

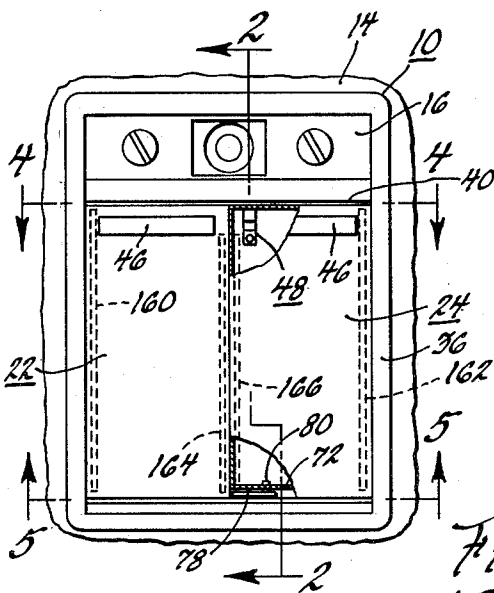
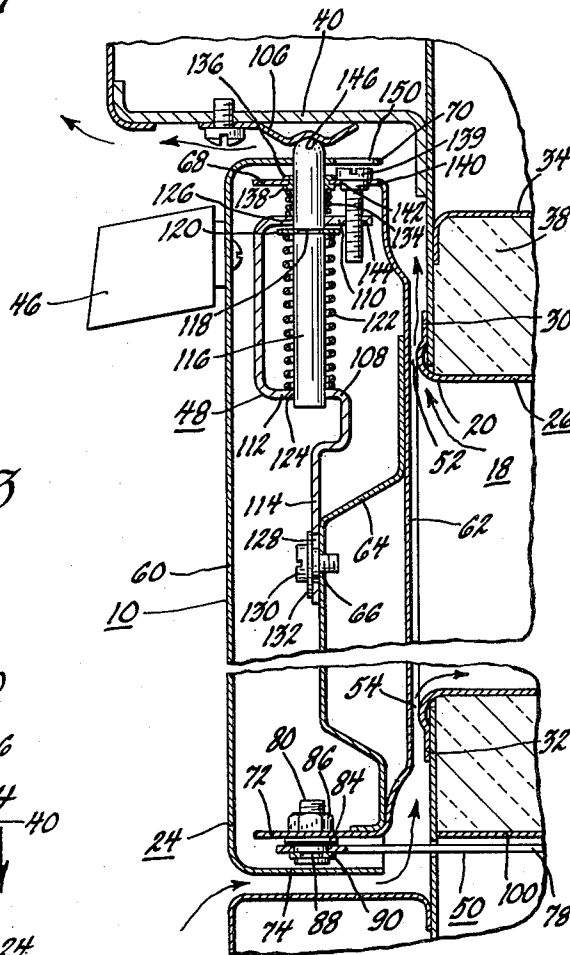
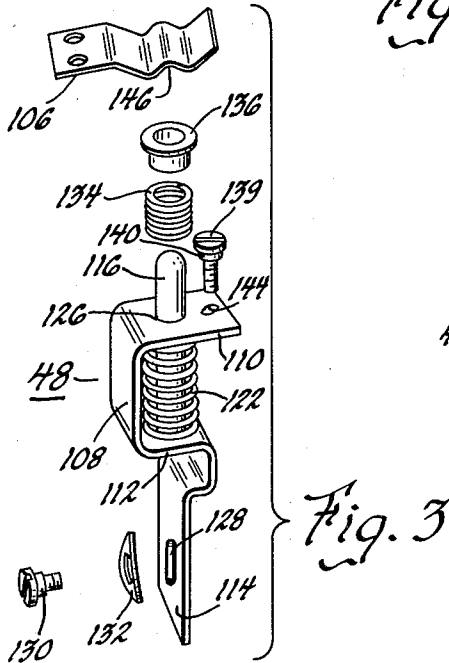
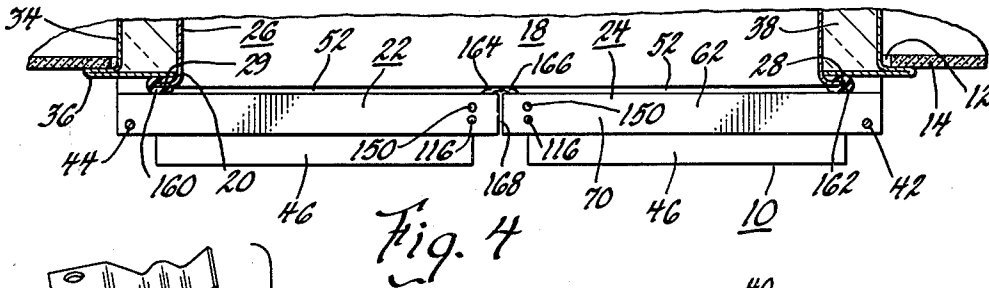
July 24, 1962

