Sept. 29, 1964 G. FERLAND 3,150,658

RANGE DOOR CONSTRUCTION

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Fig. 1

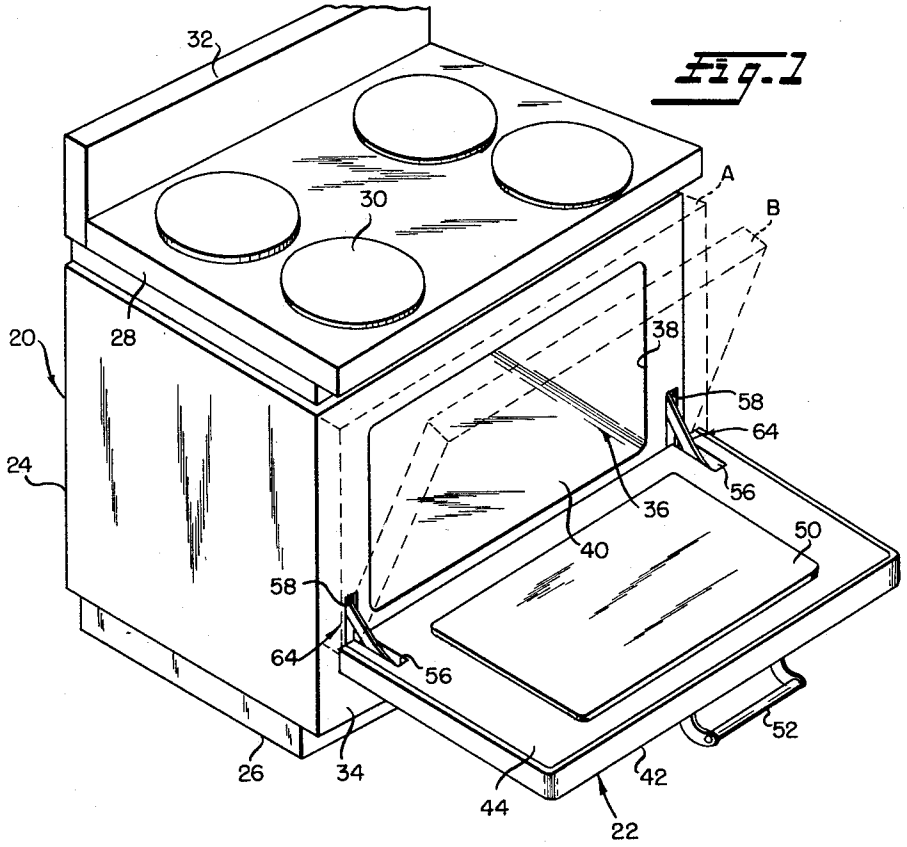
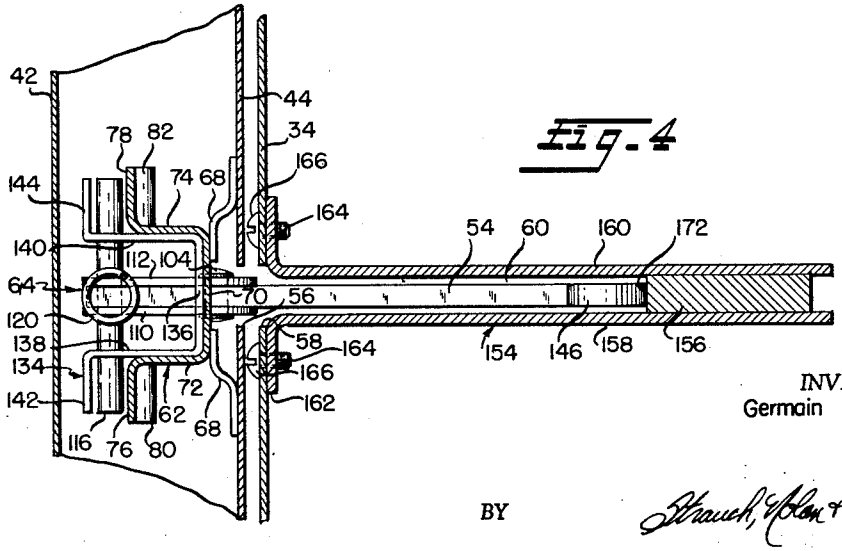


