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2,447,341

OVEN DOOR

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Fig. 1.

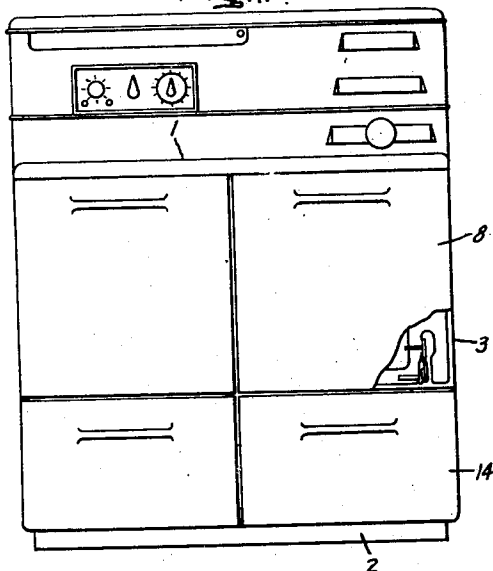


Fig. 2.

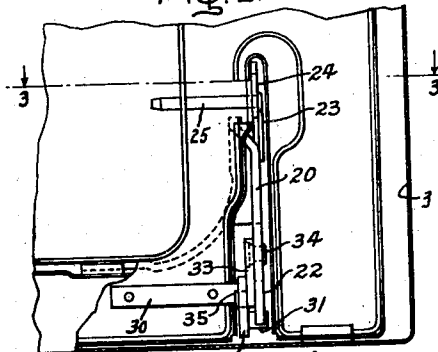


Fig. 3.

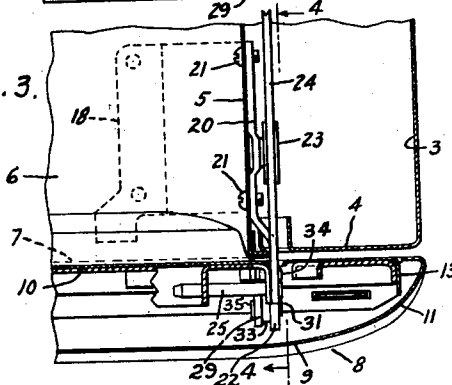


Fig. 4.

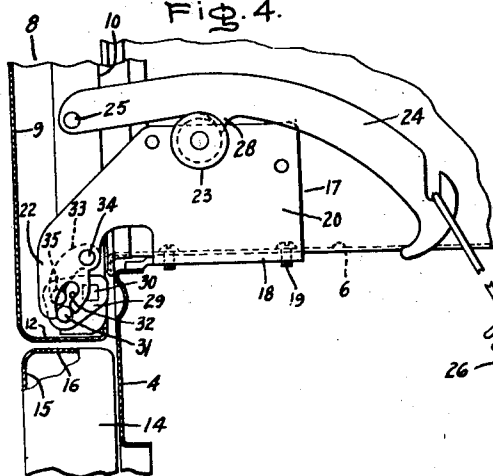


Fig. 5.

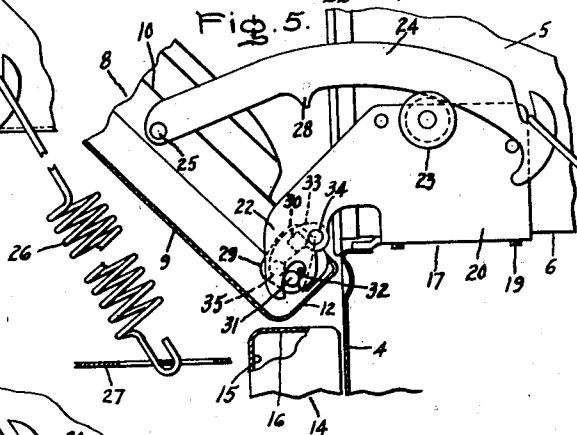
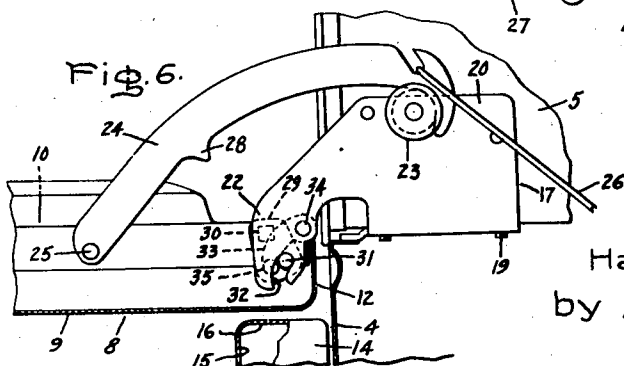


Fig. 6.



