

[54] **SELF-CLEANING OVEN DOOR HOLDING MEANS**

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[58] Field of Search..... 126/19, 273, 197;
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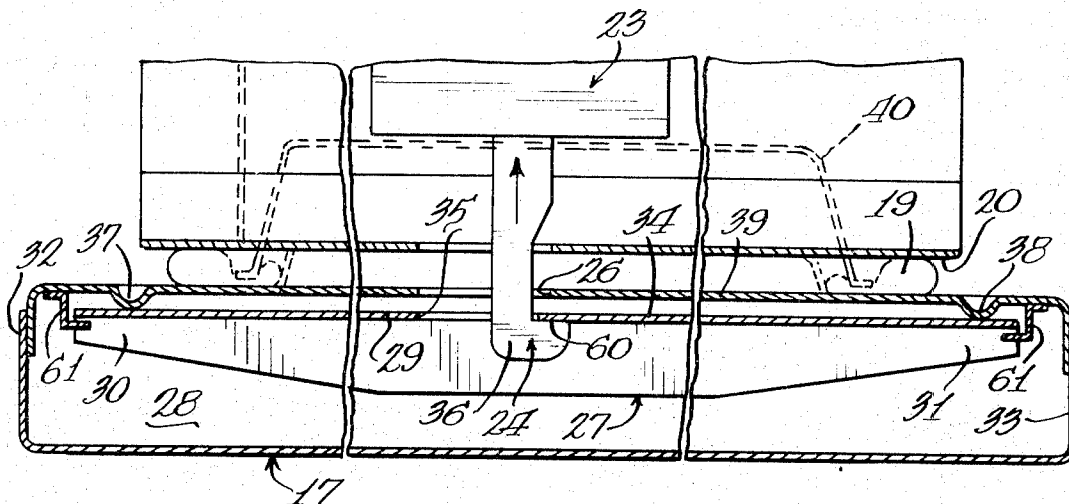
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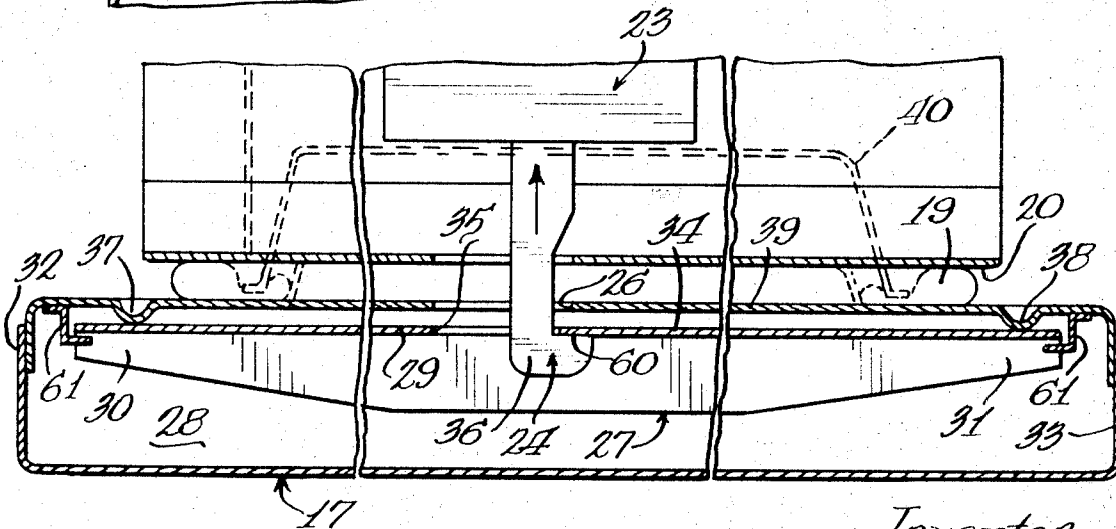
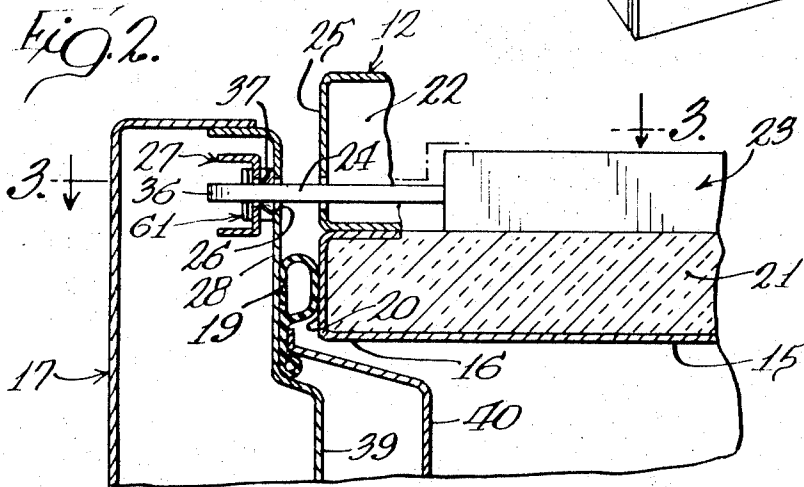
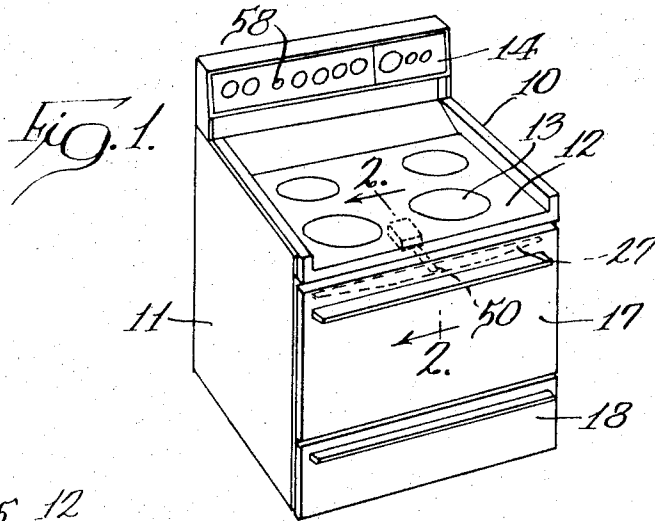
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ABSTRACT

