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CLOSURE MECHANISM FOR OVEN DOORS

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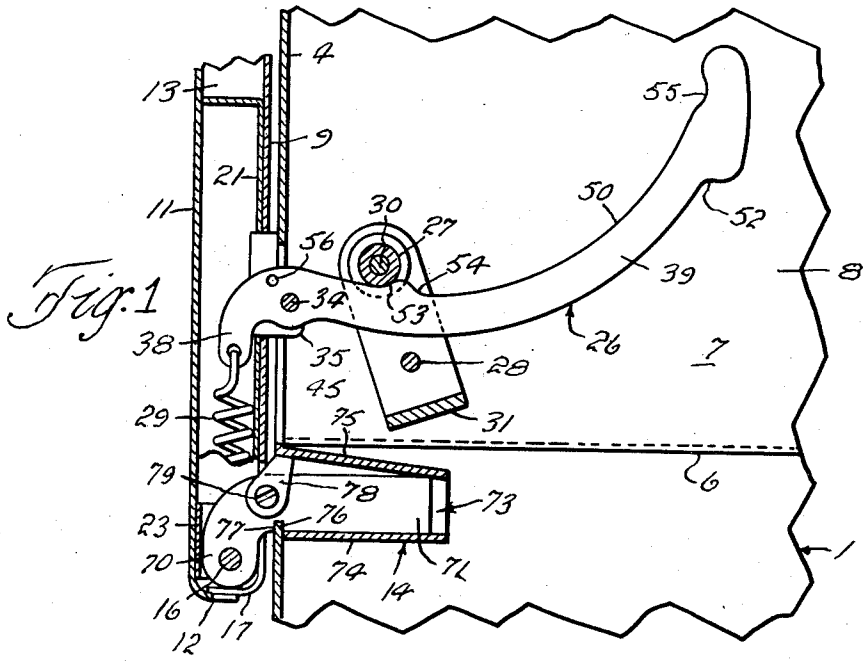


Fig. 1

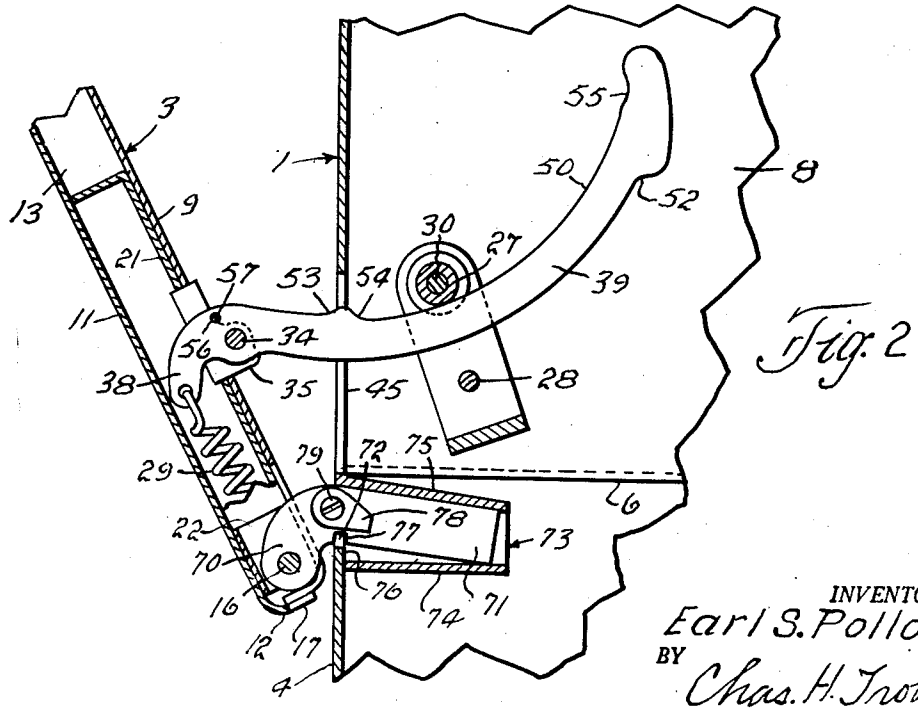


Fig. 2

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CLOSURE MECHANISM FOR OVEN DOORS

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2 Claims. (Cl. 126—194)

This invention relates generally to a closure mechanism for a cooking range oven and is a continuation-in-part of the closure mechanism disclosed in my copending application Serial No. 286,144, filed May 5, 1952, now Patent No. 2,721,547. More specifically the invention relates to the hinge mechanism for removably mounting a door, of the "drop" type which swings outwardly and downwardly from a vertical closed position to a substantially horizontal open position upon the front wall of a range in position to close the oven therein.