Fig. 4



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Fig. 2

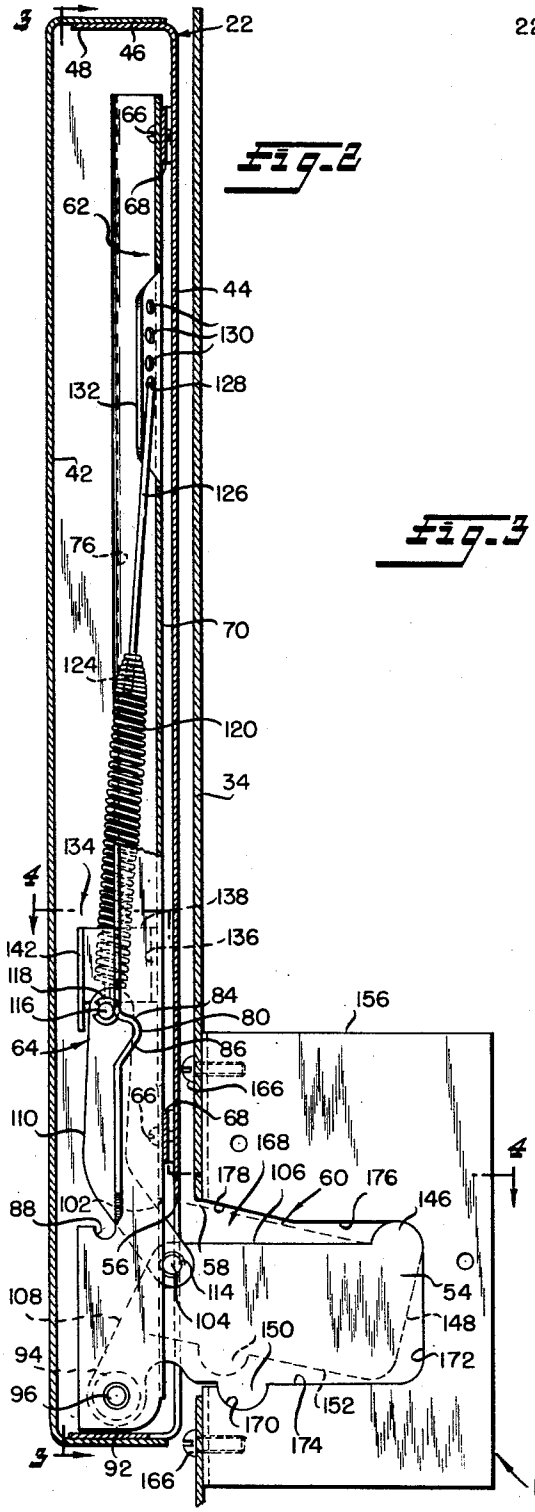
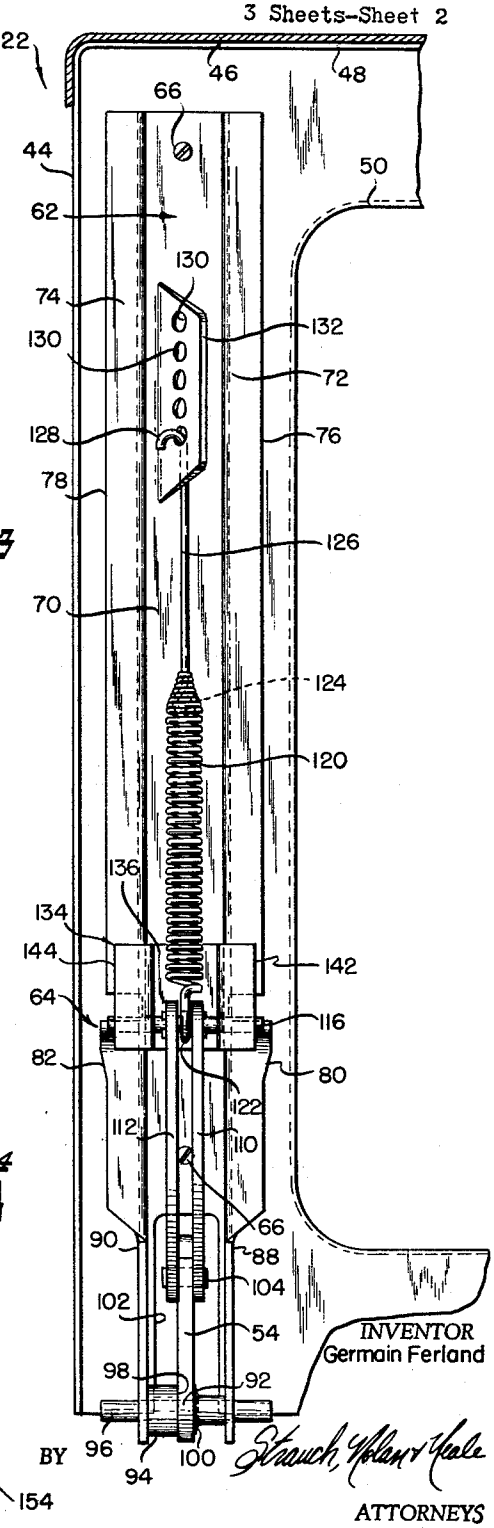


