

- [54] SELF-LOCKING OVEN DOOR HINGE
- [75] Inventors: **Herbert A. Kauranen**, Granville;  
**Alvin J. Schettl**, Grand Rapids, both  
of Mich.
- [73] Assignee: **Kelvinator, Inc.**, Grand Rapids,  
Mich.
- [22] Filed: **Dec. 26, 1973**
- [21] Appl. No.: **428,085**

3,327,701	6/1967	Smith.....	126/194
3,450,125	6/1969	Hopkins.....	126/191
3,474,226	10/1969	Kauranen.....	219/413

*Primary Examiner*—Carroll B. Dority, Jr.  
*Assistant Examiner*—Larry I. Schwartz  
*Attorney, Agent, or Firm*—McNenny, Farrington,  
Pearne & Gordon

- [52] U.S. Cl. .... 126/194; 126/197; 16/149
- [51] Int. Cl. .... F24c 15/02
- [58] Field of Search ..... 126/191, 192, 194, 197,  
126/190; 49/386; 219/413; 16/149

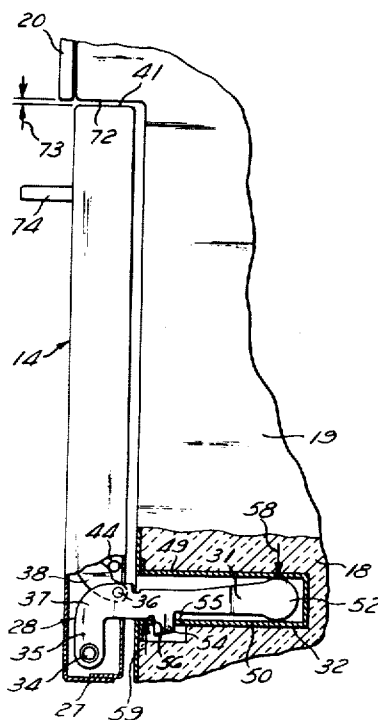
[56] **References Cited**  
**UNITED STATES PATENTS**

