Jan. 8, 1957 H. D. FERGUSON, JR., ET AL 2,776,655

CABINET DOOR HINGING

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FIG. 1.

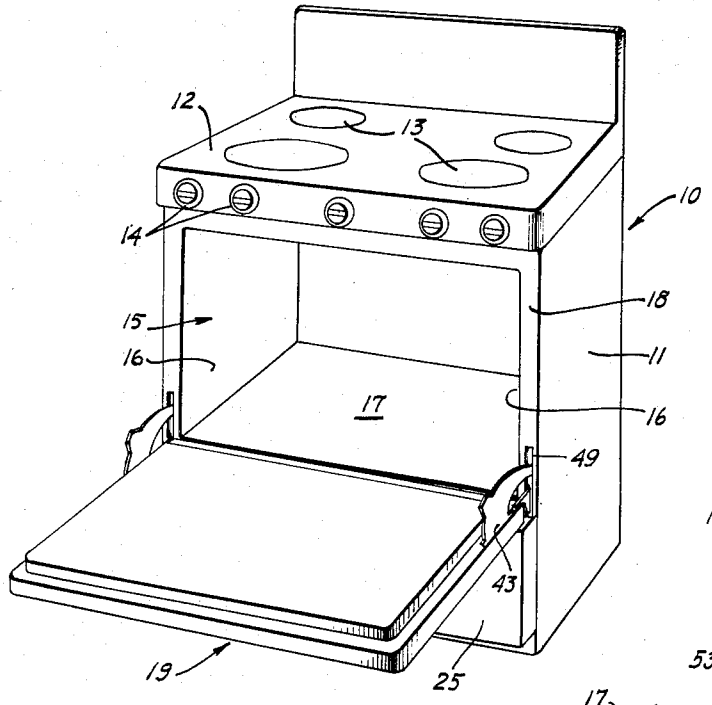
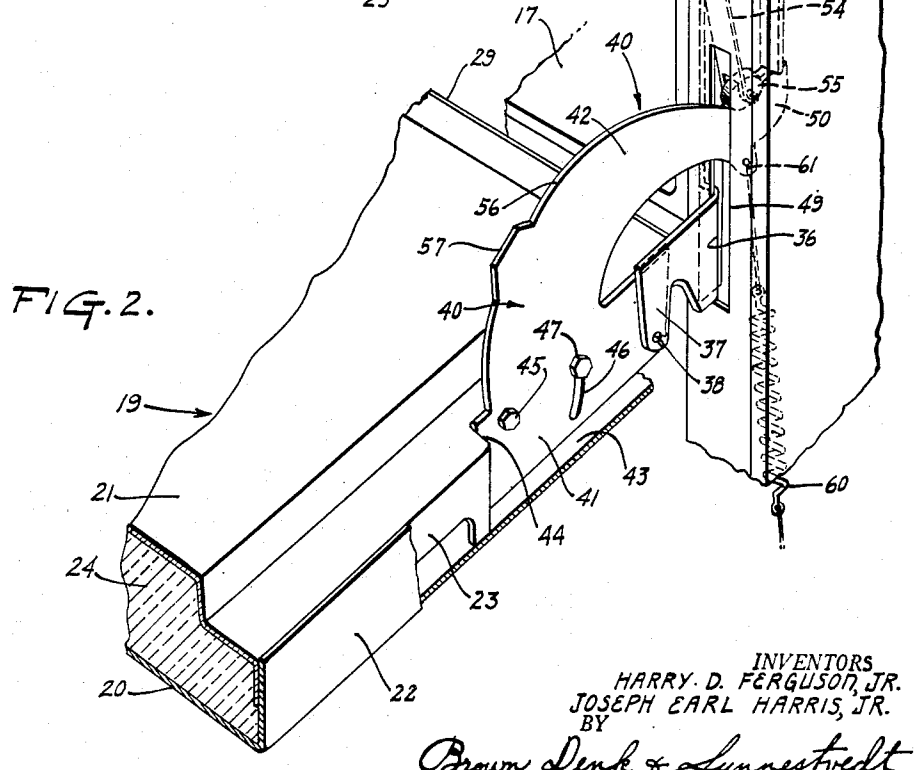


FIG. 2.