Fig. 3



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RANGE DOOR CONSTRUCTION

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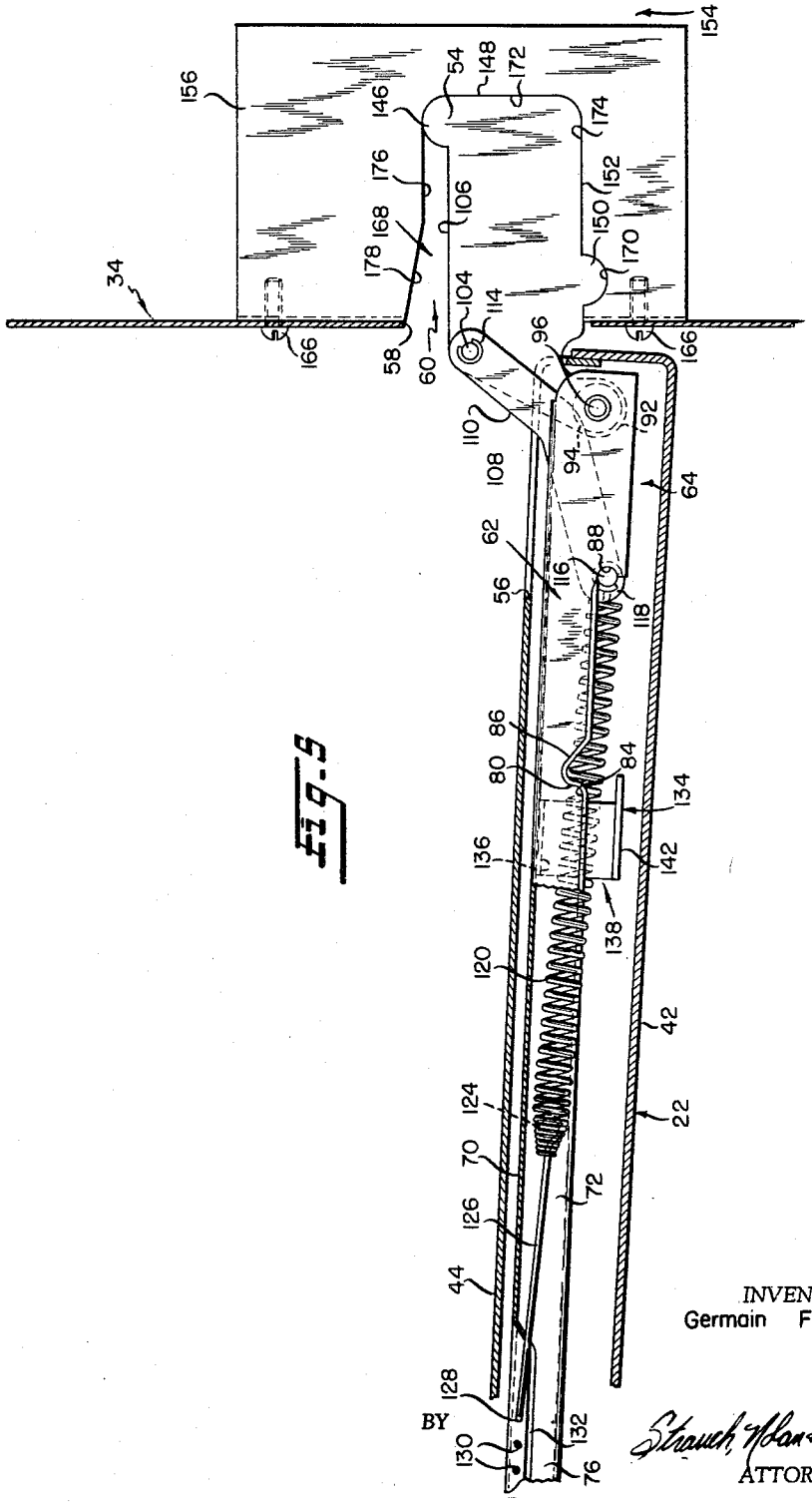