Cooking range oven doors are relatively heavy as they must be thoroughly insulated and constructed to stand hard usage. Means must be provided to limit the open position thereof to substantially horizontal and means must also be provided to hold the door tightly closed in order to prevent the escape of heat from the oven. Means should also be provided to substantially counterbalance the door in all positions between closed and fully open positions. In electric cooking ranges where the broiler element is located in the oven means should also be provided to hold the door slightly ajar in order to vent the oven and keep it from being unduly heated. In order to facilitate the cleaning of an oven, and the door therefor, after use the door should be so mounted that it can be quickly and easily removed and replaced.

The mechanism disclosed herein comprises an oven door of the drop type, hinge means by which the door is removably mounted in front of an oven, and a counterbalance means which will yieldingly hold the oven door tightly closed, yieldingly hold it slightly ajar, yieldingly hold it fully open, and will substantially counterbalance it in all positions between closed and fully open positions.

The counterbalance means is designed for use with an oven door having inner and outer walls and a connecting annular flange to provide a chamber within the door. It comprises a lever which is mounted upon a fulcrum carried by a bracket which is suitably secured to the inner wall of the door, a roller which is mounted upon a fixed stud within a range, a fixed abutment within the range and a tension spring which is disposed within the door chamber. The end of the lever adjacent the pivot point is disposed at an angle to the rest of the lever and extends downwardly into the door chamber and has one end of the tension spring connected thereto. The other end of the spring is connected to a tension adjusting screw which is suitably mounted within the door chamber and is accessible through an aperture in the door flange. The upper edge of the other end of the lever is generally concave and extends into the range under the roller against which it is yieldingly held in all positions of the door by the tension spring. The under edge of the lever adjacent the free end thereof has a notch formed therein which engages the fixed abutment when the door is in fully open position. The fixed abutment and the roller cooperate with each other and the lever to limit the opening movement of the door to substantially horizontal position. The tension spring always tends to slightly bias the door toward closed position. The relative positions of the

door hinge axis, the roller axis, and the fulcrum for the arm with respect to each other, and the contour of the upper edge of the lever are such as to progressively decrease the biasing force exerted by the spring as the door is moved from fully open to closed position and thus compensate for the constantly changing force exerted by gravity upon the door as it moves from open to closed position. This arrangement substantially counterbalances the door in all positions and prevents slamming of the door in opening and closing. In order to yieldingly hold the door tightly closed, slightly ajar or fully open three spaced shoulders are provided in the upper edge of the lever. When the door is closed one of these shoulders engages the roller rearwardly thereof. When the door is slightly ajar another shoulder engages the roller forwardly thereof, and when the door is fully open the third shoulder engages the roller. In order to lock the counterbalance means in inoperative condition when it is desired to remove the door an aperture is provided in the lever adjacent the fulcrum therefor through which a pin is inserted when the door is in fully open position. Then when the door is moved towards closed position the spring rocks the lever in a counterclockwise direction until the pin engages a stop on the door and prevents further rocking movement of the lever. The door and with it the lever can then be readily removed.

The hinge means comprises hinge pins which are carried by the oven door within the chamber therein, and hinge brackets having apertures therein through which the hinge pins extend. The hinge brackets extend outwardly from the upper ends of elongated shanks and into the door chamber through suitable slots in the door. The elongated shanks are slidably mounted in downwardly and inwardly inclined sockets secured to the rear face of the front wall of the range.

The principal object of the invention is to provide improved hinge means for removably mounting a door on a cooking range in front of the oven therein.

Other and more limited objects of the invention will be apparent from the following specification and the accompanying drawings forming a part thereof wherein:

Fig. 1 is a fragmentary vertical section through a cooking range having a closure mechanism embodying my invention mounted thereon showing the oven door yieldingly held in closed position.

Fig. 2 is a view similar to Fig. 1 showing the counterbalance mechanism locked in inoperative condition preparatory to removing the door from the range.

Referring now to the drawings by reference characters, the numeral 1 indicates a cooking range having an oven compartment which is closed by an oven door 3. The front wall of the range is designated by the numeral 4. The numeral 6 designates the bottom of the oven and the numeral 7 designates one of the side walls of the oven which is spaced from the adjoining end wall of the range to provide a chamber 8 therebetween.