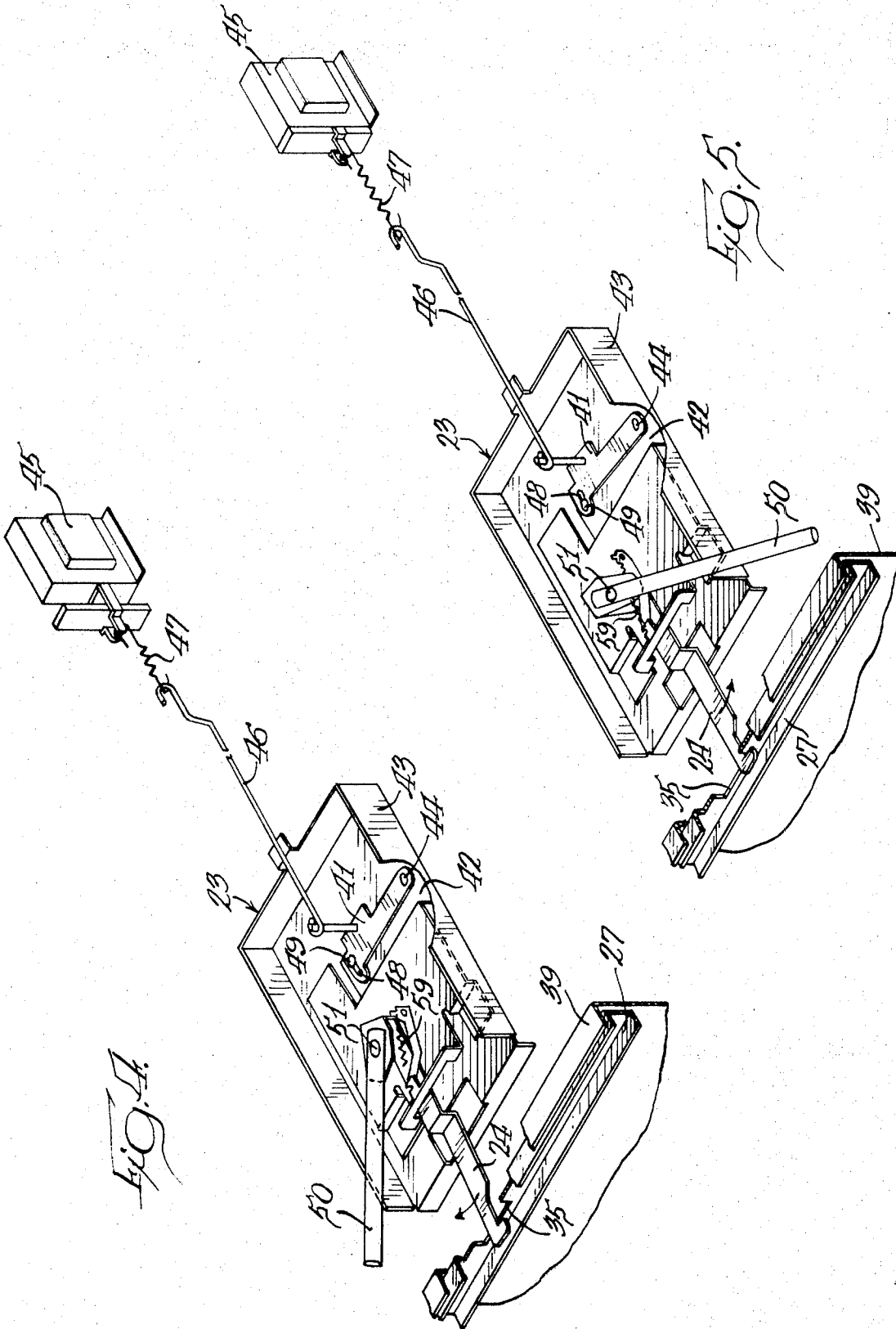
A self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing the front opening, and means for producing a self-cleaning, high temperature condition within the oven chamber including a manually operable control member selectively setttable to place the oven in a self-cleaning mode. Means are provided for equalizing the pressure applied to the door for holding the door in a chamber closing position during the self-cleaning operation.