3,150,658	9/1964	Ferland.....	126/191
3,214,567	10/1965	Chisholm.....	219/413

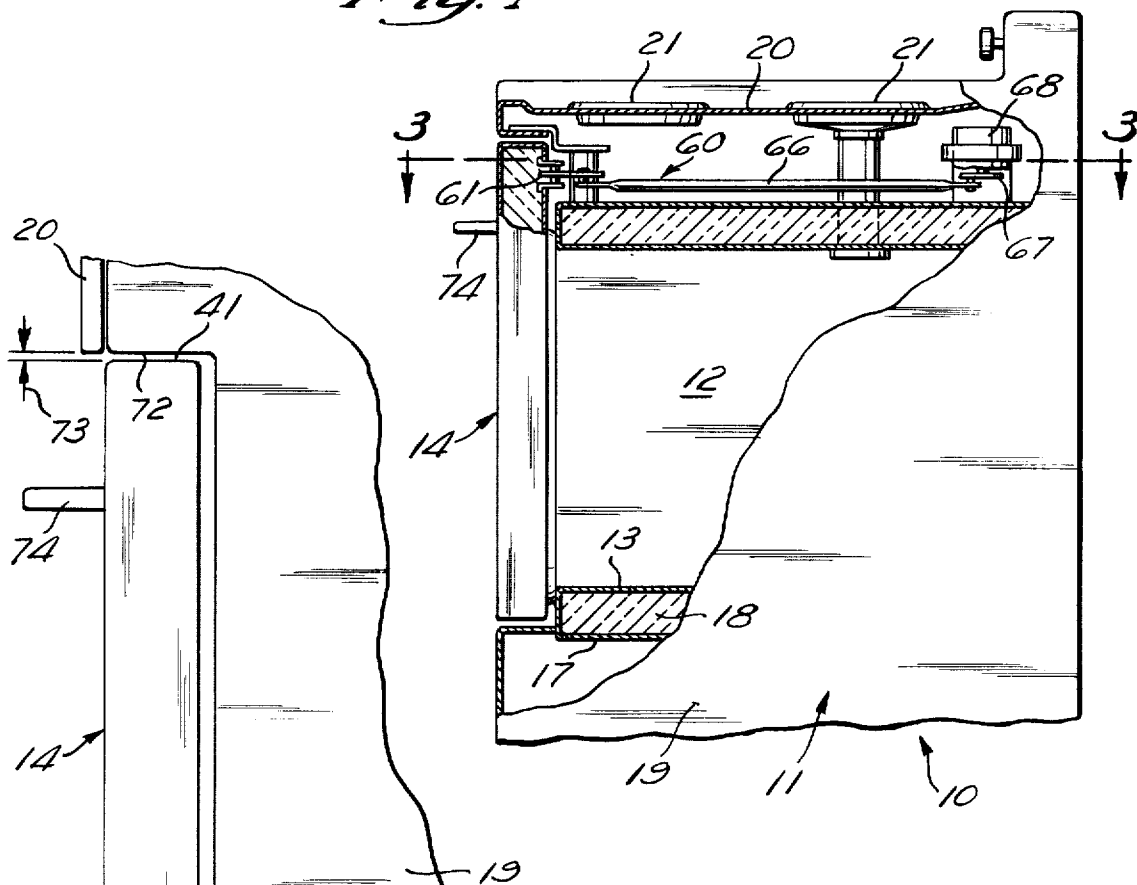
[57] **ABSTRACT**

A self-contained oven door hinge assembly for releasably mounting a door on a range oven cabinet including locking surfaces arranged to prevent disengagement when the door is in a closed position, whereby the door latch mechanism normally provided in a self-cleaning oven is utilized to prevent the door from being opened or removed during high temperature operation.