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FIG. 3.

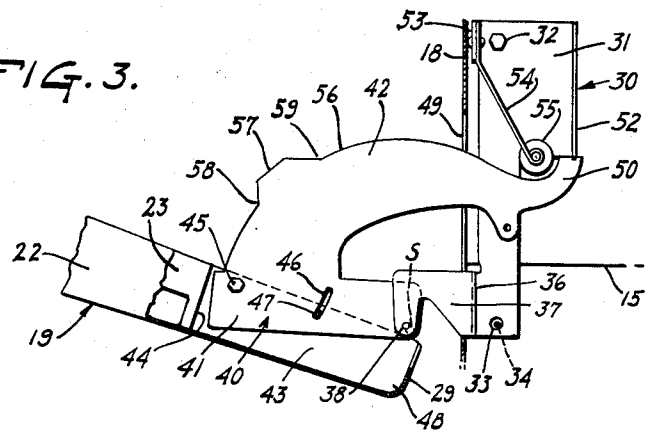


FIG. 4.

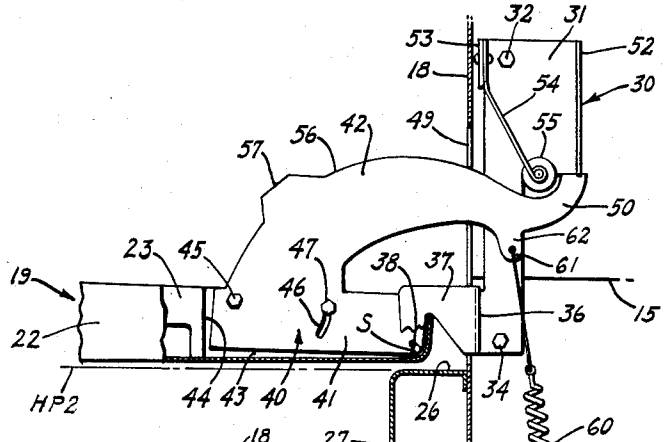
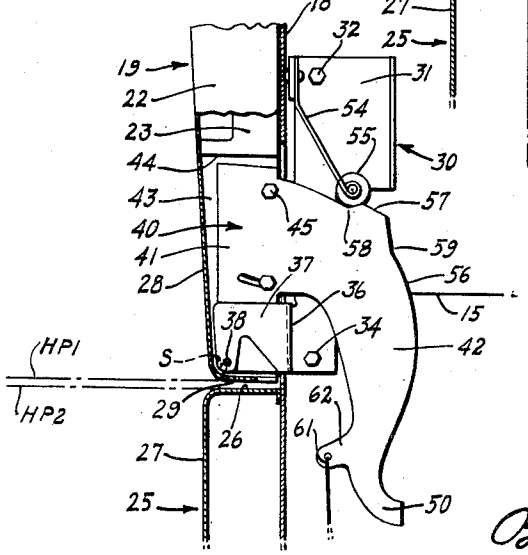


FIG. 5.



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CABINET DOOR HINGING

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Application January 8, 1953, Serial No. 330,243

2 Claims. (Cl. 126—194)

The invention hereinafter described and claimed relates to cabinet construction. More particularly it is concerned with compartment door structures of the so-called "drop" type commonly used on open front ovens, and wherein the door is hinged at its bottom edge so that it can pivot downwardly from a vertical closed position to a substantially horizontal open position.

In modern range construction there is provided a plurality of compartments including at least one oven. All of these compartments include front access openings lying substantially in a common plane, and all are closed by doors or panels cooperating to present a substantially flush vertical surface. Because of necessary insulation the oven door usually is rather thick, and when closed its lower edge closely overlies a door sill of a width which corresponds to the thickness of the door, said sill being formed by the top of a subjacent door, or by a front panel of the range. Under these conditions it is difficult to hang the door in a manner preventing damage to the door or to subjacent structure, when the door is dropped to its open position.