LE ROY McDONNOLD
OVEN DOOR MOUNTING MEANS

3,045,663

Filed Sept. 28, 1959

2 Sheets-Sheet 1



INVENTOR.
LeRoy McDonnold
BY Frederick M. Ritchie
HIS ATTORNEY

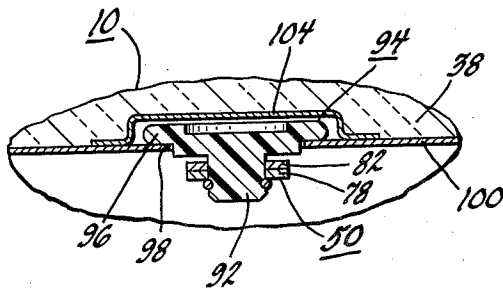
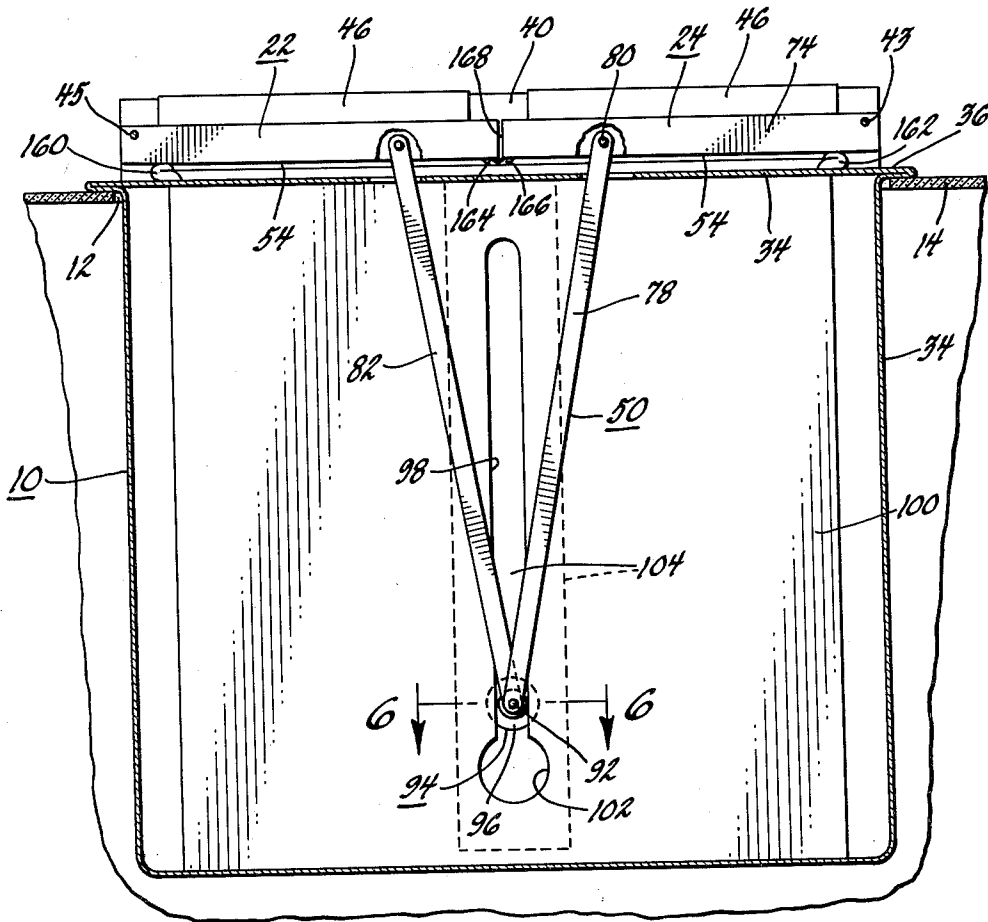
July 24, 1962