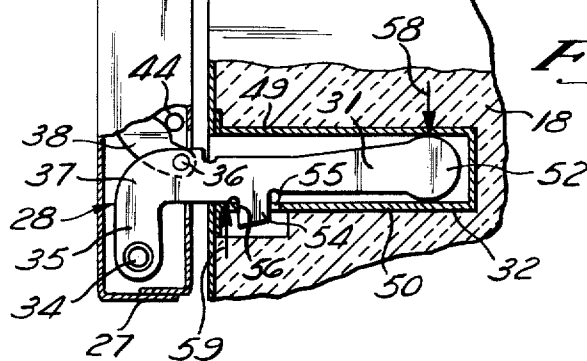
**9 Claims, 4 Drawing Figures**



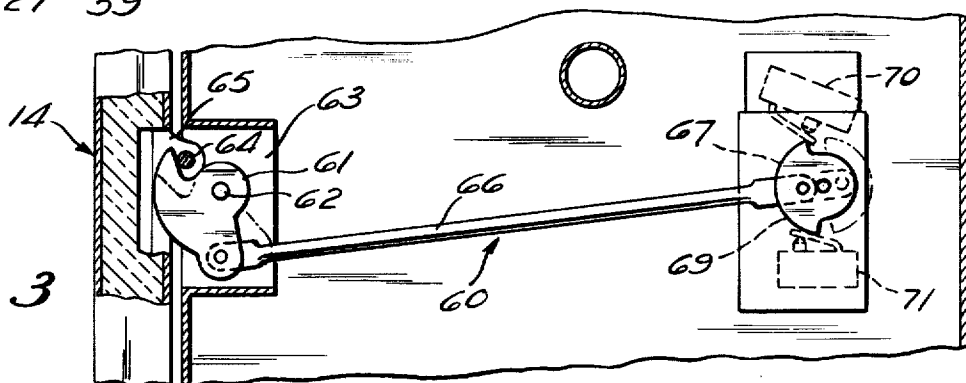
*Fig. 1*

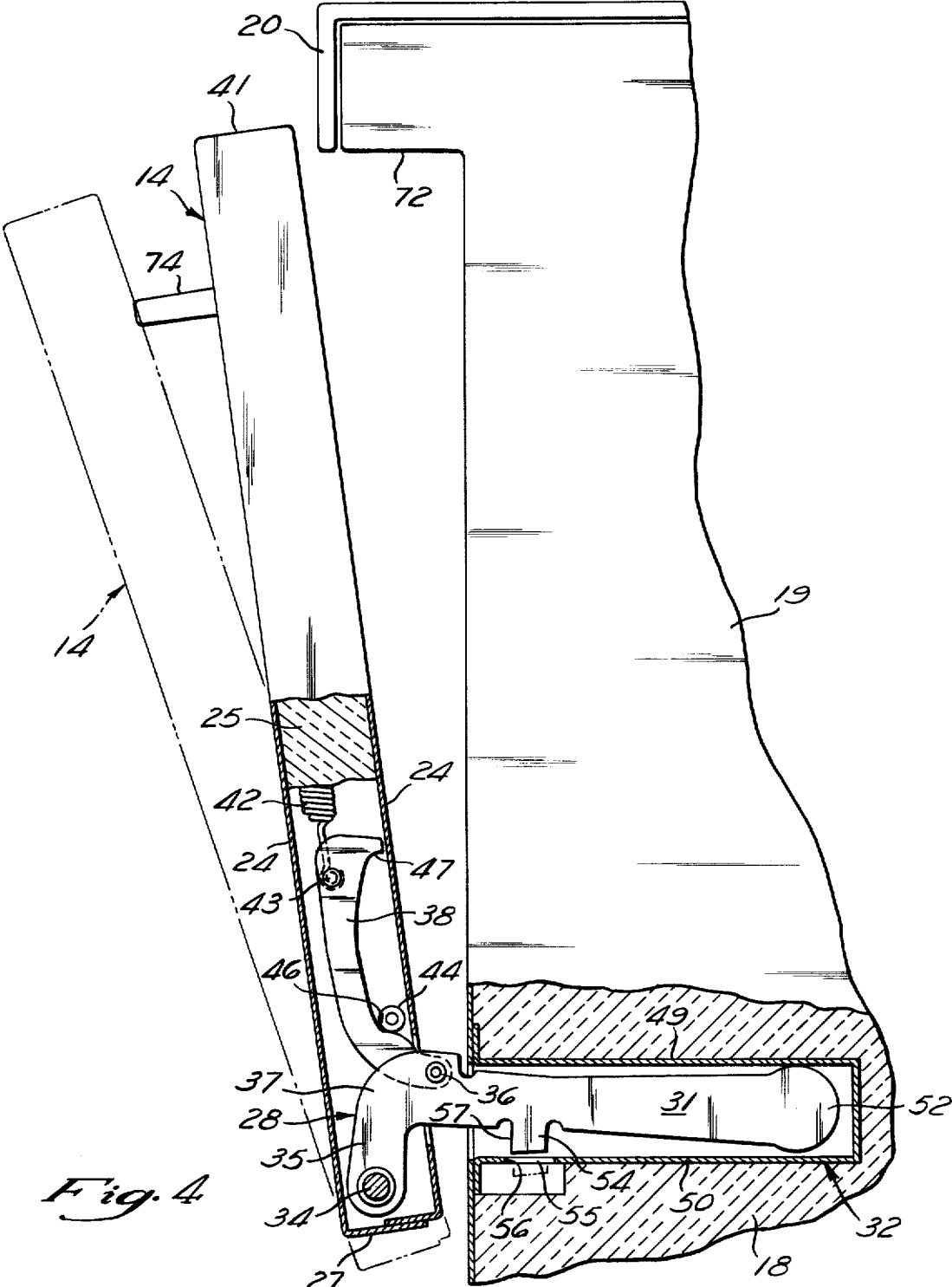


*Fig. 2*



*Fig. 3*





## SELF-LOCKING OVEN DOOR HINGE

### BACKGROUND OF THE INVENTION

The invention relates to improvements in domestic ranges and, more specifically, pertains to a removable door assembly particularly suited for self-cleaning ovens.

### PRIOR ART

Self-cleaning domestic range ovens develop relatively high temperatures, above those normally used during cooking, to remove food and soils from the walls of the oven chamber by the process known as "pyrolysis." To avoid the risk of injury to users and to property, it has been the practice to include in such ranges latching means to prevent an oven door from being opened while the interior of the oven is at elevated cleaning temperatures.

When manual cleaning of minor spills, spot cleaning and wiping up of residual pyrolytic ash is to be done, such work is facilitated by removal of the oven door. One mounting arrangement which allows removal of the door from the range cabinet is disclosed in U.S. Pat. No. 3,450,125 to Hopkins. This patent discloses a door hinge which is releasably engaged with cooperating surfaces of the oven cabinet to permit removal of the door by lifting the hinge relative to the cabinet assembly. For reasons of safety, it has been necessary to secure retaining brackets over the hinge arms to prevent removal of the door during self-cleaning operations. Such brackets have been secured with threaded fasteners and, consequently, require extra work by the user for dismounting and remounting the door. Examples of automatic door latching mechanisms for self-cleaning ovens are disclosed in U.S. Pat. Nos. 3,474,226 to Kauranen and RE 27,545 to Guy.