Presently used hinge constructions operate satisfactorily when the subjacent structure is tightly closed against the range body, but not if said structure is ajar, or open. Ideally the door should be hinged to permit opening thereof without damaging interference with the lower structure regardless of the position of the latter, whether completely closed, or open to any degree.

In the past, hinge mechanisms have been devised to accomplish this desirable result, but for various reasons, such as assembly difficulties, lack of ready adjustability, high cost, etc. none has proved completely satisfactory in use.

It is, therefore, the primary object of the present invention to provide a construction enabling an oven door to be hinged in a manner overcoming these difficulties.

Another object is to provide an inexpensive hinge mechanism particularly characterized by its ease of assembly both to the door and the cabinet.

Still another object of the invention is the provision of such a mechanism further characterized by its ease of adjustability relative to the door and cabinet structure, even after assembly therewith.

The invention has as a further object the provision of a door and hinge assembly readily adapted for bench sub-assembly.

It is also an object of the invention to provide such a hinge mechanism in which simple inexpensive changes may be made in certain parts, thereby adapting it for doors of various thicknesses.

In accordance with these objects the invention includes—stated generally—a bracket sub-assembly adjustably secured to the cabinet structure, and a door sub-assembly including a hinge leaf adjustably secured thereto. Both of these sub-assemblies cooperate to pivotally mount the door upon the cabinet in a manner whereby it may readily be adjusted to fit perfectly over the oven opening. An important structural feature of

the invention, enabling the door to be moved to and from its open position without interference from subjacent structure, is the positioning of the pivotal axis of the door at its lower forward edge. With the axis so located pivotal movement of the door is attained without any of its structure moving substantially below a horizontal plane coincident with the lower edge of the door when the latter is in closed position, and therefore without interfering with the subjacent structure regardless of the position of the latter.

In amplification of this brief description the invention is described more in detail below, with reference to a specific illustrative embodiment.

In the drawings:

Figure 1 is a perspective view of a domestic type electric range showing the oven door in its dropped or open position;

Figure 2 is an enlarged fragmentary perspective view showing details of the mechanism and the manner in which the door is hinged to the cabinet in accordance with the present invention;

Figure 3 is a fragmentary elevational view of the structure shown in Figure 2, but showing the manner of assembling the door to the cabinet;

Figure 4 is a view similar to Figure 3, but showing the mechanism assembled and the door open; and,

Figure 5 is a view similar to Figure 4, and with the door shown in closed position.

With detailed reference to the attached drawings of this exemplary embodiment of the invention, and more particularly to Figure 1 thereof, the numeral 10 designates an electric cooking range comprising a body or base portion **11** and a top cooking surface **12**. The usual surface heating elements or burners **13** are shown on the cooking top, which is also provided along its front edge with the customary controls **14** for the various heating elements.

Still with reference to Figure 1, it can be seen that the body of the range houses an open front compartment **15** which has been illustrated as an oven including opposed side walls **16**, and a bottom wall **17**. It is understood, of course, that the oven also includes top and rear walls, but as these are not important to the description of the invention they require no specific identification. The front opening of the oven is substantially in the same plane as the front face **18** of the cabinet base **11**, and is provided with a closure or door **19** which, when closed, occupies a substantially vertical position, as shown in Figure 5.

The door **19**, as more clearly seen in Figure 2, comprises an outer or front panel **20**, and an inner or rear panel **21**. The edges of the front panel **20** are bent rearwardly (considering the door to be in a vertical position) to form a wide peripheral flange **22**, while the inner panel is provided with a forwardly turned peripheral edge flange **23** which nests within the outer panel, and may be secured to the inner side of flange **22**, as by spot welding or other suitable means. The panels thus cooperate to form a hollow door structure, the hollow space therebetween being filled with suitable insulation, as indicated at **24** in Figure 2.

The front wall **18** of the cabinet, which is formed by part of its skeletal frame work, defines a flat marginal area completely surrounding the oven opening. The door is so dimensioned as to cover this marginal area, when closed.