FIG. 9

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3,150,658

RANGE DOOR CONSTRUCTION

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3 Claims. (Cl. 126—191)

This invention relates to construction for detachably supporting an over door on the body of the oven. More particularly, the invention relates to a construction mounting an over door for movement from a closed position to a second position in which the door is partly opened for broiling and to a third position in which the door is fully opened, and so that it may be simply and quickly removed by lifting it off the oven when desired.

Prior removable oven doors have involved complicated mechanism which has been expensive to manufacture, adjust and repair. Moreover, taking off and replacing prior art doors has usually involved disconnecting a spring or a link or rendering a spring inoperative by inserting a pin, moving a lever, or manipulating the door in a specific manner. Typical structures of this type are shown in United States Patent Nos. 2,552,373 to Hardwick, 2,921,575 to Fry, and 2,934,059 to Baker.

The primary objects of this invention, therefore, include:

(1) The provision of a detachable oven door which is normally rigidly secured to the oven but which may be removed from the oven simply by lifting it off the oven and without disconnecting springs, removing pins, or otherwise removing or disconnecting portions of the structure to which the oven door is attached;

(2) The provision of improved detachable oven doors which are movable from a closed position in which spring tension holds the door against the oven frame to an open position where the door is held in a horizontal position at the bottom of the oven opening with sufficient rigidity to permit heavy objects to be placed on the door;

(3) The provision of improved detachable oven doors in which the hinge mechanism and the counterbalancing arrangement and all moving parts are enclosed within the door so the mechanism is not only protected from the heat (which increases the durability of the counterbalancing spring) but may be constructed as a bench or conveyor subassembly, thereby reducing manufacturing cost. This arrangement also facilitates repair and adjustment since such work can be done in a convenient place away from the range.

(4) The provision of improved detachable oven doors having a counterbalancing spring and very simple means to adjust the spring tension to compensate for variations in the tensions of different springs.

(5) The provision of improved detachable oven door constructions provided with a novel guide arrangement permitting the door to be readily and quickly replaced on the oven.