LE ROY McDONNOLD
OVEN DOOR MOUNTING MEANS

3,045,663

Filed Sept. 28, 1959

2 Sheets-Sheet 2



INVENTOR.
Le Roy McDonnold
BY 
Frederick M. Ritchie
HIS ATTORNEY

1

3,045,663

OVEN DOOR MOUNTING MEANS

Le Roy McDonnold, West Carrollton, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Sept. 28, 1959, Ser. No. 842,634

7 Claims. (Cl. 126—190)

This invention relates to a domestic appliance and more particularly to an improved side opening oven door actuating and latching arrangement.

With the modern trend toward built-in kitchens the built-in wall oven has gained increasing acceptance. The inaccessible nature of such an appliance has made it necessary to vent the oven through a front opening thereof. One method for doing this utilizes an oven door which is spaced slightly from the oven chamber opening in order to provide an air flow passageway at both the top and the bottom of the door. In such an arrangement the positioning of the door is critical in order to maintain proper heat distribution within the oven. Past latching and hinging arrangements for such a French-type door had no provision to compensate for tolerances due either to production shortcomings or subsequent wear or warp. Thus heat distribution within the oven varied as the vent passageways strayed from the designed norm. It is to the solution of this and other problems that the present invention is directed.

One object of this invention is to provide a door latch, the entire assembly of which may be adjustable relative to the door.

A more particular object of this invention is to provide a door latch which may be adjusted in a manner which will not change the spring rate of the latch bolt.

A still more specific object of this invention is the provision of a door latch for a French door oven which may be adjusted relative to the French door as a step in the manufacture of the oven as well as during subsequent oven use.

It is also an object of this invention to provide a wall oven which is vented at the front thereof.

A further object of this invention is the provision of a French door wall oven wherein the door support linkage and the door latches combine to effect a non-warping door arrangement which provides consistently unchanged venting from the front of the oven to effect even heat distribution within the oven.

Another object of this invention is the provision of an improved French door actuating linkage which is easily assembled and dependable in use.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

FIGURE 1 is a fragmentary front elevational view with parts broken away to show a French door wall oven manufactured in accordance with this invention;

FIGURE 2 is a fragmentary sectional view of an adjustable door latch and operating arm arrangement taken along line 2—2 in FIGURE 1 and showing oven venting currents;

FIGURE 3 is an exploded perspective view of the door latch assembly of this invention;

FIGURE 4 is a sectional view taken along line 4—4 in FIGURE 1 to show the vent spacing arrangement of the French door oven here disclosed;

FIGURE 5 is a sectional view taken along line 5—5 in FIGURE 1 to show the French door operating arm linkage of this invention; and

FIGURE 6 is a fragmentary sectional view taken along

2

line 6—6 in FIGURE 5 to show the operating arm guide and channel slide arrangement.