The oven door 3 comprises an inner rectangular wall 9 having an outwardly extending annular flange of the inner wall, and an outer wall 11 having an inwardly extending annular flange 12 which telescopes the outwardly extending flange 10 and is suitably secured thereto. The walls 9 and 11 are spaced from each other to provide a chamber 13 therebetween. The door 3 is secured to the front wall 4 of the range 1 by a pair of hinge members, one of which is disposed at each side of the door adjacent the lower end thereof. In opening, the upper end of the door 3 swings outwardly and downwardly from the front wall 4 of the range.

Each hinge member comprises a bracket 70 and a pivot pin 16 which extends through a complementary aperture in the bracket 70. The pivot pins 16 are secured to and between one wall 20 of cages 21, secured

to the door 3 within the door chamber 13, and a leg 22 secured to and spaced from the wall 20 by a bridge 23. The brackets 70 are integral with elongated angularly disposed shanks 71 which extend through slots 17 in the door are slidably mounted in sockets 73 disposed in the chambers 8 behind the front wall 4 of the range. This hinge construction permits the ready removal and replacement of the door 3 when desired as will be hereinafter explained.

In order to limit the opening movement of the door 3, to yieldingly hold it in fully open position, slightly ajar or closed, and to substantially counterbalance the door in all positions between closed and fully open counterbalance means which comprises a lever 26, a flanged roller 27 fixed abutment 28 and a tension spring 29 is provided.

The flanged roller 27 is rotatably mounted upon a fixed shaft 30 carried by a U-shaped bracket 31 which is rigidly secured between the side walls of the chamber 8 in the range 1. The abutment 28 is also carried by the bracket 31, below and slightly inwardly of the roller 27.

The lever 26 is rotatably mounted upon a shaft 34 between a pair of ears 35 which extend out through a slot, in the inner wall 9 of the door, from the cage 21 within the door chamber 13. The lever 26 consists of a short section 38 disposed on one side of the pivot pin 34 and a relatively long section 39 disposed on the other side of the pivot pin 34 at an angle to the section 38. The section 38 of the lever 26 extends into the door chamber 13 through the slot therein and is connected to one end of the tension spring 29. The other end of the spring 29 is connected to the door structure. The other section 39 of the lever 26 extends through a slot 45 in the front wall 4 of the range into the chamber 8 and between the roller 27 and the abutment 28. The spring 29 always yieldingly holds the upper edge 50 of the lever 26 in engagement with the roller 27.

As the door 3 moves from closed to fully open position the force exerted by gravity urging the door towards fully open position progressively increases. Conversely as the door is moved from the fully open position to the closed position the force exerted by gravity upon the door progressively decreases. Consequently in order to substantially counterbalance the door in all positions between closed and fully open positions it is necessary that the counterbalance mechanism be so constructed and arranged that the counter force exerted thereby against the force exerted by gravity will also progressively change in direct proportion to the change in the force exerted by gravity as the door is moved back and forth between closed and fully open positions. To this end the contour of the upper edge 50, of the lever 26, which bears against roller 27 is in the form of a concave compound curve. The curvature thereof is such that the normal to the point of contact thereof with the periphery of the roller 27 progressively varies from substantially vertical to substantially horizontal as the door 3 is moved from closed to fully open position. The roller 27 and the lever 26 cooperate to progressively vary the effective force exerted by the spring 29 during opening and closing of the door. When the door is closed with the normal substantially vertical the effective force of the spring 29 is at its minimum; and when the door is fully open with the normal substantially horizontal the effective force of the spring 29 is at its maximum.

In order to limit the opening movement of the door 3 to substantially horizontal position a notch 52 is provided, in the lower edge of the lever 26, which engages the fixed abutment 28 when the door is in open position. As the door approaches fully open position the roller 27 forces the lever 26 downwardly until the notch 52 engages the abutment 28 after which the roller 27 and the abutment 28 cooperate with each other and with the lever 26 to prevent further opening movement of the door.

In order to yieldingly hold the door 3 tightly closed, slightly ajar or fully open three spaced shoulders 53, 54 and 55 in upper edge 50 of the lever 26 are provided. When the door is closed the shoulder 53 engages the roller 27 as shown in Fig. 1; when slightly ajar the shoulder 54 engages the roller 27, and when fully open the shoulder 55 engages the roller 27. During the initial opening movement of the door sufficient extra force must be manually applied to the door to depress the lever 26 until the shoulder 53 passes the roller 27. During the final closing movement of the door 3 from the slightly ajar position sufficient extra force must be manually applied to the door to depress the lever 26 until the shoulder 54 passes the roller 27; and during the initial closing movement of the door sufficient extra force must be manually applied to the door to move the shoulder 55 away from the roller 27.