16 Claims, 5 Drawing Figures





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SELF-CLEANING OVEN DOOR HOLDING MEANS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to ovens and in particular to improved means for maintaining the oven door closed during a high temperature self-cleaning operation.

2. Description of the Prior Art

In one form of commercially available electric oven, means are provided for effecting a self-cleaning operation selectively by the user. The oven includes a manual control which, when set to a self-cleaning position, automatically initiates a high temperature condition in the oven suitable to effect a self-cleaning thereof. Grease and other material on the walls of the oven are suitably reduced to ash traces by the high temperature self-cleaning operation, permitting facilitated removal thereof to complete the cleaning operation.

It has been found that the high temperature necessary to effect the desired self-cleaning operation may present safety and other problems. To prevent inadvertent contact with the oven surfaces when at such a high temperature, it is desirable to maintain the oven door closed during the self-cleaning operation. To this end, improved means for latching the door in closed position in effective sealing relationship with the oven during the self-cleaning operation have been provided. The present invention provides means for improved equalization of the sealing action of the door despite the tendency of the oven door to warp under the high heat conditions occurring in self-cleaning ovens.

SUMMARY OF THE INVENTION

The present invention comprehends such a self-cleaning oven structure having new and improved means for holding the oven door closed in substantial sealing relationship with the oven during such a high temperature self-cleaning operation.

More specifically, the invention comprehends providing such means for holding the door in the chamber closing position across the front opening of the oven chamber including a pressure transfer member having a mid-portion, and pressure-applying and pressure-equalizing portions spaced oppositely from the mid-portion and engaging outwardly facing surface portions of the door, force means for forcibly urging the mid-portion of the pressure transfer member inwardly toward the oven chamber to apply equalized inward pressure by the door against the wall means adjacent the opening, and means for maintaining the forcible urging of the mid-portion by the force means while the oven is in the self-cleaning mode.

The pressure transfer member may comprise an elongated member with the end portions thereof aligned with the edge of the oven chamber opening to apply closing pressure by the door against the aligned oven chamber edge portions. In the illustrated embodiment, the pressure transfer member is disposed above the top of the oven chamber opening when the door is in the closed position whereby substantially equalized closing forces are developed against portions of the oven walls above and laterally of the top of the oven chamber opening.

The pressure transfer member may be carried by the oven door and the means for urging the pressure transfer member toward the oven chamber may be mounted on the top of the oven above the oven chamber. A ten-

sion bar may be provided as a portion of the forcible urging means adapted to pass through an opening in the mid-portion of the pressure transfer member to engage the outer surface thereof. The door may carry a peripheral seal which is sealingly urged in an equalized manner against the edge of the oven chamber opening by the pressure transfer member holding action.