In accordance with this invention and with reference to FIGURES 1, 2 and 4, a wall oven shown generally at 10 is adapted for installation within an opening 12 of a wall 14. The oven is comprised of a control section 16 and an oven chamber 18 having an access opening 20 closed by a pair of French doors 22 and 24. The oven proper is defined by a liner 26 which has outer flanges 28, 29 at each side thereof and flanges 30, 32 along the top and bottom, respectively, of the opening 20. The outer casing 34 of the wall oven has a turned-over flange 36 which abuts against the wall 14 and may be snugged up thereto in any conventional manner. For satisfactorily limiting heat transfer from the liner 26, insulation 38 may be provided between the liner 26 and the outer casing 34. The control panel 16 has a bottom wall 40 which overlies the top of each door 22 and 24 and provides the means for securing the hinge pivot pins 42, 43, and 44, 45 for the doors 24 and 22, respectively. Any conventional handle 46 may be utilized to permit actuation of the doors for vertical hinged movement about the hinge pins. When the doors 22 and 24 are in a closed position, as shown in FIGURE 4, each door is restrained at the top thereof by a door latch assembly shown generally at 48 (see FIGURES 1 and 2) and at the bottom thereof by a door operating arm arrangement shown generally at 50. Since the venting of the oven chamber 18 must be accomplished through the front of the wall oven 10, it is important that the top and bottom of the doors 22 and 24 be maintained in a dependably fixed position, as will be described more fully next following.

Each of the doors 22 and 24 are comprised of an outer panel 60, an inner panel 62, and an intermediate reinforcement panel 64. The door latch assembly 48 is adapted to be slightly movably affixed to an aperture 66 in the reinforcement panel 64, as will be described more fully hereinafter. To provide a compact and strong door construction both outer and inner door panels are drawn into a box-like shape. A top flange portion 68 of the inner door panel 62 nests within and underlies a top flange portion 70 on the outer door panel 60. Similarly, a turned-over flange portion 72 on the inner door panel 62 nests within a turned-over flange portion 74 on the outer door panel 60 along its bottom edge. When each of the doors is in a closed position, the inner door panel 62 is held in spaced relationship to the exposed flange of the oven liner 26 to form the oven vent passageways 52 and 54. The size of the passageways 52 and 54 must be maintained consistent if even heat distribution is to be accomplished within the oven chamber 18. For this reason, the top of each of the doors 22 and 24 must be maintained in a fixed position by a door latch assembly 48. At the same time, each bottom of the doors 22 and 24 is positioned positively by the action of the door operating arm assembly 50. Of course, this positive positioning is at the center portion of the door, the outer edges being maintained fixed by the pivotal mounting of the hinge pins 42, 43 and 44, 45.

Reference may now be had to FIGURES 2 and 5 for a complete understanding of the door operating arm assembly 50. The assembly is comprised of an actuating link 78 which is pivotally attached to a door operating arm stud 80 while a second link 82 is pivotally attached in the same manner to the lower flange portion of the inner door panel of the door 22. More particularly, the operating arm stud 80 has a shoulder 84 which abuts against the underside of the inner door panel flange 72. A nut 86 may be snugged up to affix the stud 80 to the door flange. A lower portion of the stud 80 has a groove 88 which receives a snap ring 90 to retain the link 78 pivotally upon the depending shaft of the operat-

ing arm stud 80. At the rearward end of the oven the links 78 and 82 are pivotally fastened together on the depending shaft 92 of a plastic door opening arm guide 94. The guide 94 has an enlarged top 96 circular in configuration and adapted to overlies a slotted opening 98 in the insulation retainer 100. The opening 98 is in the form of an elongated slot running from front to back along the bottom of the oven. At the back or rearward end of the slot 98, an enlargement 102 is adapted to receive the top guide portion 96 at the time the oven is assembled. Note, however, in FIGURE 5 that with the doors 22 and 24 in the closed position, the door operating arm guide 94 is retained in front of the enlarged opening 102 and thus cannot be disengaged from the slot 98 without disconnecting the links 78, 82 from the doors. An inverted channel 104 overlies the slide slot 98 and the operating arm guide 94 to restrain the insulation 38 for interfering with the operation or sliding movement of the guide 94. Thus, it may be seen that the opening of either door 22 or 24 will cause the simultaneous opening of the remaining door. Since the doors 22 and 24 are pivotally pinned at one end of the links 78 and 72 while the other ends of the link are fastened pivotally together, it should be obvious that the bottom of the doors must move together and cannot warp out of relationship with one another. This holds the spacing of passageway 54 constant at each door.

