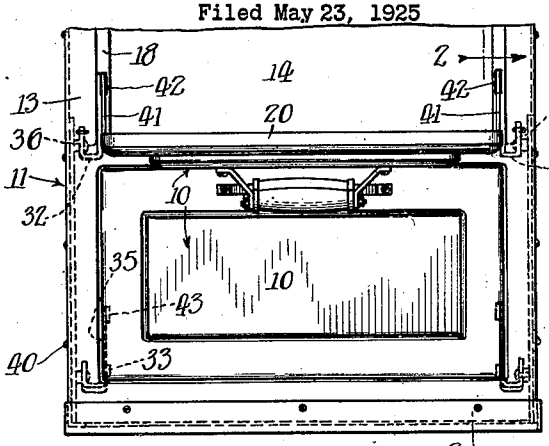
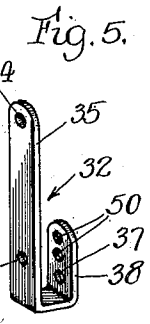
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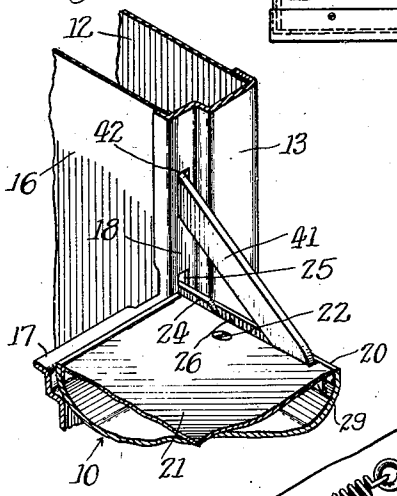
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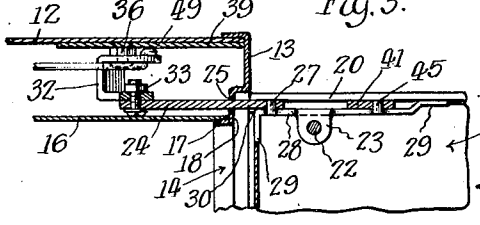
HINGE

Filed May 23, 1925









Inventor:
C. M. Fitch
By Lindabl. Parker & Dargan
Attys.

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UNITED STATES PATENT OFFICE.

CHARLES M. FITCH, OF KANKAKEE, ILLINOIS, ASSIGNOR TO SEARS, ROEBUCK AND CO., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

HINGE.

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My invention relates to hinges and refers more particularly to a hinged mounting for the doors of cook stove ovens, refrigerators, and the like.

In order that cooking ovens shall have a neat and artistic outer appearance, it is desirable to avoid the use of bolts, screws, and other hinge fixtures on the front face of the oven. In the past, several so-called boltless front ovens have been constructed, but inasmuch as it is desirable that the edges of the door overlap the door frame around the entire periphery of the doorway, it has been the practice to hinge the doors of such ovens on an axis positioned outside of the door, usually below the lower edge thereof. In prior constructions some sort of lug or hinge fixture has been employed which projects outwardly from the oven or the door.

The general object of this invention is to provide a new and improved hinge for oven doors and the like, all of the parts of which are contained within the oven and entirely concealed from view when the door is in its closed position.

Another object is to provide a novel means for mounting doors for pivotal movement about an axis which is automatically and progressively moved away from the door frame as the door is opened and is retracted as the door is closed.

A further object is to provide a door hinge mechanism including a counterbalancing means for the door, the same means producing a tension on all four edges of the door and thereby holding it firmly against the door frame.

A further object of the invention is to provide a novel door hinge in the form of a quadruple linkage system, certain members of which constitute a means for limiting the outward swing of the door.

Still a further object is to provide a combined oven door hinge, counterbalancing means and stop mechanism which is simple and inexpensive in construction, which is noiseless and positive in operation, and which has its operating parts compactly arranged and adapted to be mounted between the outer and inner walls of an oven or other similar structure.

Further objects and advantages will be understood from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a front elevation of a cooking oven having two doors hinged thereto in accordance with my invention, the upper door being open.

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1 and showing a part of the oven lining and a portion of one of the hinge members cut away.