### SUMMARY OF THE INVENTION

The invention provides releasable oven door mounting means which utilizes operation of existing automatic door latching mechanisms to prevent the door from being removed during high-temperature self-cleaning operations. In accordance with the invention, the door mounting means requires that the door be at least partially opened before it can be released and the door dismounted. In structural detail, the door and cabinet assembly includes surfaces which are vertically disposed in confronting relation to one another in the closed-door position, and thus interfere when attempt is made to raise the door. Upon opening of the door, the relevant surfaces are swung clear of one another to thereby permit the door to be fully raised and to be removed. Since the latching mechanism is operative to lock the door in its closed position during high-temperature cleaning operations, the door is at the same time rendered unremovable.

In the disclosed embodiment, the door includes a pair of laterally spaced hinge assemblies of a self-contained, counterbalancing type, each with a hinge arm projecting from the door body adjacent its lower edge. The hinge arms are adapted to extend into the oven cabinet and, by means of integral locking lugs, releasably engage slots provided in the oven enclosure. Preferably, the length of the locking lugs is arranged to exceed the vertical clearance between the top edge of the door in its closed position and overhanging portions of the range cabinet.

Where the hinge assembly includes a detent or means for defining an intermediate position for maintaining the door in a partially open broiling position, the geometry of the locking lugs and associated elements is ideally arranged to allow the door to be raised and thereby released without causing the hinge assembly to be jarred out of its detented position. With each hinge remaining in the detented position, upon reinstallation of the door there need be no individual manipulation of each hinge arm to otherwise accomplish insertion of the arms into their receptacles.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partially in section, of a domestic range embodying the present invention;

FIG. 2 is a fragmentary, elevational view, partially in section and on an enlarged scale, of details of a door and hinge assembly mounted on the range cabinet;

FIG. 3 is a plan view taken along the lines 3—3 of FIG. 1, illustrating elements of an automatic door latching mechanism; and

FIG. 4 is a view similar to FIG. 2, showing the door and hinge assembly in a raised position where the door is releasable from the oven cabinet.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

A domestic range 10 embodying the invention includes a cabinet assembly 11 which encloses an oven chamber 12. The cabinet assembly 11 includes an inner liner 13 of sheet material or the like having a boxlike configuration open at a front side adjacent a door assembly 14. The liner 13 is surrounded by a spaced casing 17, again of sheet metal or the like, so that a space for insulation material 18 is provided to surround the oven chamber 12. Additionally, as shown, the cabinet assembly 11 may include exterior appearance side panels 19 and a top panel 20, on which may be supported burners, indicated generally at 21.

The door assembly 14, as shown, may be formed of spaced sheet metal panels 24, between which suitable insulation material 25 is disposed. The door assembly 14 is pivotally supported adjacent its lower edge, designated 27, on a pair of laterally spaced hinge assemblies 28 (only one of which is shown in the Figures). A disclosure of the general operation of a hinge of the type illustrated, in pivotally supporting and counterbalancing a door assembly, is disclosed in the aforementioned U.S. Pat. No. 3,450,125.

A hinge assembly 28 includes a main support arm 31 which, when assembled on the range cabinet 11, extends horizontally into a receiving bracket or receptacle 32 welded or otherwise fixed relative to the liner 13 and casing 17. A pin 34 in an unsupported end 35 of the hinge arm contained in the door assembly 14 pivotally supports the door assembly 14 about a horizontal axis. A second pivot pin 36 carried in a knee-shaped section 37 of the hinge arms 31 pivotally anchors an end of a cam link 38 extending in a direction towards the opposite or upper edge 41 of the door assembly 14 (FIG. 4).

An elongated tension spring 42 is connected at its lower end to a stud 43 adjacent the free end of the cam link 38. In a known manner, tension in the spring 42 is increased as the door 14 is opened or swung downwardly about the hinge pivot pin 34, owing to a displacement of the cam link 38 away from the upper edge

41 of the door caused by the difference in pivot centers of the door and cam link. The increasing spring force counterbalances the door assembly 14. Tension in the spring 42 develops torque or a moment about the pin or joint 36 which holds the cam link 38 against a cam roller 44 fixed to the door assembly 14. The cam link 38 and spring 42 cooperate to maintain the door assembly 14 in the closed position of FIG. 2, in an intermediate, partially open, broil position defined by a detent area 46 on the profile of the cam, as shown in phantom in FIG. 4, or in a fully open, generally horizontal position (not illustrated) limited by an upturned cam area 47.

