Application filed July 12, 1920. Serial No. 395,477.

To all whom it may concern:

Be it known that I, IVOR D. THOMAS, a citizen of the United States, residing at Cleveland Heights, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Door-Shifting Mechanism, of which the following is a full, clear, and exact description.

This invention relates to an oven door shifting mechanism and covers certain modifications of the structure shown in my Patent No. 1,346,474 granted July 13, 1920.

The structure or structures constituting the subject matter of the present application have the important features and advantages of my prior construction including in addition to the lifter proper, upper and lower abutments which are adapted to be pressed against the door with substantially equal pressure, and an arrangement wherein the lifter proper is carried by a member capable of yielding on contact with the door.

The principal object of the present invention is to provide an efficient door shifting mechanism utilizing the above mentioned features of construction, and having special utility with ovens or furnaces having doors which are adapted to be engaged at the top by the lifter.

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 sheet of drawings, Fig. 1 is a side view of the door shifting mechanism, adapted in this instance to be mounted on a coke pusher, the mechanism being shown supporting the door removed from the door frame, and showing by dotted lines the door being replaced in the frame; Fig. 2 is a top plan view of the same on a reduced scale; Fig. 3 is a front view of a pivoted arm which carries the lifter and the upper and lower abutments; Fig. 4 is a sectional view substantially along the line 4—4 of Fig. 1 looking in the direction indicated by the arrow; Fig. 5 is a side view of a door shifter embodying a modified form of the invention and adapted especially for use on the coke side of the oven; Fig. 6 is a front view of the door shifter shown in Fig. 5; Figs. 7 and 8 are detail views of the same.

Referring first to the shifter shown in Figs. 1 to 4, this mechanism includes an endwise movable member 10, in this case in the form of a beam which is supported on rollers 11 of a frame 12 which can be carried on any suitable device capable of being moved laterally with reference to the ovens. As before stated, inasmuch as the door shifting mechanism here shown is adapted especially for use on the pusher side of the ovens, the frame or framework 12 which supports and guides the beam 10 is supported on the framework 13 of a coke pusher which is not shown in its entirety as the pusher itself forms no part of the present invention, and as it is well known in this art that coke pushers are adapted to be moved along a track parallel to the front of a series of ovens, and are utilized when the ovens are opened to push the coke out of the ovens from the side known as the coke side. However, the shifting mechanism may be mounted independently of the coke pusher on its own trucks or wheeled base as in the modification shown in Figs. 5 and 6.

The beam is adapted to be moved in an endwise direction toward and from an oven by a motor 14 and gearing 15 including a pinion indicated at 16 and adapted to engage a rack 15^a on the lower side of the beam precisely as shown in my prior application.

At the forward end of the endwise movable beam 10 is a movable head 17, which indirectly supports the lifter proper, this head being connected, substantially as in my prior application, to opposite sides of the beam by arms 18 which are pivoted to the head and to the beam.

In my prior application the lifter is mounted directly on the head, but in this instance the lifter which is shown at 19 and which is adapted to engage a bail or loop 20 at the top of the oven door 21 is pivotally supported between its ends at the top of an arm 22 which is in front of the head and is pivoted thereto to turn upon a pin or on trunnions 23 which are between the ends of the arms and somewhat nearer the lower end than the top thereof.

The arm 22 is provided equal distances

above and below the pivotal axis 23 with upper abutments 24 and lower abutments 25, both in this case being in the form of rollers, there being two upper rollers and two lower rollers as shown in Fig. 3.

The lifter 19 is adapted to be rocked on the axis of its pivotal connection with the arm 22 so as to elevate or release the door 21 by mechanism mounted on the head 17, and including a motor 26 which through a suitable gearing in a gear case 27 rotates a crank 28 which is connected by rods 29 to the lifter 19.

When the parts are in normal position, the pivoted arms 18 which connect the head to the beam 10 are forwardly inclined as shown in Fig. 1, and on pressure of the abutments 24 and 25 against the oven door the head may yield, the yielding movements being opposed by the fact that in yielding the head is moved upwardly slightly, but principally by a coil spring 30 which is between an abutment extending down from the head to an abutment or lug extending upwardly from the beam and surrounds a bolt extending through these abutments. When the parts are in normal position and when the door is supported by the lifting mechanism, the arm 22 is slightly inclined to the vertical, and both abutments are out of engagement with the door, the upper abutments being somewhat closer thereto than the lower abutments, but when the upper abutments engage the door, the arm 22 swings on its axis bringing the lower abutments up against the door so that both the lower and upper abutments engage the door with equal pressures. The rocking movement of the arm 22 is limited by a stop such as illustrated in Fig. 4, and which as here shown is in the form of a bolt 31, passes through the rear wall of the arm and is threaded into a suitable boss of the head.

When it is desired to remove a door from the oven, the pusher or other supporting machine is moved along the track so that the door extractor mechanism is directly in front of the door, then the beam 10 is moved toward the door and the lifter is inserted under the strap or bail 20. Then the lifter 19 is actuated by the motor 26 so as to elevate the door slightly, after which the beam 10 is moved back from the oven carrying with it the door, and then the whole machine will be moved laterally. If when the mechanism approaches the door the beam is moved inwardly too far, the upper abutments 24 will engage the upper part of the door, and this will rock the arm 22 bringing the lower abutments 25 also up against the door, and if these abutments are pressed against the door with sufficient pressure the head may yield so as to prevent breakage. Likewise when the door is being restored, if the door sticks and does not enter the frame readily, both the upper and lower abutments will be brought up against the door, and they will press it into the door frame with equal pressures. After the door is restored into the door frame, the front end of the lifter 19 is lowered, and then the shifting mechanism is backed away from the door.