In carrying out these objects, the present invention provides a door support construction in which the entire hinging and counterbalancing mechanism is incorporated within the door except for a plate which projects through the lower part of the door lining toward the front of the range at each end of the door and which forms one leg of an oven door hinge. These plates cooperate with sockets formed in a pair of members mounted within the range body and with a pair of tension springs to hold the door in the closed position by its own weight. As will be explained, this arrangement also permits the door to be removed by merely lifting up on the door handle. The other leg of each hinge comprises a stiffener rail attached to the inside of the door liner and pivotally connected to the plate. A tension spring connects this

stiffener rail to a link which is pivotally connected to the plate at a point offset from the connection of the plate and the stiffener rail and counterbalances the weight of the door. A pin, connected between the spring and the link, slides on the stiffener rail which has stops to limit the travel of the pin (and thus the movement of the door) and a depression which cooperates with the pin to hold the door ajar for broiling.

Additional objects and advantages of this invention will be apparent from the following description and accompanying drawings, in which:

FIGURE 1 is an isometric view of a range incorporating a detachable oven door in accordance with the principles of the present invention with the oven door in the open position;

FIGURE 2 is a side elevational view, partly in section, showing the oven door and one of the hinge mechanisms, the door being in the closed position;

FIGURE 3 is a view of the oven door and hinge mechanism taken substantially along the line 3—3 of FIGURE 2;

FIGURE 4 is a view of the hinge mechanism taken substantially along the line 4—4 of FIGURE 2; and

FIGURE 5 is a view similar to FIGURE 2 but showing the relative position of the parts with the oven door in the open position.

Referring now to the drawings, FIGURE 1 illustrates a range **20** employing a detachable oven door **22** constructed in accordance with the principles of the present invention. Range **20** which is of conventional construction, has a body **24**, a base **26**, a top **28** which mounts gas or electric surface heating units **30**, a panel **32** on which the burner controls (not shown) may be mounted, a front **34**, and an oven **36** with a vertical access opening **38** and a liner **40**.

The oven door **22** is formed from an outer door panel **42** and an inner door panel **44** having overlapping flanges **46** and **48** (see FIGURE 2) which may be connected in any convenient manner. Inner door panel **44** is provided with an embossment **50** which engages the lining of oven **36** when door **22** is in the closed position. Door **22** may be moved between the closed position (indicated by dotted line A), the broil position where the door is slightly ajar (indicated by dotted line B), and the open position (shown in full lines) by the usual handle **52**.

Door **22** is detachably mounted on range body **20** by a support construction which includes two hinge plates **54** (see FIGURES 2 and 5) which are carried by the door structure and which project through slots **56** in inner door panel **44** and through slots **58** in the stove front **34** into sockets **60** in the range body **20**.

Referring now to FIGURES 2 through 5, a stiffening rail **62** of a hinge mechanism **64** is mounted on the interior side of inner door panel **44** by screws **66** which extend into brackets **68** rigidly attached to the panel. Though only one hinge mechanism **64** is shown in FIGURES 2 through 5, it is to be understood that two such mechanisms are employed, one at either side of the door **22**, as is shown in FIGURE 1.

Stiffening rails **62** are constructed with a hat-shaped cross-section and have a base **70**, side walls **72** and **74**, and flanges **76** and **78** which terminate above the lower end of the rail. Aligned detents **80** and **82** are provided in flanges **76** and **78** intermediate the upper and lower ends of rail **62** to hold the oven door in the broil position. As is best shown in FIGURE 2, the upper sides **84** of the detents **80** and **82** are steeply inclined and the lower sides **86** are gradually inclined.

Aligned notches **88** and **90** are provided in the side walls **72** and **74** adjacent the lower ends of flanges **76** and **78** to support door **22** in the open position.

A downwardly extending arm portion **92** of plate **54** is pivotally mounted between rail side walls **72** and **74** on a bushing **94** carried by a pin **96** extending through the rail side walls. Arm portion **92** is held against an annular shoulder **98** on bushing **94** by a lock washer **100**.

As is best shown in FIGURE 3, hinge plate **54** extends toward oven front **34** through a rectangular slot **102** in the lower end of rail base **70** and through slot **56** in inner door liner **44**.