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UNITED STATES PATENT OFFICE

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OVEN DOOR

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5 Claims. (Cl. 126—194)

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This invention relates to door structures, more particularly to door structures for ovens and the like, and it has for its object the provision of improved structure of this character.

This invention is applicable particularly to oven and the like door structures of the "drop" type wherein the door is provided with hinge means at the bottom so that it may be dropped down from a vertical closed position to a substantially horizontal open position; and more especially where the door is relatively thick and when closed has its lower edge adjacent to a relatively wide door jamb formed on a front panel of the range. And it contemplates an improved door structure having means for shifting the swing center of the door upwardly and outwardly as the door drops down to its open position whereby the door itself is bodily shifted in an upward and outward direction so that it clears the door jamb panel as it swings down. This avoids chipping, chipping and marring the door and panel finishes which usually are made of enamel.

For a more complete understanding of this invention, reference should be had to the accompanying drawing in which Fig. 1 is a front elevation of an electric range provided with an oven equipped with door structure arranged in accordance with this invention; Fig. 2 is a fragmentary elevation of a part of the range structure shown in Fig. 1, parts being removed so as to illustrate certain details of construction and the figure being drawn to a larger scale than Fig. 1; Fig. 3 is a horizontal sectional view taken through the line 3—3 of Fig. 2 and looking in the direction of the arrows; Fig. 4 is a vertical sectional view taken through the line 4—4 of Fig. 3 and looking in the direction of the arrows; and Figs. 5 and 6 are similar to Fig. 4 but illustrate certain elements in different operative positions.

Referring to the drawing, this invention has been shown as applied to an electric range comprising a cabinet having a top cooking surface 1, and a lower base 2, side walls 3 and a front wall 4; it will be understood that the cabinet also will be provided with a rear wall which is not shown.

Mounted within the range under the cooking surface 1 at the right-hand half thereof, is an oven defined by a pair of opposed side walls 5 (the right-hand wall only being shown) and a bottom wall 6. It will be understood that the oven also will be provided with a top wall positioned parallel to the bottom wall 6 and will be provided with an end wall, the top and end walls not being shown. In other words, the oven is of

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rectangular box-like form and is mounted within the cabinet 1. The oven is provided with a front opening 7 which is substantially in the plane of the front wall 4, and which is closed by a door 8; this door when in the closed position is substantially vertical, as shown.

The door 8 comprises an outer panel 9 and an inner panel 10 spaced from the front panel, as shown. The two side edges of the front panel 9 are curved backwardly toward the rear panel as indicated by the numeral 11, while at its lower edge there is a substantially horizontal rearwardly extending flange 12 which also goes back to the back panel. The rear panel 10 is provided with forwardly extending edge flanges 13 (Fig. 3) and it is nested within the outer panel, as shown.

The front wall 4 of the cabinet defines a flat marginal area completely surrounding the door opening 7 and the door is so arranged that when it is closed it masks or covers this marginal area.

Mounted below the door 8 is a panel structure 14 having a front wall 15 and a top wall 16 constituting a door jamb panel. The front wall 15 is approximately in the plane of the front wall 9 of the door, while the top wall 16 is substantially horizontal and is in substantially parallel relation with the lower door flange 12 when the door is closed, as clearly shown in Fig. 4. Furthermore, it is very close to this lower door flange when the door is closed so that there is substantially flush front panel effect provided by the front panel 9 and front wall 15, as shown in Fig. 1. The panel structure 14 may be secured to the cabinet structure in fixed relation with it, but in the embodiment of the invention illustrated it constitutes the front wall of a drawer mounted in the cabinet below the oven and which is arranged to be slid outwardly and inwardly to open and closed positions.

The door is hinged to swing on a transverse axis positioned adjacent its lower edge so that it may be lowered from its vertical closed position of Figs. 1 and 4 to a substantially horizontal open position shown in Fig. 6. Furthermore, it is provided with counterbalance structure for balancing it as it is swung on its axis. In general, the hinging means and the counterbalance structure is arranged as described and claimed in the United States patent to G. L. Rees No. 2,313,582, dated March 9, 1943. As there described, the hinging means comprises a pair of hinge brackets 17 one positioned at each front lower corner of the oven on the exterior thereof.