In the modification shown in Figs. 5 and 6, substantially the same results are obtained with mechanism differently constructed than that shown in the preceding figures. In this instance the shifting mechanism is carried by a wheeled truck or frame 35 which supports only the shifting mechanism and is moved along the line of ovens, preferably though not necessarily, at the coke side. In this instance the lifting mechanism includes a shifting member in the form of a casting 36 which is movable in an endwise direction toward and from an oven, and is supported in part by an upper roller 37 and a lower pinion 38 which is driven through gearing by a motor 39 and engages a rack 36^a on the lower side of the member 36, (see Figs. 7 and 8.) Preferably the rack is yieldingly connected to the member 36 through a spring 36^b (Fig. 8) so that the member 36 may give slightly with reference to the rack to avoid shocks when the abutments engage the door. Additionally the shifting member 36 is supported at its forward end by a pair of arms 40 which are pivoted at 41 to the frame 35, and at 42 to the front end of the member 36. Pivotally connected at 42 to the forward end of the shifting member 36 is an arm 43 which corresponds to the pivoted arm 22 of the construction first described. This arm has at the top a pivoted lifter 44 which is connected by rods 45 to cranks driven by a motor 46 which is supported on the member 36. Likewise this arm 43 has a pair of upper abutments in the form of rollers 47, and a pair of similar lower abutments 48, the rollers 47 and 48 being equal distances from the axis 42 about which the arm 43 rocks.

With this construction to remove a door from the oven, the frame 35 is properly positioned on its track with respect to the door, and then the member 36 is moved inwardly by the motor 39, and in so doing the front end of the member 36 swings upwardly as the pivoted arms 40 approach the vertical position, and it swings downwardly slightly when these arms 40 pass beyond the vertical position. In approaching the door, should the upper abutment 47 engage it, the arm 43 will rock, bringing the lower abutments against the door. After the lifter 44 engages the strap or bail at the top of the door, the front end of the lifter 44 is elevated by the motor driven mechanism, and then the shifting member 36 is retracted carrying the door back from the door frame, after which the door can be moved laterally

with reference to the oven. The door is restored in like manner, it being understood that should the door stick in the frame, the arm 43 will be rocked, and first the upper abutments and then the lower abutments will be brought up against the door and will press the upper and lower parts of the door inward into place with equal pressure.

Having described my invention, I claim:

1. In a door shifting mechanism, a door shifting member movable toward and from an oven, an upright arm pivoted intermediate its ends to said member and provided with a lifter adapted to engage an appropriate part of the door, and abutments carried by the arm above and below the pivot thereof and adapted to engage the door.

2. In a door shifting mechanism, a door shifting member movable toward and from an oven, an upright arm pivoted intermediate its ends to said member and provided with a lifter adapted to engage an appropriate part of the door, abutments carried by the arm above and below the pivot thereof and adapted to engage the door, and cushioning means interposed between said arm and shifting member.

3. In a door shifting mechanism, a door shifting member movable toward and from an oven, a pivoted arm supported by said member and provided with a lifter adapted to engage an appropriate part of the door, and a pair of abutments carried by the arm on opposite sides of its axis of movement, and adapted to be brought up against the door.

4. In a door shifting mechanism, a shifting member movable toward and from an oven, an arm pivotally supported by said member so as to turn about an axis which is between the ends of the arm, a lifter carried by the arm, and a pair of abutments carried by the arm and normally out of engagement with the door when the latter is supported by the lifter.

5. In a door shifting mechanism, a shifting member movable toward and from an oven, an arm pivotally supported at the inner end thereof to turn about an axis between the ends of the arm, a lifter at the upper part of said arm, and a pair of door engaging abutments carried by the arm above and below its axis of movement.

6. In a door shifting mechanism for ovens and the like, a shifting member movable toward and from an oven, an upright lifting arm pivoted intermediate its ends to said member, an abutment carried by said arm below the pivot and adapted to engage the door, a lifter carried by said arm above the pivot adapted to engage an appropriate part of the door and means for operating said lifter.

7. In a door shifting mechanism for ovens and the like, a shifting member movable toward and from the door, a second member yieldingly supported by the first member, an arm pivotally connected intermediate its ends to said second member, a lifter carried by said arm above the pivot, and an abutment carried by the arm below its pivot adapted to engage the door.

8. In a door shifting mechanism for ovens and the like, a shifting member movable toward and from an oven, a head yieldingly supported thereon, an arm pivotally connected to the head, a lifter supported by the arm, and an abutment carried by the arm and normally out of engagement with the door when the door is supported by the lifter.

9. In a door shifting mechanism for ovens and the like, a shifting member movable toward and from an oven, a head yieldingly supported by said member, an arm pivotally connected intermediate its ends to said head so that it may rock about an axis, said arm having a lifter adapted to engage an appropriate part of the door and having a pair of abutments, one above and the other below the pivot and adapted to engage the door.

10. In a door shifting mechanism for ovens and the like, a shifting member movable toward and from an oven, a head yieldingly supported thereon, an arm pivotally connected intermediate its ends to said head, a lifter carried by the arm and adapted to engage an appropriate part of the door, and a pair of abutments carried by the arm adapted to engage the upper and lower parts of the door with substantially the same pressure.

In testimony whereof, I hereunto affix my signature.

IVOR D. THOMAS.