A pin **104**, carried by the plate **54** adjacent the intersection of its upper and forward edge surfaces **106** and **108**, pivotally mounts a pair of elongated links **110** and **112** which are secured in place by snap rings **114**.

Connecting links **110** and **112** extend through slot **102** in rail base **70** and then upwardly between rail side walls **72** and **74**.

A pin **116**, carried by the upper ends of connecting links **110** and **112**, is adapted to slide along rail flanges **76** and **78**. Pin **116** is held in place by snap rings **118**.

A tension spring **120**, which is provided to counterbalance the weight of door **22**, terminates at its lower end in a hook portion **122** which is fastened over pin **116** between connecting links **110** and **112**. The upper end of spring **120** is reduced in diameter and surrounds an enlarged loop **124** in the lower end of a wire link **126**. The upper end of wire link **126** terminates in a hook **128** which is hooked into one of a series of longitudinally spaced holes **130** formed in a tab **132** bent inwardly from base **70** of rail **62**.

Spring **120** tends to move stop pin **116** upwardly with respect to rail **62**. To limit this upward movement, a stop **134** is fastened in rail **62** just above the detents **80** and **82**. Stop **134** has a base **136**, side walls **138** and **140** against which pin **116** abuts, and outwardly extending flanges **142** and **144** which maintain pin **116** in its proper position adjacent flanges **76** and **78**.

A semicircular lug **146** extends upwardly from the upper edge surface **106** of hinge plate **54** adjacent edge surface **148**. A second semicircular lug **150** extends downwardly from lower edge surface **152** of plate **54** intermediate edge surfaces **108** and **148**.

The hinge support **154** which is best illustrated in FIGURES 2, 4, and 5 is an important feature of this invention. It comprises a thick, rectangular spacer plate **156** rigidly secured between a pair of angle plates **158** and **160** by welding or by heavy bolts. The flanges **162** and **164** of angle plates **158** and **160** are attached by bolts **166** to the inside of stove front **34** with spacer plate **156** aligned with slot **58**.

As is shown in FIGURE 5, the length of spacer plate **156** and angle plates **158** and **160** greatly exceeds the width of hinge plate **54**. Further, the angle plates are bolted to the stove front **34** adjacent their upper and lower ends which effectively resists turning moments generated by the heavy oven door. This construction, while simple, is extremely strong and rigid and allows the oven door to be used to support heavy objects without damage to the hinge mechanism.

Although only one hinge support **154** is illustrated in FIGURES 2, 4 and 5, it is to be understood that there is a support **154** for each of the two hinge mechanisms **64** and that one of these supports is aligned with each of the two slots **58** in stove front **34** (see FIGURE 1).

Referring again to FIGURE 2, a substantially rectangular, forwardly open recess **168** in spacer plate **156** cooperates with the juxtaposed surfaces of angle plates **158** and **160** to define the socket **60**. Socket **60** is adapted to receive hinge plate **54** and is somewhat wider and deeper than the plate. A semicircular notch **170** in spacer plate **156** is adapted to receive the depending semicircular projection **150** on hinge plate **54**.

As is shown in FIGURE 2, the relative dimensions of hinge plate **54** and socket **60** are such that when hinge plate **54** is secured in socket **60**, forward edge **148** of

hinge plate **54** abuts the inner end **172** of socket **60**. Also, when hinge plate **54** is secured in socket **60**, the bottom edge surface **152** of plate **54** abuts the bottom wall **174** of socket **60**, the top of the projection **146** on hinge plate **54** abuts the top wall **176** of socket **60**, and hinge plate projection **150** engages the surface of recess **170**. The front portion **178** of the top wall **176** of socket **60** is sloped upwardly. This allows hinge plate **54** to be moved to the position shown in dotted lines in FIGURE 2 so that door **22** may be removed from the oven. In addition, the angled upper wall facilitates the replacement of door **22** on the oven by making it easier to insert hinge plate **54** into the open end of socket **60**.