The hinged arm 31 is confined vertically between a pair of spaced flanges 49 and 50 of the bracket 32, each lying in a horizontal plane. At its distal end, the hinge arm 31 includes a circular portion 52 having a sliding fit between the bracket flanges 49 and 50. This circular portion permits the hinge arm to pivot in the bracket 32 about its distal end. Intermediate the length of the hinge arm 31 is formed an integral, vertically depending locking lug 54 received in a slot 55 provided in the lower bracket flange 50. A vertical surface 56 of the slot 55 engages an opposed vertical surface 57 of the locking lug 54 to normally prevent removal of the hinge arm 31 from the bracket 32. The weight of the door 14 is supported by reaction forces developed on the hinge arms 31 by the receiving bracket 32 at points indicated by the arrows 58 and 59 at opposite ends of the bracket 32 (FIG. 2).

Referring to FIGS. 1 and 3, there is provided an automatic door latching mechanism 60 of a general type such as disclosed in the above-mentioned U.S. Pat. Nos. 3,474,226 and RE 27,545. The mechanism 60 includes latch 61 horizontally pivotal on a shaft 62 carried by a bracket 63 fixed to the cabinet assembly 11. The latch 61 is adapted to engage a keeper pin 64 carried by a bracket 65 fixed on the door assembly 14 adjacent its upper edge 41. A control rod 66 is pivotally connected at one end to the latch 61 and at another end to an eccentric 67.

The eccentric 67 is rotatably driven by a gear motor 68 (FIG. 1). The eccentric 67 includes a peripheral cam profile 69 which operates electrical switches 70 and 71 forming a part of a control circuit (not shown), for operating the gear motor, and therefore the latch 61, at appropriate times. Rotation of the eccentric 67 through 180 degrees to the phantom position illustrated in FIG. 3 causes a corresponding retraction of the latch 61 to the indicated phantom position to release the keeper pin 64 and the door assembly 14.

In accordance with conventional practice, temperature-responsive means and other control elements sense the temperature of the oven chamber 12 and cooperate in a manner such that the latch 61 is in the extended door-holding position illustrated in FIG. 3 when the internal temperature of the oven chamber 12 is above normal baking temperatures and is in a range approximately between 750° and 950° F. The details of elements which sense oven temperature and other conditions to actuate the gear motor 68 form no part of the present invention, and are therefore omitted from the present discussion.

It is essential that the door 14 be irremovable from its hinge mounting during high-temperature pyrolytic operation for the same reasons of safety that the door is normally latched in the closed position during such

time. In accordance with the invention, the length of the locking lug 54 of the hinge assembly 28 extending into the slot 55 is greater than a vertical distance or clearance 73 between the upper edge 41 of the door assembly and an overhanging portion 72 of the cabinet assembly 11. In the illustrated embodiment, the overhanging portion 72 is provided by the side panels 19 at each side of the door assembly 14. It may thus be appreciated that an attempt to raise the door assembly 14 when it is in the closed or vertically disposed position of FIG. 2 will be ineffective to raise the locking lugs 54 a sufficient height to permit the hinge arms to be withdrawn from the receiving bracket 32.

In contrast, when the door is open a sufficient amount, such as when it is in the "broil" position illustrated in phantom in FIG. 4, the door may be raised above the overhanging surface portion 72 to the solid-line position illustrated in FIG. 4 by gripping and lifting a door handle 74. The hinge assembly 28 is adapted to pivot on the circular arm portion 52 a distance sufficient to withdraw the locking lug 54 from the slot 55 to permit the hinge arm 31 to be withdrawn from the bracket 32. Ideally, the locking lug 54 and various other elements are proportioned to allow release of the lug while the hinge assembly 28 remains detented in the broil position, with the roller 44 in the detent area 46.

Both during and after removal of the door assembly from the cabinet assembly 11, the hinge arm 31 will thus remain in a fixed position extending generally perpendicularly from the plane of the door assembly 14. Retention of the hinge arms 31 at both sides of the door assembly 14 in this orientation facilitates later reinstallation of the door, since both hinge arms will be aligned with one another at a convenient disposition relative to the door, to allow relatively easy registration into the brackets 31. It will thus be appreciated that removal of the door or, more specifically, unlocking and displacement of the lower edge 27 of the door during pyrolytic cleaning operations is prevented.

Although a preferred embodiment of the invention is illustrated in detail, it is to be understood that various modifications and rearrangements of parts may be resorted to without departing from the scope of the invention disclosed herein.