Here, it should be noted that the hinging and

counterbalancing arrangement now to be described is duplicated at each lower corner of the oven. Since they are identical only that at the lower right-hand corner has been shown and only that will be described.

Each hinge bracket 17 is of L-shape having a lower horizontal leg 18 positioned under the bottom wall 6 of the oven and secured thereto in any suitable manner as by screw-fastening means 19. The vertical plate 20 of the brackets fits closely to the associated side wall 5 and is secured thereto by screw fastening means 21. Each bracket is provided with a forwardly and downwardly extending projection lug 22 to which the door is hinged. Furthermore, the side plate 20 supports rollers 23 upon which a counterbalance link 24 rolls. This link, at its forward end, is secured to the door by means of a pin 25 and at its rear end is attached to a counterbalancing tension spring 26 which is anchored to a fixed part 27 of the cabinet structure. The link is further provided on its lower edge with a protuberance 28 for coacting with the roller 23 to yieldingly hold the door in its closed position and also in an open broil position, all as fully described in the aforementioned Rees patent.

Thus far, the hinging and counterbalancing means is arranged in accordance with this Rees patent.

However, the specific means for securing the door to the projection 22 is arranged in accordance with this invention, and it provides for a bodily upwardly and outwardly shifting movement of the swing center of the door as the door is lowered, whereby the relatively thick lower flange 12 of the door will clear the lower panel structure 14 of the cabinet; and also provides for a return movement of the swing center as the door reaches its horizontal open position so that the lower flange 12 will lie above the top wall 16 of the panel 14 and positioned relatively close to the front plate 4, all as shown in Fig. 6.

This hinging means comprises a hinge plate 29 which is fixed to the door so as to move with it; as shown, it is provided with a square opening which receives a similarly shaped end portion of a hinge pin 30 which is secured to the door whereby the plate 29 must move as the door swings. The plate 29 further is provided at its outer side with an outwardly projecting pin 31 which is arranged to move in a cam slot 32 provided for it in the hinge bracket projection 22. In addition, the hinge means comprises a link 33 which is pivoted at its upper end to a pin 34 fixed to the projection 22, and which at its lower end carries a pin 35 which is received in an aperture provided for it in the hinge plate 29. In other words, the link 33 functions to pivotally interconnect the door with the projection 22 of the hinge bracket.

The center of the pin 35 constitutes the swing center of the door. And the parts are so constructed and arranged that when the door is closed this center occupies its position shown in Fig. 4, and as there shown, the projecting pin 31 on the hinge plate lies at the lower end of the slot 32.

When the door is pulled outwardly at the top so as to lower it the projecting pin 31 rides upwardly in the slot 32 and the swing center 35 moves upwardly and outwardly; that is, it moves in the direction of the front opening 7 of the oven and outwardly from the front plate 4. As the door continues to lower the hinge center moves back substantially to its original position of Fig. 4.

All of this is accomplished by giving the slot 32 an arc shape, the arc curving upwardly and inwardly toward the oven, as shown. By reason of this arrangement when the door is swung downwardly from its vertical position it is as a body shifted upwardly and outwardly away from the lower panel structure 14 whereby its lower flange 12 clears the panel structure 14. At a point about 45° in the downward movement of the door the center 35 begins to shift back to its starting position of Fig. 4 so that when the door reaches its horizontal open position of Fig. 6, the lower wall 12 is moved back over the upper wall 16 of the cabinet panel structure 14 in substantially parallel relation with the front plate 4 and adjacent to it, while the front panel 9 of the door will be in substantially parallel relation with the wall 16, all as shown in Fig. 6.

When the door is swung closed the reverse operation takes place. That is, the swing center 35 again moves upwardly and outwardly so that the door panel 9 and flange 12 clear the lower panel structure 14, and thence it moves back inwardly and downwardly to its initial position of Fig. 4.

This invention provides a simple door structure incorporated in a range wherein both the door and the adjacent panels are relatively thick for assuring that the movement of the door is not in any way restricted because of its thickness or of the thickness of the adjacent panels, and it insures a smooth movement of the door between open and closed positions.

While I have shown and described a particular embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention in its broader aspects and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a door structure having means defining a door opening, a door for closing said opening, and hinge means for hinging said door to swing on an axis along one edge of the door comprising, a fixed hinge support adjacent said edge, a coacting hinge element fixed to said door so as to move with it as a unit, a link pivotally connected to said hinge support and to said hinge element, the pivotal connection between the link and the hinge element constituting the swing center of the door, and coacting cam elements on said hinge support and element respectively interacting to force said swing center from said edge in the direction of said door opening and outwardly away from the plane thereof as the door is being moved to its open position and said hinge element moves with it as a unit.