As aforesaid, it is desirable that oven venting by convection currents remain unchanged during the life of the oven. Foregoing were remarks directed to the positive positioning of the door bottoms as by the operating arm assembly 50. The top of the doors 22 and 24 are positively positioned by the cooperation of an adjustable door latch assembly 48 in each of the doors 22 and 24 with a keeper or striker 106 overlying each door latch assembly. Identical strikers 106 may be provided above each door latch assembly or the striker 106 simply may be elongated to overlies both of the door latch assemblies.

The exploded perspective of FIGURE 3 may be relied on for a complete understanding of the door latch assembly 48 in its relationship to a striker or keeper member 106. The door latch assembly 48 is comprised of a one piece sheet metal stamping support member or door latch bracket 108 having a top flange 110, an intermediate flange 112 and a depending bottom attachment flange 114. Both of the horizontal flanges 110 and 112 have central apertures 126, 124 to receive and accommodate the reciprocating movement of a door latch pin or bolt 116. The pin 116 has an intermediate groove 118 (see FIGURE 2) which receives a snap ring 120 as the upper limiting abutment for the door latch spring 122.

Thus the door latch pin or bolt 116 may reciprocate vertically within the openings 124, 126 of the door latch bracket 108. For attachment of the latch assembly 48 to the intermediate reinforcement panel 64 of the oven door, the depending flange 114 is formed with an elongated aperture 128 through a No. 6-32 hardened self-tapping screw 130 projects to engage the aperture 66 in the reinforcement flange 64. A spring washer 132 may also be utilized to maintain a continuous, frictionally yieldable attachment of the latch bracket 108 to the reinforcement panel of the door. In order to maintain the latch assembly 48 in a fixed relationship to the upper flange 68 of the door panel 62 a door latch retaining spring 134 circumscribes the upwardly exposed portion of the door latch pin or bolt 116. A latch pin guide 136 is inserted through an opening in the flange 68 and crimped over as at 138 to provide a smooth trim cylinder in which the latch bolt may operate.

In accordance with a primary concept of this invention, it is desirable that the entire door latch assembly 48 be adjustable vertically with reference to the French door 24. An adjusting screw or bolt 139 which may be a No. 6-32 special hardened tapping screw, is provided with a shoulder 140 which seats within an aperture 142

in the top flange 68 of the inner door panel 62. The bolt 139 rotates therein and is threadably engaged with an aperture 144 in the top flange 110 of the latch bracket 108. It should now be seen (FIGURE 2) that the manipulation of the bolt 139 within the aperture 144 of the latch bracket 108 will move the door latch assembly 48 up or down, clearance being provided for such movement by the elongated slot 128 in the bracket flange 114. In this fashion, the upward extension of the latch bolt 116 may be kept in proper relationship to a striker groove 146 in the striker 106. The door latch assembly 48 is held by spring tension at two points. The spring 134 maintains pressure between the top flange 110 of the latch bracket and the top flange 68 of the inner door panel 62. At the same time, the pressure asserted by the spring washer 132 on the depending flange 114 of the latch bracket yieldably affixes the latch assembly to the reinforcement panel 64. It should be noted that the vertical adjusting movement of the door latch assembly 48 has no effect on the spring rate for the spring 122. This is important for this fact accounts for the same amount of tension or pressure being applied by the bolt 116 on the keeper or striker 106. The French doors are thus located consistently in the same position, whereby the upper convection air passageway 52 may remain fixed. It should be further noted that subsequent adjustment of the door latch assembly 48 is permanently available to the purchaser of the oven 10. For instance, an aperture 150 is formed in the top flange 70 of the outer door panel 60. This permits access to the adjusting bolt 139 throughout the life of the product for maintaining proper adjustment of the latch assembly 48 relative to the striker 106. So long as the bolt rests solidly within the retaining channel 146 of the striker, the convection air passageway 52 will remain unchangingly and positively dimensioned.