Force concentration and equalization may be provided by means of a plurality of limited surface engaging portions between the force transfer member and the door. In the illustrated embodiment, such means comprises bosses on the door engaging the outer ends of the force transfer member. The force means for forcibly urging the pressure transfer member toward the oven chamber may be arranged to engage the pressure transfer member at the mid-portion thereof with the holding forces being generated at the opposite edges of the door by the transfer of the urging force through the pressure transfer member therethrough to provide an improved substantially equalized sealed retention of the door across the oven chamber opening during the high temperature self-cleaning operation.

The oven structure door holding means of the present invention is extremely simple and economical of construction while yet providing the highly desirable features discussed above in a novel and simple manner.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a perspective view of an oven having a door-holding means embodying the invention;

FIG. 2 is a fragmentary enlarged vertical section taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary enlarged horizontal section taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary perspective view of the door-holding means in a release position; and

FIG. 5 is a perspective view thereof in a door-holding position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a range generally designated 10 is shown to comprise an electric range, of the free standing type, having a cabinet 11 defined by outer walls. It will be understood that the present invention is equally applicable to built-in ovens. A top wall 12 of the range of FIG. 1 carries conventional surface burner units 13 and a conventional control console 14 is mounted at the rear of the top wall 12 for suitable control of the operation of the range. Subjacent the top wall 12, the range defines an oven chamber 15 (FIG. 2) having a front opening 16 which is selectively closed by a door 17. In the illustrated embodiment, the door is pivotally mounted on the front wall 18 of the cabinet to swing downwardly about a horizontal axis at the lower end of the door for selectively opening and closing the front opening 16 of the oven chamber. Door 17 carries a peripheral sealing member 19 for sealingly engaging the front surface 20 of the cabinet 11 when the door is in the closed position of FIGS. 1 and 2.

The oven chamber, or cavity, 15 is defined by an inner insulated wall means 21 the front end of which effectively defines the surface 20, as best seen in FIGS.

2 and 3. Top wall 12 further includes an upper hollow portion 22 carrying a door-holding means generally designated 23 having a tension bar 24 extending forwardly through the front 25 of the top wall portion 22 and through a mating opening 26 into the interior of the door 17. The door 17 may advantageously be insulated. The door 17 insulation is not shown in the drawings since it is not necessary for an understanding of the invention. A pressure transfer member generally designated 27 is mounted on door 17 within the hollow interior 28 thereof for engagement by the tension bar 24 in holding the door 17 in the closed position such as during a high temperature, self-cleaning operation.

As best seen in FIGS. 2 and 3, the pressure transfer member 27 comprises an elongated element, and in the illustrated embodiment, defines a U-section channel member formed of a relatively rigid material such as metal and having a mid-portion 29 and opposite end portions 30 and 31 spaced oppositely from mid-portion 29 and adjacent the side edges 32 and 33 of the door. The web 34 of the channel pressure transfer member is provided at mid-portion 29 with an opening 35 which aligns with the opening 26 in door 17 for extension of the tension bar 24 therethrough when the door is in the closed position. As best seen in FIG. 3, tension bar 24 includes a distal turned portion 36 which engages the edge 60 of the pressure transfer member mid-portion 29 when the door-holding means 23 is operated to effect a door-holding operation. A door-holding force is transmitted through the pressure transfer member from mid-portion 29 to the end portions 30 and 31 and, in turn, is transferred to the door 17 by the engagement of end portions 30 and 31 with rearwardly projecting bosses 37 and 38 formed in the rear wall 39 of the door 17. As shown in FIGS. 2 and 3, bosses 37 and 38 are disposed outwardly of the seal 19 which may be retained on the rear wall 39 of the door by a liner 40 projecting rearwardly into the oven chamber 15 when the door is in the closed position. Thus, pressure transfer member 27 effectively transfers the door-holding and sealing force from the mid-portion 29 thereof to the upper and outer corners of the door upwardly and outwardly of the seal 19 to equalize the sealing forces applied to the door thereby to effect an improved door-holding and sealing operation such as during a high temperature self-cleaning cycle.

The pressure transfer member 27 may be retained within the door on door wall 39 by suitable retainer clips 61 engaging the opposite ends of the channel member while permitting limited adjustable movement of the channel member for improved force transfer to the bosses 37 and 38 in the door-holding operation and substantial pressure equalization across the door. Thus, the present invention provides pressure equalizing means within the door effective after the primary force has been applied by the tension bar 24.