2. A door structure for a cabinet having walls defining an opening therein, a relatively wide jamb panel adjacent one edge of said opening, a door for said opening having a relatively wide edge panel located adjacent to and in substantially parallel relation with said jamb panel when the door is closed, and means for hinging said door to swing on an axis adjacent said edge comprising, a fixed hinge support adjacent said edge, a coacting hinge element fixed to said door so as to move with it as a unitary structure, a link, pivotal connections between the ends of said link and said hinge support and hinge element, respectively, the pivotal connection between said link and said hinge element constituting the swing

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center of said door, and coacting cam elements on said hinge support and element, respectively, interacting to force said swing center from said edge in the direction of said door opening and outwardly from the plane thereof as the door is opened and said hinge element moves with it as a unit so that said relatively wide edge of said door clears said jamb panel.

3. In a range provided with a cabinet and an oven within said cabinet having a front opening, a door closing said opening provided with a front panel and a lower relatively wide end panel, a panel section on said cabinet below said door having a front panel and an upper edge panel located adjacent said lower end panel in substantially parallel relation with it when the door is closed and having a width substantially equal to the width thereof, and hinge means hinging said door to swing on a transverse axis adjacent its lower end comprising, a hinge support, means fixedly securing said support to said cabinet, a hinge element fixed to said door, a link pivoted at one end to said hinge support and at its other end to said element, the pivotal connection between said link and hinge element constituting the swing center of said door, said hinge support having formed therein a cam slot and a pin on said hinge element sliding in said slot so that when said door is swung downwardly toward its open position said swing center is shifted upwardly and outwardly thereby to cause said lower end panel on said door to clear said upper edge panel of said panel section.

4. In a range provided with a cabinet and an oven within said cabinet having a front opening, a vertically positioned door closing said opening provided with a front panel and a lower relatively wide end panel, a panel section on said cabinet below said door having a front panel and an upper edge panel located adjacent said lower end panel in substantially parallel relation with it when the door is closed and having a width substantially equal to the width thereof, and hinge means hinging said door to swing on a transverse axis adjacent its lower end from its vertical closed position to a substantially horizontal open position comprising, a hinge support, means fixedly securing said support to said cabinet, a hinge element fixed to said door, a link pivoted at one end to said hinge support and at its other end to said element, the pivotal connection between said link and element constituting the swing center of said door, said hinge support having formed therein a cam slot and a pin on said hinge element sliding in said slot, said slot being curved upwardly and inwardly so as to cause said pin to follow such a path that when the door is lowered to its open position said swing center first moves upwardly and outwardly so as to cause said door lower end panel to clear said upper

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edge panel of said panel section, and thence to return substantially to its initial position as the door reaches its fully open position, whereby said lower end panel is located above and in substantially right angular relation with said upper edge panel.

5. In a range provided with a cabinet and an oven within said cabinet having a front opening, said cabinet being provided with a front wall having a marginal area around said opening and substantially in the plane thereof, a vertically positioned door for closing said opening having a front panel covering said opening and said marginal area when the door is closed and also having a lower relatively wide end panel extending back horizontally from said front panel when the door is closed, a panel below said door having a front panel and a relatively wide substantially horizontal top panel positioned adjacent to and in substantially parallel relation with said door end panel when the door is closed, and hinge means hinging said door to swing on a transverse axis adjacent its lower end from its vertical closed position to a substantially horizontal open position comprising, a hinge support, means fixedly securing said support to said cabinet, said support having a projecting part extending forwardly from said front wall into the space back of said door front panel, a hinge element fixed to said door, a link pivoted at its upper end to said projecting part and at its lower end to said element, the pivotal connection between said link and element constituting the swing center of said door, said projecting part having formed therein a cam slot and a pin on said hinge element sliding in said slot, said slot being curved upwardly and inwardly so as to cause said pin to follow such a path that when the door is lowered to its open position said swing center first moves upwardly and outwardly so as to cause said lower door end panel to clear said top panel as it inclines as the door swings down, and thence to return substantially to its initial position so that said end panel when said door is in its horizontal open position is adjacent to and substantially parallel with said front plate.

HARRY R. JOHNSON.

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