Fig. 3 is a section taken along the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary perspective view of the oven showing the relation of the parts when the door is open.

Fig. 5 is a perspective view of one of the hinge members.

While I have shown in the drawings and will herein describe one embodiment of my invention for the purpose of illustration, I do not intend to be limited thereby to the form disclosed but aim to cover all modifications and alternative constructions falling within the spirit and scope of the appended claims.

In the exemplary form shown in the drawings, the invention is applied to the doors 10 of baking and broiling ovens such as are commonly provided on gas cooking ranges. The doors are mounted on a door frame 11 which is formed by the two outer side walls 12 of the oven and a front wall 13, the latter providing two rectangularly shaped doorways 14. 15 designates the rear enclosing wall, and 16 an inner lining. The front wall surrounding each doorway is drawn inwardly to form a Z-shaped flange providing an inturned edge 17 and a vertical portion 18 which constitutes a door jamb.

In the present instance, each door is rectangularly shaped and has a flat peripheral flange 20 adapted to lap over and abut against the face of the door jamb 18 when the door is closed. A plate 21 is secured on the inner side of the door flush with the edges of the flange 20 by means of bolts 22 each threading into a lug 23 on the door.

Each door is supported by two flat links 24 which are adapted to slide in and out of the oven through two vertical slots 25 one formed in the lowermost portion of the door jamb 18 on each side of the doorway 14. The forward end of each link extends through a cutaway portion 26 (Fig. 4) of the plate 21 and is pivoted on a pin 27. The latter is formed on an elongated bar 28 which is disposed between the door plate 21

and the front face of the door and has its ends 29 welded or otherwise suitably secured to the inner side of the flange 20. To receive the lower edge of each link 24 when the door is swung outwardly, the flange 20 at the lower corners of the door is cut away as shown at 30 (Fig. 3). Thus, the outer ends of the links 24 and the means connecting them to the door are concealed within the door.

To allow utensils to be conveniently slid into the oven when the door is open, the links 24 are connected to the door at such a point that the lower edge of the door flange 20 will be elevated to the level of or slightly above the flange 17 at the bottom of the doorway 14. This is accomplished in the present instance by pivoting the links 24 just beneath the plate 21 and in substantially the same horizontal plane as the oven flange 17.

To prevent interference between the lower edge of the door and the door jamb 18 when the door is being opened, means is provided for shifting the axis of the door away from the door frame. For this purpose the rear end of each link 24 is pivotally supported on a J-shaped lever 32 by a bolt 33 extending through a hole 34 (Fig. 5) in the longer leg 35 of the lever. The latter is pivotally mounted within the oven on a bolt 36 extending through a hole 37 in the short leg 38. In this instance, the bolt 36 is carried by a plate 39 suitably secured to the outer side wall of the oven as by bolts 40.

From Figs. 2 and 5 it will be noted that the connecting point between each of the links 24 and their respective levers 32 is disposed above the axis on which the levers 32 turn, so that as the levers swing about their axes, the links 24 will be moved forwardly or rearwardly. The lower edges of the slots 25 serve as supporting bearings for the links during this sliding movement of the links 24. It will also be noted from Fig. 2 that the links 24 are disposed substantially horizontally and that the rear ends of the links are not raised or lowered materially during the movements of the lever 32. Thus the pivotal axis of the door will always remain in substantially the same horizontal plane while it is being shifted by rotation of the lever 32.

Means is provided for automatically rotating the lever 32 about its axis as the door is being opened or closed and thereby shifting the pivotal axis of the door. This means comprises a pair of links 41 projecting through elongated slots 42 in the door jamb 18 on opposite sides of the doorway. Each link 41 is vertically alined with one of the links 24 and the rear end is pivotally connected to the lever 32 by a bolt 43 extending through a hole 44 in the long leg 35 of said lever. The forward end of each link 41 enters the cutaway portion 26 of the door plate 21 at a point substantially above the lower edge of the door and is pivoted on a pin 45 mounted in the same way as the pivot pin 27.

It will be apparent that as the door is opened the forward ends of the links 41 will move outwardly and downwardly until the door is in a horizontal position. At that point the upper ends of the levers 32 are arranged to strike against the inner side of the door jamb 18 and continued movement of the door will be prevented. In this position the links 41 will serve as braces to sustain the weight of articles placed upon the door.