When the door **22** is mounted in place on range **20**, its weight will hold hinge plate **54** in the position shown in full lines in FIGURE 2. When it is desired to remove door **22** from range **20**, it is opened slightly so that embossment **50** is free of oven front **34**. Then door **22** is lifted by pulling upwardly on handle **52**. This will cause hinge plate **54** to rotate about lug **146** until the plate assumes the position shown in dotted lines in FIGURE 2 in which projection **150** is above recess **170**. Plate **54** may then be withdrawn from socket **60**, allowing door **22** to be lifted off the range.

When it is desired to replace door **22**, it is held in a vertical position adjacent stove front **34**. Hinge plates **54** are then aligned with slots **58** in stove front **34** and inserted through these slots into sockets **60**. The door **22** is then pushed inwardly until the edges **148** of plates **54** abut the inner ends **172** of sockets **60** and lowered until the depending projections **150** on plates **54** are seated in recesses **170**.

When door **22** is opened, pin **116** slides downwardly on flanges **76** and **78** of rail **62** because of the toggle action of hinge plate **54** and connecting links **110** and **112**. The tension spring **120** is adjusted by inserting hook **128** of link **126** in the proper hole **130** in tab **132** so that when door **22** is nearly closed, the spring will urge it toward its closed position. If properly adjusted, door **22**, when nearly open, will, by its weight, overcome the tension of spring **120**. The door may, therefore, be held open with only a slight force and may be easily moved from one position to another. When the door **22** is opened to a horizontal position, pin **116** rests in notches **88** and **90**, bracing the door against further downward movement (see FIGURE 5).

When the door is moved slightly ajar to the broil position (shown by broken line B in FIGURE 1), pin **116** drops into detents **80** and **82**. The force exerted by spring **120** holds pin **116** against the steep upper sides **84** of the detents. Pin **116**, in this position, prevents spring **120** from closing door **22**. However, slight additional pressure on door handle **52** will cause pin **116** to ride up the steep sides **84** of detents **80** and **82** and will allow spring **120** to close the door. The shallow sides **86** of detents **80** and **82** allow pin **116** to ride easily out of the detents when door **22** is moved downwardly to the open position.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. In combination an oven having a vertical wall, means forming an access opening in said wall, a door assembly for selectively opening and closing said access opening and means for mounting said door on said wall, said mounting means comprising means defining a socket in said wall, a hinge member adapted to be removably carried in said socket, means forming cooperating fixed

recess and detent formations on said hinge member and said socket, said formations being engaged by the weight of said door for normally preventing removal of said hinge member from said socket, said hinge member and said socket being so dimensioned as to permit disengagement of said detent from said recess and removal of said hinge member from said socket by raising said hinge member with respect to said socket, means mounting said hinge member adjacent the lower edge of said door assembly for pivotal movement about a first axis, a spring extending essentially vertically in said door and being connected at one end to the interior of said door adjacent the upper portion thereof, a link mounted on said hinge member for pivotal movement about an axis spaced from said first axis, said link extending away from said hinge member upwardly and into said door, means connecting the lower end of said spring to said link within said door whereby when said door is opened by movement thereof about said first axis said spring is extended to counterbalance the weight of said door, and detent means positioned within said door for selectively holding said door in predetermined relation to said hinge member independently of the weight of said door to dispose said door in slightly open position and to permit said door to be raised to disengage and remove said hinge member from said socket.

2. The combination according to claim 1 wherein said detent means comprises a pin carried by said link and a

bracket carried in fixed position within said door, said bracket having spaced detent surfaces for engagement by said pin when said door reaches its fully opened position and when said door reaches its slightly open position.

3. The combination according to claim 1 wherein said recess and detent formations comprise a pair of oppositely directed projections on, and in the plane of, said hinge member and a recess in said socket adapted to receive one of said projections, said one projection being held in said recess by the weight of said door, the other of said projections providing a pivot for said hinge member, said hinge member and said socket being so dimensioned that the hinge member may be rotated about the pivot provided by said other projection to disengage said one projection from said recess to permit removal of said hinge member from said socket.

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