Positioned below the door is a panel member **25** which may be fixed structure, or may comprise the front panel of a drawer or bin positioned in the cabinet below the oven. For the purposes of this description it may be considered to be the front panel of a drawer. The top wall **26** of panel **25**, Figure 4, constitutes a sill for the

oven door. The width of the sill corresponds substantially to the thickness of the door. The front wall 27 of panel 25, as seen in Figure 5, is substantially in the plane of the front wall 28 of the oven door, while its top wall 26 is substantially horizontal, and is disposed in parallelism with the lower door flange 29, when the door is closed. Furthermore, top wall 26 is closely subjacent to flange 29 when the door is closed thereby imparting to the range a substantially unbroken flush front.

The door is hinged to swing on a transverse horizontal axis between a vertical closed position, as seen in Figure 5, and a substantially horizontal open position, as seen in Figure 4. The axis is located within the door structure adjacent the lower front edge thereof, inside the bend formed where front wall 28 meets the lower flange 29.

More specifically the hinging means comprises a pair of hinge mechanisms, one positioned at each front lower corner of the oven exteriorly of the side walls 16 and adjacent bottom wall 17. As the hinging mechanisms are duplicates—opposite hand, of course—the details of one only are shown in the drawings, and the following description is similarly limited.

With reference to Figure 3, it is seen that the mechanism includes a hinge bracket 30 comprising an elongated vertically positioned plate 31 pivotally secured adjacent its upper edge to the side wall of the oven, as by screw fastening means designated by the numeral 32. It should be understood that by reversing their positions, one for the other, brackets 30 may be secured to the outer side walls of the range rather than to the oven walls. Adjacent its bottom edge the plate is provided with an aperture 33 through which passes screw fastening means 34 of somewhat smaller diameter than the aperture. This means serves to secure the lower portion of plate 31 to the cabinet frame, and simultaneously permits a degree of angular adjustment of the plate relative to the oven and about fastening means 32 as a pivot, the purpose of which will be more fully described hereinafter.

In particular accordance with the present invention, the lower front edge of bracket plate 31 is provided with a flange 36 including a forwardly projecting hook-shaped portion 37 to which the door is hinged as by pin 38, and hinge leaf 40 carried by the door. The aforesaid pivotal axis of the door passes through the center of pins 38.

With reference to Figure 3, it is seen that the door sub-assembly includes the hinge leaf which comprises a base portion 41 and an angularly extending curved portion 42. The leaf is pivotally secured in a pocket 43—formed by flange 22 of the door outer panel and by an offset portion 44 (Figure 2) of flange 23—as by screw fastening means 45 which passes through base 41 and into flange 23 of inner panel 21. Base portion 41 is provided with an arcuate slot 46 having its center of curvature at pivot 45, and through which screw fastening means 47 passes to engage flange 23. Slot 46 serves to restrict the pivotal movement of the base.

In the initial phase of assembly, fastening means 47 is not drawn up tightly, but only enough to permit restricted pivotal movement of the hinge leaf relative to the door. Also in this phase, the right hand end of the hinge leaf, as seen in Figure 3, is completely out of pocket 44. It will be noted, as shown more clearly in Figure 4, that the lower right hand corner of base 41 is provided with an open ended slot S which is of approximately the same width as the diameter of pin 38.

In final assembly, the base is engaged over pin 38, and the door rotated in a counterclockwise direction about pivot 45, so that the pin 38 becomes located in the lower right hand corner 48 of the pocket, as shown in Figure 4. The door is then pivoted about pin 38 to its raised

position (Figure 5) where final adjustment of the door relative to the oven opening is made.

It is important that the curve of corner 48 in panel 20 be such that during pivotal movement of the door in either direction none of the door structure passes substantially below horizontial plane HP-1 (Figure 5), in which lies the lower edge of the door flange 29 when the door is in its raised position. Preferably the curve is generated by a radius having its center substantially at the center of pin 38.

Adjustment of the door over the oven opening is a rather simple procedure and an important feature of the invention. The freedom of movement between the door and its hinge leaf, and between the bracket and cabinet, is such as to present some resistance to relative movement of the parts, until the parts of the assembly are in the position desired. The door is then lowered and fastening means 34 and 47—which are sufficiently tight to hold the door in its adjusted position during this movement—are drawn up to "fix" the door and hinge mechanism.