In order to lock the counterbalance means in inoperative condition to permit easy removal of the door 3 from the range I provide an aperture 56 through the lever 26 close to the shaft 34, and a locking pin 57 which is adapted to be inserted through the aperture 56. When it is desired to remove the door 3 from the range 1 the door is first moved to fully open position. The pin 57 is then inserted through the aperture 56 and then the door is moved to the position shown in Fig. 2. In this position the spring 29 has rocked the lever 26 in a counterclockwise direction until the pin 57 engages stops carried by the ears 35. The spring 29 and pin 57 will hold the lever 26 stationary in this position.

Returning now to the particular construction of the hinge means, it will be seen that the bottom wall 74 of the socket 73 is secured to the range wall 4 slightly below the lower edge of an opening 72 in the same and extends substantially horizontally rearwardly therefrom. The top wall 75 of the socket 73 is secured to the range wall 4 adjacent the upper edge of the opening 72 and extends rearwardly and downwardly therefrom. The portion of the front wall 4, between the bottom wall 74 of the socket 73 and the lower edge of the opening 72 constitutes a latch 76 which extends across the lower end of the open outer end of the socket 73. The latch 76 engages a notch or keeper 77 in the lower edge of the shank 71. A locking pawl 78 which is secured to one side of the shank 71 by a screw 79 is provided to prevent accidental withdrawal of the keeper 77 from the latch 76. Normally the free end of the pawl 78 engages the inner face of the socket wall 75 and/or the edge of the range wall 4 which constitutes the top of the opening 72, and thereby locks the shank 71 against withdrawal from the socket 73.

To continue with removal of the door, after the same has been swung to open position and the pin 57 inserted in the aperture 56 to lock the counterbalance means, the pawl 78 is turned to the position shown in Fig. 2. The door is then returned to partially closed position and raised upwardly to withdraw the keeper 77 from the latch 76 as shown in Fig. 2. The lower end of the door can then be moved outwardly from the range to withdraw the shank 71 from the socket 73, after which the lever 26 can be withdrawn from between the roller 27 and the abutment 28.

Although I have shown the hinge and counterbalance mechanisms applied to only one side of the door 3 it is to be understood that they are duplicated at the other side of the door.

From the foregoing it will be apparent to those skilled in this art that I have provided a very simple and efficient mechanism for accomplishing the objects of the invention.

It is to be understood that I am not limited to the specific construction shown and described herein as various modifications may be made therein within the scope of the appended claims.

What is claimed is:

1. In cooking range structure including a cabinet hav-

ing a front wall, an oven within said cabinet, an opening into said oven through said front wall, and an oven door by which said opening is closed; means for removably securing said door to the cabinet front wall for movement between a vertical closed position and a substantially horizontally open position, said means comprising an elongated socket secured to and extending inwardly from the front wall beneath the oven opening, a hinge bracket pivotally connected to a lower portion of the door and having an elongated shank inserted in said socket, the shank being of such size and shape relative to the surrounding socket as to be laterally movable therewithin to a limited extent, latching means including a latch member and a keeper adapted transversely to interengage the cabinet and the inserted shank, said latch member being carried by one of the cabinet and the shank and the keeper being carried by the other of such parts, such latch member and keeper being moved into and out of latching engagement by lateral shifting of the shank within the socket, and a rockable locking member releasably braced between the socket and the shank in opposition to lateral movement of the latter tending to disengage the latch member and the keeper, whereby the hinge bracket is removable from the socket by rocking the locking member out of braced condition and then shifting the shank to disengage the latching means.

2. In cooking range structure including a cabinet having a front wall, an oven within said cabinet, an opening into said oven through said front wall, and an oven door by which said opening is closed; means for removably securing said door to the cabinet front wall for movement between a vertical closed position and a substantially horizontal open position, said means comprising an elongated socket secured to and extending inwardly from the front wall beneath the oven opening, a hinge bracket pivotally connected to a lower portion of the door and having an elongated shank inserted in said socket, such shank being capable of limited lateral movement within the socket and being formed with a notch in its lower edge, a fixed latch on the cabinet projecting upwardly from the bottom region of the socket near the outer end of the same for engagement in such notch, and a locking pawl carried by the shank for movement into and out of engagement with the upper wall of the socket, said pawl being operative releasably to force the shank downwardly in the socket and maintain the notch thereof engaged with the fixed latch, the hinge bracket being withdrawable after releasing the pawl and disengaging the latching means.

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