The foregoing description has shown how an oven chamber 18 equipped with French doors 22 and 24 may be adapted for front venting. As aforesaid, the venting must remain unchanged if even heat distribution is to result within the oven chamber 18. At the top of the doors, an adjustable door latch assembly 48 has been utilized to position the doors positively with relationship to the top front flange 30 of the oven liner 26. Similarly, a door operating arm assembly 50 has been pivotally affixed to the bottom of each of the oven doors and thus maintains the correctly sized air passageway between the inner door panel 62 and the lower flange 32 of the liner. In order to provide the bottom to top convection air currents which are desired, it is necessary to provide seals along the sides of the oven chamber and adjacent the center crack between the doors 22 and 24. For this purpose a straight seal 160 overlies the flange 29 of the oven liner while a similar seal 162 serves the same purpose at the opposite flange 28 of the liner. These seals 160 and 162 are attached to the liner itself and thus the doors 22 and 24 move into engagement therewith when they are in a closed position. Along the center edge of each door seals are provided which seal against each other thereby limiting flow through the crack created by the juxtaposed doors. More particularly, the seal 164 is affixed to the door 22 while a seal 166 is attached to the door 24. When the doors are closed, the seals 164 and 166 abut each other and prevent egress or air through the crack 168 between the doors. The four straight seals, in effect, set up and define the side limits of the convection air passageways shown by air flow arrows in FIGURE 2. In this manner, air must enter under the flange 74 of the outer door panel 60, follow upwardly through the lower passageway 54 and finally proceed out of the oven by way of passageway 52. These passageways are fixed by the adjustment of the door latch assembly 48 and the retaining action of the door operating arm assembly 50. Should the top passageways 52 vary through years of oven use, the door latch assembly 48 may be readjusted to reestablish the

5

proper clearance. Thus, proper heat distribution within the oven chamber 18 is always effected.

Additionally, prior art French doors have suffered from the disadvantage of uneven warpage. This problem also has been solved by the foregoing invention. The bottom of each of the French doors is positively affixed by the linkage arrangement 50 which cannot be changed. Any warpage which could occur to one of the doors must necessarily be transferred to the other door, thereby creating movement to the doors together. The foregoing disclosure teaches an improved oven door arrangement wherein the vent passageways may be maintained by a latch which is adjustable as a whole—the latch bolt pressure being maintainable as a constant throughout the life of the product.

While the embodiments of the present invention as herein disclosed, constitute a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In combination with a French door oven having an opening, a pair of French doors for closing said opening, each of said doors having an inner and an outer panel, a latch assembly between said panels for each of said doors, said assembly including a support bracket, a reciprocable pin carried by said bracket, a first spring affixed to and circumscribing said pin and abutting said bracket at one end thereof and connected to said pin at the other end thereof for biasing said pin outwardly from each door, a second spring between said bracket and each door, an adjusting screw relatively rotatable seated on each door and threadedly engaging said bracket to adjust said bracket in relationship to each door without altering the tension on said first spring, and a striker connected to said opening in alignment with said pin.