As will be obvious to those skilled in the art, the localized pressure point force transfer may be effected by means of a boss on the web 34 of the channel 27 within the scope of the invention.

A preferred means for forcibly urging the tension bar 24 and selectively positioning the tension bar for engagement with the door wall portion 37 when the door is in the closed position and the oven is in the self-cleaning mode is shown in detail in FIGS. 4 and 5. Apparatus 23, the details of which are not part of the present invention and therefore are not completely shown,

may advantageously include a locked safety cam 41 which is pivotally mounted to the base 42 of a housing 43 by means of a pivot 44. A solenoid 45 is connected to the cam 41 by an actuating rod 46 through a spring 47. The solenoid 45 is connected to console 14 so as to be energized when the control is set for the self-cleaning operation. When the solenoid is energized, it swings cam 41 in a clockwise direction, as seen in FIG. 5, to a limit of movement thereof controlled by a slot 48 on the cam receiving a pin 49 carried on housing base 42.

A door lock handle 50 is pivotally mounted on base 42 by a pivot 51. Manual swinging of the handle 50 from the release position of FIG. 4 to the door locking position of FIG. 5 may advantageously effect movement of a switch actuating lever (not shown) thereby to close a plurality of switches for energizing the oven heating elements. A self-cleaning operation control switch 58 may be provided in console 14 and is set to a self-cleaning position to effect a subsequent self-cleaning operation at this time.

The swinging of lock handle 50 to the locking position, further urges the tension bar 24 in a counterclockwise direction as seen in FIG. 5, against the retracting biasing action of a spring 59 which normally disposes the lever 24 in the clockwise extreme position of FIG. 4.

The drawing shows manual actuation of tension bar 24. However, it will be appreciated that tension bar 24 could also be actuated by, for examples, a motorized cam or a solenoid.

The control is responsive to the temperature within the oven and includes means (not shown) for de-energizing the solenoid 45 when the temperature in the oven reaches a preselected high temperature, such as approximately 600° F. Deenergization of the solenoid permits the solenoid plunger to pull the rod 46 toward the solenoid and thereby swing the cam 41 in a clockwise direction to the position shown in FIG. 5 thereby preventing manipulation of the handle 50 to the left to unlock the door.

Upon completion of the cleaning cycle, which may be controlled by switches actuated by a suitable clock-timer (not shown), the temperature within the oven chamber drops to below the preselected temperature and thereby permits re-energization of the solenoid 45 thereby releasing the cam 41 and permitting the swinging of the lock handle 50 in a clockwise direction to the release position of FIG. 4 and thereby releasing the tension bar 24 from the door for terminating the automatic door-holding functioning of the apparatus.

Thus, the present invention comprehends an improved means for maintaining the oven door closed in a pyrolytic oven wherein a high temperature self-cleaning operation presents a safety problem where access to the oven chamber when the oven is at such a high temperature may be highly injurious to the user. The improved door-holding means of the present invention is extremely simple and economical of construction while yet providing the highly desirable door-holding and equalized door sealing functioning as discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing said front opening, and means for providing a self-cleaning high temperature condition with the oven chamber including manually operable control means selectively settable to place the oven in a self-cleaning mode, means for holding the door in a chamber-closing position across said opening comprising: a pressure transfer member having a mid-portion free of engagement with the door, and pressure-applying portions spaced oppositely from said mid-portion and engaging outwardly facing surface portions of the door; force means for forcibly urging said mid-portion of the pressure transfer member inwardly toward said oven chamber to apply inward pressure through said pressure-applying portions by said door in substantially equalized manner at its periphery against said wall means adjacent said opening; and means for maintaining the forcible urging of said mid-portion by said force means while said oven is in the self-cleaning mode.

2. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member comprises an elongated member and said pressure-applying portions comprise end portions thereof aligned with the edge of said oven chamber opening when disposed in pressure-applying position.

3. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member is adjustably carried by the oven door.

4. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member is mounted within the oven door.

5. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member is disposed at the top of the oven door for applying inward pressure by said door against said wall means on the top of said opening.

6. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member is disposed at the top of the oven door for applying inward pressure by said door against said wall means at the top of said opening at the opposite sides thereof.

7. The self-cleaning oven door holding means of claim 1 wherein said pressure transfer member comprises a U-section channel.