Usually it is desirable to space the bottom edge of the door slightly away from the cabinet to permit air to enter the oven in that region. With the present improved construction this is easily accomplished by inserting a shim, or other device of desired thickness, between the bottom edge of the door and the cabinet prior to final adjustment, after which it is removed.

To determine the fully opened position of the door, as shown in Figure 4, stop means is provided on angularly extending portion 42 of hinge leaf 40. This portion extends through a slot 49 in front face 18 of the range and past the bracket 30. Included on this portion is an outwardly curved end 50 adapted, when the door reaches its fully open position, to engage the underside of a flange 52 on bracket 30.

On the upper front edge of plate 31 of the bracket is another short flange 53 to which is secured a spring leaf 54 having rotatably mounted at its lower end a roller 55 adapted to bear against the curved edge 56 of the hinge plate extension 42 during movement of the door to and from its open position. Intermediate its ends, extension 42 is provided with a protuberance 57 the sides of which form with edge 56 obtuse angles 58 and 59. When the door is in its closed position, as seen in Figure 5, roller 55 rests in angle 58 and against the left side of the protuberance thus to urge the door tightly against the cabinet. If the door is opened to an extent that roller 55 comes to rest in angle 59 on the other side of the protuberance, it will be effective to maintain the door in a partially opened position as is desirable when broiling.

Movement of the door is counterbalanced, conventionally, as by a spring 60 having one end 61 looped through an ear 62 on the lower end of extension 42, and its other end attached to fixed structure on the range as indicated at 63, Figure 4.

If, for any reason, it becomes necessary to readjust the position of the door over the oven opening, it is merely necessary to loosen screw fastener 47 sufficiently so that a strong push or slight blow will move the door relative to the hinge plate 40 about pivot 45, and then to proceed as described above in connection with original assembly. If desired screw 34 may also be loosened to provide for movement of bracket 30 and thereby afford greater latitude in adjustment.

Whether or not portions of the front panel remote from pivot 38 will drop below plane HP–1 when the door is opened is determined by the position of the door when it reaches the limit of its downward movement. This movement preferably is arrested while the outer panel of the door is still above the horizontal plane HP–2 in which lies the top wall 26 of the subjacent structure, as seen in Figure 4.

It will be readily understood, of course, that by merely

lengthening the forward projections 38 of hinge bracket 30 and the extension 42 of the hinge leaf, doors of variout thicknesses may be accommodated by this same hinge design.

From the foregoing description it will now be understood that the invention provides a hinge assembly which is of simple and inexpensive construction, affording ease of adjustment and assuring positive and perfect alignment of the door over a compartment opening. The apparatus further affords freedom of movement of the door without any possibility of interference from subjacent structure.

We claim:

1. In combination with a compartment having an access opening and a door therefor, a hinge structure comprising a member having an open ended slot, a member having a projection receivable within said slot through the open end thereof, means for attaching one of said members to said compartment, means for mounting the other of said members on said door and including a pivot about which said other of said members is movable for placement in two different angular positions with respect to said door, means provided on said door to expose the open end of said slot for receiving said projection when said other of said members is placed in one of said angular positions and to cover said open end and retain said projection within said slot when said other of said members is placed in the other of said angular positions, and means for securing said other of said members in said

other of said positions with said projection within said slot, thereby establishing a hinge connection for swinging movement of said door about said projection to open and close said access opening.

2. In a range, an oven having an access opening and a door therefor, a hinge structure for supporting said door on said oven to open and close said opening, said hinge structure comprising: hinge leaves having open ended slots; hinge brackets having pins receivable within said slots through the open ends thereof; means for attaching said brackets to said oven; means for mounting said leaves on said door and including pivots for placement of said leaves in two different angular positions with respect to said door; means provided on said door to expose the open end of said slots for receiving said pins when said leaves are placed in one of said angular positions, and to cover the open end of said slots with said pins therein when said leaves are placed in said other of said angular positions; and means for securing said leaves in said other of said positions to retain said pins within said slots.

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