Mounted in the oven walls are springs 46 which serve to counterbalance the weight of the door by yieldingly resisting the forward and pivotal movement of the door. At one end, the springs are fixed to the oven structure by a bolt 47 and hooks 48. At the other end they are connected to the levers 32 by means of hooks 49 entered through holes 50 in the short legs 38 of the levers. Several holes 50 may be provided so that a spring of given resiliency can be adjusted to properly balance different weights of doors. Each spring 46 is thus adapted to produce a tension in both of the links 24 and 32 thereby serving to press all four edges of the door against the door jamb 18 and providing a tight lap joint. The application of tension at all four edges of the door results from the fact that the pivotal axis of the door is shiftable rather than fixed.

From Fig. 2 it will be seen that each spring 46 produces a maximum rotational moment of the lever 32 about its axis when the door is closed or only partially opened. The reason for this is that the effective moment arm of the spring tension becomes shorter and shorter as the door approaches its open position. Thus each spring, though at all times acting to counterbalance the door, may be adjusted to be effective in closing the door only when the door is nearly closed.

By the arrangement thus provided, a tight lap joint is formed around the entire periphery of the door which is mounted to swing about an axis disposed between the upper and lower edges of the door. Thus, the hinge members may be connected on the rear side of the door so that they will be hidden behind the door when it is closed. Since the door is automatically shifted away from the door frame as it is opened, there will be no interference between it and the edges of the door jamb. An oven having its doors thus hinged presents a neat and artistic appearance, there being no auxiliary fixtures, lugs or screws on the outer side of either the door or the oven. The members of this quadruple hinge linkage also provide a

counterbalancing means and a stop mechanism for the door.

I claim as my invention:

1. A hinge for mounting a door on a door frame comprising, in combination, a member pivoted on said frame, a pair of links each connecting said member and said door, one of the links being arranged for endwise movement and pivotally supporting the door, said other link being adapted to move said member about its axis as the door is opened.

2. A hinge for mounting a door on a door frame comprising, in combination, a member pivotally associated with said frame, a link slidable on said frame and pivotally supporting said door, one end of said link being connected to said member, and means controlled by the movements of said door for swinging said member.

3. A hinge for mounting a door on a vertical door frame comprising, in combination, a lever mounted on said door frame to swing about a horizontal axis, a link connected to said lever above said axis and pivotally supporting said door, said link being arranged for endwise movement by said lever, a second link connecting said door and lever above said supporting link, said second link being adapted to swing said lever in opposite directions as the door is opened and closed whereby to move said door relative to said frame.

4. A hinge for mounting a door on a door frame comprising, in combination, supporting means for the door resting slidably upon said frame, a lever pivoted on said frame and adapted to move said supporting means relative to the frame, and means actuated by the movements of said door for swinging said lever about its axis.

5. A hinge for mounting a door on a door frame comprising, in combination, pivotal supporting means for said door, a lever pivoted on said frame and adapted to move said supporting means on the frame, and means for swinging said lever as the door is opened, said lever being arranged to strike said frame for limiting the outward swing of the door.

6. The combination with an oven having a door frame defining a door way, of a door, two members projecting outwardly from the door frame on opposite sides of said doorway, said members pivotally supporting said door exteriorly of the door frame, and means connected to said members within the oven and arranged to shift the members outwardly as the door is being opened and inwardly as the door is being closed, whereby to hold the lower edge of the door out of contact with the door frame when the door is in open or partially open position.

7. The combination with an oven having a door frame defining a doorway, of a door, a lever mounted within said oven to swing on an axis parallel to said doorway, a link mounted to slide endwise on said door frame in a plane perpendicular to said doorway, said link being connected to said lever adjacent the fulcrum point of the lever, a door pivotally supported on the outer end of said link, and means to move said lever as the door is opened and closed whereby to shift the axis of the door in a fixed plane.

8. The combination with an oven having a door frame defining a door way, of a door, a lever mounted within said oven to swing on an axis parallel to said doorway, a link mounted to slide endwise on said door frame in a plane perpendicular to said doorway, said link being connected to said lever adjacent the fulcrum point of the lever, a door pivotally supported on the outer end of said link, and a second link connecting said lever and the door above said first mentioned link whereby to swing said lever as the door is opened or closed.