What is claimed is:

1. A range comprising a cabinet assembly having an oven chamber, and a door assembly, including a lower hinge, adapted to be removably mounted on the cabinet assembly, the door assembly being in a closed position when vertically disposed and being pivotal away from the oven chamber about a horizontal hinge axis adjacent its lower edge, releasable locking means adjacent the lower door hinge for retaining the lower door hinge on the oven chamber, said releasable locking means including interengaging elements associated with said door assembly and said cabinet assembly, said releasable locking means allowing separation of said door assembly from said cabinet assembly when the lower edge of the door assembly is raised a predetermined distance from a normal locked position, door latching means operative to prevent the door from being opened when the internal temperature of the oven chamber is above normal baking temperatures, and means preventing the lower door edge from being lifted said predetermined distance when said door latching means is operative on said door assembly and allowing said lower door edge to be lifted said predeter-

mined distance when said door latching means is not operative wherein said door lift prevention means includes a first surface fixed relative to the cabinet assembly and a second surface fixed relative to the door assembly engageable with said first surface when said door assembly is vertically disposed, said first and second surfaces being arranged relative to one another in a manner which, when in engagement, prevents said door from being lifted through said predetermined distance.

2. A range as set forth in claim 1, wherein said door assembly includes a hinge adjacent each of its lateral sides, each of said hinges including an arm extending generally horizontally from a door pivot into the cabinet assembly, said arms forming said locking elements of the door assembly.

3. A range as set forth in claim 2, wherein said locking means includes lug means and cooperating slot means.

4. A range as set forth in claim 3, wherein said lug means is provided by said hinge arm locking elements.

5. A range as set forth in claim 1, wherein said second surface is provided on the upper edge of the door assembly.

6. A range as set forth in claim 5, wherein said cabinet assembly includes an exterior surface forming said first surface, said first surface extending horizontally over said door assembly when the latter is closed.

7. A domestic range comprising a cabinet assembly including an oven chamber, a door assembly associated with the oven chamber, counterbalancing hinge assemblies contained in each lateral side of the door assembly for pivotally mounting the door about a horizontal axis adjacent its lower edge, said door assembly being pivotally movable between open and closed positions, a latching mechanism adapted to hold the door assembly in a closed position when the temperature of the oven chamber is at elevated pyrolytic cleaning temperatures, each of said hinge assemblies including a hinge arm extending from the door assembly into an associated receptacle fixed on the cabinet assembly, said receptacles each having upper and lower horizontally extending surfaces vertically supporting the associated hinge arm, a slot in each lower horizontal surface, said hinge arms each including a depending locking lug extending a first distance into the adjacent slot, a surface of the cabinet assembly extending horizontally over the upper edge of the door assembly at a predetermined vertical distance when the door assembly is in its closed position, said hinge arms being vertically movable in said receptacles upon lifting of the door assembly relative to the cabinet assembly to release said locking lugs from said slots, said predetermined vertical distance between said

upper door edge and said cabinet assembly surface being less than the length of the locking lugs in their slots whereby the door assembly cannot be fully lifted to release said lugs when the door assembly is in its closed position, said door assembly clearing said cabinet assembly surface when in a partially open position to permit release of said locking lugs and removal of said door.

8. A range as set forth in claim 7, wherein said counterbalancing hinge assemblies include means for holding said door assembly and said hinge arms in a fixed relationship relative to each other with the door assembly in a partially open broil position, and said lugs are arranged to clear said slots while said door assembly and said hinge arms remain in said fixed relationship.

9. A range comprising a cabinet assembly having an oven chamber, and a door assembly, including a lower hinge, adapted to be removably mounted on the cabinet assembly, the door assembly being in a closed position when vertically disposed and being pivotal away from the oven chamber about a horizontal hinge axis adjacent its lower edge, releasable locking means adjacent the lower door hinge for retaining the lower door hinge on the oven chamber, said releasable locking means including interengaging elements associated with said door assembly and said cabinet assembly, said releasable locking means allowing separation of said door assembly from said cabinet assembly when the lower edge of the door assembly is raised a predetermined distance from a normal locked position, door latching means operative to prevent the door from being opened when the internal temperature of the oven chamber is above normal baking temperatures, and means preventing the lower door edge from being lifted when said door latching means is operative on said door assembly and allowing said lower door edge to be lifted when said door latching means is not operative, said door lift prevention means including a first surface fixed relative to said cabinet assembly and a second surface fixed relative to said door assembly engageable with said first surface when said door assembly is vertically disposed, said second surface being on the upper edge of said door assembly, said cabinet assembly including an exterior surface forming said first surface, said first surface extending horizontally over said door assembly when the latter is closed, the vertical clearance between the door assembly and said overhanging surface portion being less than said predetermined distance whereby engagement between said door assembly and said surface prevents said door assembly from being raised through said predetermined distance when said door is in its closed position.

\* \* \* \* \*