8. The self-cleaning oven door holding means of claim 1 wherein said door carries a peripheral resilient seal for sealingly engaging said oven walls about said opening when the door is in the closed position and said door surface portions are disposed outwardly adjacent said seal.

9. The self-cleaning oven door holding means of claim 1 wherein said pressure-transfer member is provided with an opening in said mid-portion and the forcible urging means includes a tension bar adapted to pass through said opening and engage the outer surface of said mid-portion to urge said mid-portion inwardly toward the oven chamber when the door is closed and the oven is in the self-cleaning mode.

10. In a self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing said front opening, and means for providing a self-cleaning high temperature condition with the oven chamber including manually operable control

means selectively settable to place the oven in a self-cleaning mode, means for holding the door in a chamber-closing position across said opening comprising: a pressure transfer member having a mid-portion, and pressure-applying portions spaced oppositely from said mid-portion and engaging outwardly facing surface portions of the door; force means for forcibly urging said mid-portion of the pressure transfer member inwardly toward said oven chamber to apply inward pressure by said door in substantially equalized manner at its periphery against said wall means adjacent said opening; and means for maintaining the forcible urging of said mid-portion by said force means while said oven is in the self-cleaning mode, bosses being provided on one of said door or said pressure transfer member to be disposed outwardly of said pressure-applying portions and said door surface portions when the door is in the closed position for providing a force concentration on said door surface portions.

11. In a self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing said front opening, and means for providing a self-cleaning high temperature condition within the oven chamber including manually operable control means selectively settable to place the oven in a self-cleaning mode, means for holding the door in a chamber-closing position across said opening comprising: a pressure transfer and pressure equalizing member carried by said door having a mid-portion free of engagement with the door, and pressure-applying portions spaced oppositely from said mid-portion and engaging outwardly facing surface portions of the door; force means carried by said wall means above said oven chamber for forcibly urging said mid-portion of the pressure transfer member inwardly toward said oven chamber to apply substantially equalized inward pressure through said pressure-applying portions by said door against said wall means above the top of said opening; and means for maintaining the forcible urging of said mid-portion by said force means while said oven is in the self-cleaning mode.

12. The self-cleaning oven door holding means of claim 11 wherein said door carries a peripheral seal and said pressure applying portions are space above and laterally outwardly of said seal.

13. The self-cleaning oven door holding means of claim 11 wherein said pressure transfer and pressure equalizing member is movably carried on the door.

14. The self-cleaning oven door holding means of claim 11 wherein said force maintaining means comprises a safety cam, a solenoid for selectively positioning the safety cam to (a) prevent release of the force holding means from the door holding position when the temperature in the oven chamber is above a preselected temperature, and (b) permit release of the force holding means when the temperature in the oven chamber is below said preselected temperature.

15. In a self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing said front opening, and means for providing a self-cleaning high temperature condition within the oven chamber including manually operable control means selectively settable to place the oven in a self-cleaning mode, means for holding the door in a chamber-closing position across said opening comprising: a pressure transfer and pressure equalizing member carried by said door having a mid-portion, and pressure-

applying portions spaced oppositely from said mid-portion and engaging outwardly facing surface portions of the door; force means carried by said wall means above said oven chamber for forcibly urging said mid-portion of the pressure transfer member inwardly toward said oven chamber to apply substantially equalized inward pressure by said door against said wall means above the top of said opening; and means for maintaining the forcible urging of said mid-portion by said force means while said oven is in the self-cleaning mode, said pressure transfer and pressure equalizing member comprising an elongated element, and said door being provided with a pair of spaced retainers engaging the opposite ends of said element for retaining the element in association with the door.

16. In a self-cleaning oven having wall means defining an oven chamber defining a front opening, a door for closing said front opening, and means for providing a self-cleaning high temperature condition within the

oven chamber including manually operable control means selectively settable to place the oven in a self-cleaning mode, means for holding the door in a chamber-closing position across said opening comprising: a pressure transfer and pressure equalizing member carried by said door having a mid-portion, and pressure-applying portions spaced oppositely from said mid-portion and engaging outwardly facing surface portions of the door; force means carried by said wall means above said oven chamber for forcibly urging said mid-portion of the pressure transfer member inwardly toward said oven chamber to apply substantially equalized inward pressure by said door against said wall means above the top of said opening; and means for maintaining the forcible urging of said mid-portion by said force means while said oven is in the self-cleaning mode, said door being provided with outwardly projecting bosses defining said outwardly facing surfaces.

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