9. A hinge for mounting a door on a door frame comprising, in combination, pivotal supporting means for the door, a lever pivoted on said frame and connected to said supporting means, and a member connected to said door and adapted to swing said lever as the door is opened, said lever being adapted in its swinging movement to engage said frame and arrest the movement of said door.

10. A hinge for mounting a door on a door frame comprising, in combination, a member pivotally associated with said frame, pivotal supporting means for the door, a link connecting said door and member and adapted to swing the latter in one direction as the door is opened, and spring means tending to swing said member in the opposite direction, said spring means being ineffective to close said door when the latter is open.

11. A hinge for mounting a door on a door frame comprising, in combination, two pairs of links, each movably mounted on said frame and pivotally connected to said door, one link of each pair supporting the door, and counterbalancing means for the door producing a tension on each of said links.

12. A hinge for mounting a door on a door frame comprising, in combination, a pair of slidable links one projecting from each side of the doorway of said frame and pivotally supporting said door, and means connected to the other end of said links for sliding them forwardly as the door is opened and rearwardly as the door is closed.

13. A hinge for mounting a door in a door frame comprising, in combination, members projecting forwardly from said frame and pivotally supporting said door exteriorly of said frame, and means actuated by the move-

ments of said door for moving said members toward and away from said frame.

14. The combination with the door frame of an oven, of two members projecting outwardly from said frame and arranged for movement in the same plane, a door pivoted on the outer ends of said members, two levers within said oven each connected to one of said members, and means within the oven operable in the act of swinging said door to open position to actuate said levers whereby to shift the axis of said door.

15. A hinge for mounting a door on a door frame comprising, in combination, slidable members resting on said frame and pivotally supporting said door, and means for progressively moving said members in one direction as the door is opened and in the opposite direction as the door is closed whereby to hold the door out of contact with the door frame in the swinging movements of the door.

16. A hinge for mounting a door on a door frame comprising, in combination, means slidably mounted on said frame and pivotally supporting said door, and means for moving said supporting means outwardly relative to said frame as the door is opened whereby to hold said door out of contact with the door frame during the swinging movements of the door.

17. A means for pivotally mounting a door on a door frame comprising a closed quadruple linkage, the door constituting one member of said linkage, one of the other members being mounted on said door for endwise movement.

18. A means for pivotally mounting a door on a door frame comprising a closed quadruple linkage, the door constituting one member of said linkage and one of said other members being slidably mounted on the door frame.

19. A means for pivotally mounting a door on a door frame, comprising a closed quadruple linkage, the door constituting one member thereof, and a spring acting to prevent elongation of said linkage.

20. A means for pivotally mounting a door on a door frame, comprising a closed quadruple linkage including said door, one member of said linkage extending parallel to the door when the door is open and perpendicular to the door when the door is closed.

21. A hinge for mounting a door on a door frame comprising, in combination, slidable members on the frame pivotally connected to the rear side of said door, and a single means for sliding said members outwardly as the door is opened and inwardly as the door is closed, said members being concealed behind the door when it is closed.

22. A means for pivotally mounting a door on a door frame, comprising three substantially straight links connected to form a closed linkage with the door, one of said links being pivoted on the door frame and another being mounted to slide on said frame.

23. A means for pivotally mounting a door, a door frame comprising two pairs of links projecting forwardly from the door frame and pivotally connected to said door, and spring means acting to produce a tension in each of said links whereby to draw said door against the door frame at four spaced points.

24. A hinged construction for ovens comprising, in combination with an oven door, a slidable member pivotally supporting the door, and positive acting means for retracting said member into the oven in the act of closing the door.

25. A hinged construction for ovens comprising, in combination with an oven door, a slidable member pivotally supporting the door, and positive acting means for projecting said member outwardly as the door is opened and inwardly as the door is closed.

26. The combination with a door frame of an oven, of a door, a lever mounted within said oven, two straight links connecting said lever and said door, one of said links resting slidably on the door frame to support the door.

In testimony whereof, I have hereunto affixed my signature.

CHARLES M. FITCH.