2. In combination with an oven having an opening, a pair of doors for closing said opening, a latch assembly on each of said doors, said assembly including a support bracket, a reciprocable pin carried by said bracket, a first spring circumscribing said pin and having a first end connected to said pin and a second end abutting said bracket for biasing said pin outwardly from said door, a second spring between said bracket and said door, an adjusting screw relatively rotatably seated on said door and threadedly engaging said bracket to adjust said bracket in relationship to said door without altering the tension on said first spring, and a striker connected to said opening in alignment with said pin.

3. In combination with an oven having an opening, a door for closing said opening, a latch assembly on said door, said assembly including a support bracket, a reciprocable pin carried by said bracket, a first spring circumscribing said pin and having a first end connected to said pin and a second end abutting said bracket for biasing said pin outwardly from said door, a second spring between said bracket and said door, and a latch assembly adjusting screw relatively rotatably associated with said door and threadedly engaging said bracket to adjust said bracket in relationship to said door without altering the tension on said first spring, and a striker connected to said opening in alignment with said pin.

4. An adjustable door latch assembly for a door comprising, a support bracket, said support bracket having an upper ported flange, an intermediate ported flange, and a depending attachment flange, said upper flange having a threaded opening, a latch bolt adapted to slidably project through said upper and intermediate ported flanges, a first spring surrounding said bolt between said upper and said intermediate flange, a snap ring affixed to said bolt and restricting said first spring to bias said bolt into an extended position beyond the limits of said door,

6

means for yieldably attaching said attachment flange to said door, a second spring between said upper flange and said door, and an adjusting means carried by said door and threadedly engaged in said threaded opening vertically to adjust said assembly.

5. An adjustable door latch assembly for a door comprising, a support bracket, said support bracket having a first ported flange, and a second ported flange, said first flange having a threaded opening, a latch bolt adapted to slidably project through said first and second ported flanges, a first spring having one end connected to said bolt and another end connected to said bracket to bias said bolt into an extended position, means for yieldably attaching said bracket to said door, a second spring between said bracket and said door, and an adjusting means carried by said door and threadedly engaged in said threaded opening to adjust said assembly.

6. In combination with an oven having an opening, a pair of vertically hinged doors for closing said opening, means for sealing said oven including a first and second seal strip between the outer edges of said doors and said opening and a third and fourth seal strip along the inner edges of said doors, said third seal strip engaging said fourth seal strip when said doors are closed, said seal strips spacing said doors from said opening to form a vent passageway between said first and second seal strips, an operating arm assembly including a first link connected to one of said doors and a second link connected to the other of said doors, a door operating arm guide slidably movable relative to said opening, said first and second link being connected to said guide and adapted to move both of said doors together, a striker plate groove associated with said opening, and a latch assembly for each of said doors including a latch pin spring biased into engagement with said striker plate groove when said doors are closed and means for moving said assembly without altering the tension on said spring to adjust for variations in clearance between said door and said striker plate groove, thereby to position said first and second seal strips in sealing engagement with the sides of said oven opening and said third and fourth seal strips in sealing engagement with each other to maintain said vent passageway constant.

7. In combination with a frame member having an opening, a door member for closing said opening, a latch assembly on one of said members, said assembly including a support bracket, a reciprocable pin carried by said bracket, a first spring circumscribing said pin and having a first end connected to said pin and a second end abutting said bracket for biasing said pin outwardly from said one of said members, a second spring between said bracket and said one of said members, and a latch assembly adjusting screw relatively rotatably associated with said one of said members and threadedly engaging said bracket to adjust said bracket in relationship to said one of said members without altering the tension on said first spring, and a striker connected to the other of said members in alignment with said pin.

References Cited in the file of this patent

UNITED STATES PATENTS

68,947	Bull	Sept. 17, 1867
2,110,336	Lehman	Mar. 8, 1938
2,707,120	Loeb	Apr. 26, 1955
2,708,709	Pearce	May 17, 1955
2,785,915	Daffurn et al.	Mar. 19, 1957

FOREIGN PATENTS

615,794	France	Oct. 18, 1926
678,764	Great Britain	Sept. 10, 1952