

June 11, 1968

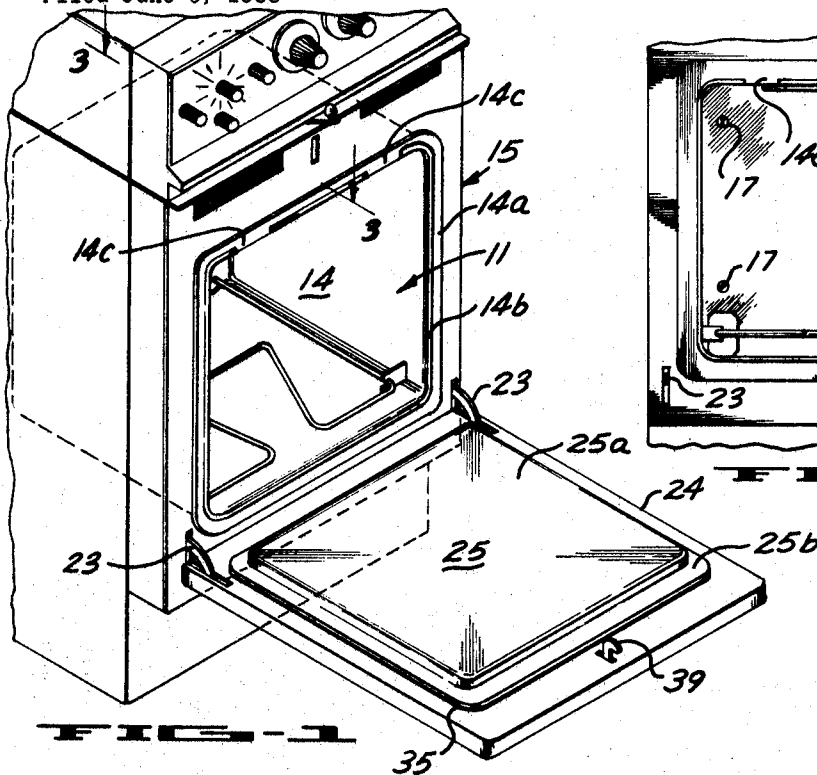
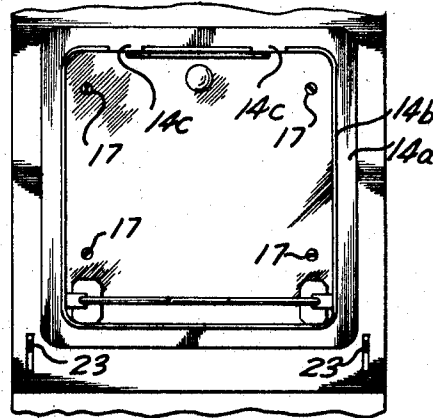
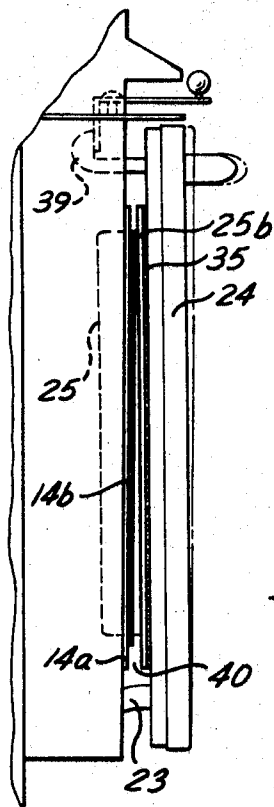
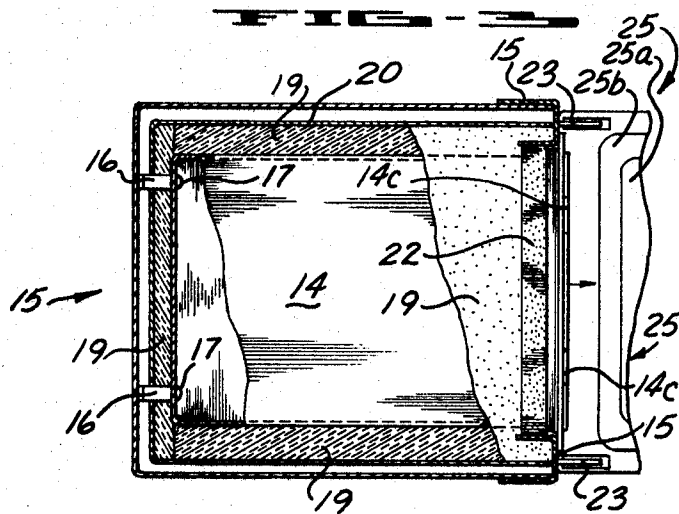
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3,387,601

SELF-CLEANING OVEN

Filed June 3, 1966

2 Sheets-Sheet 1



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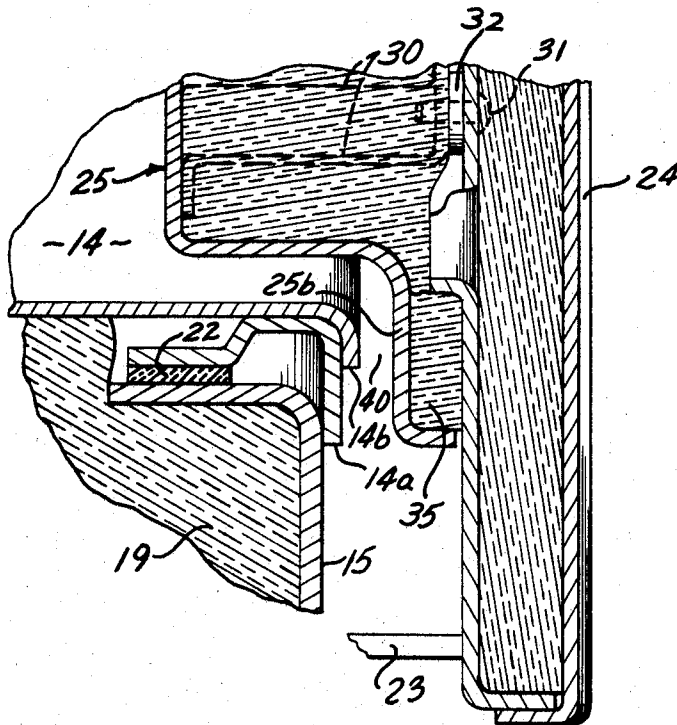
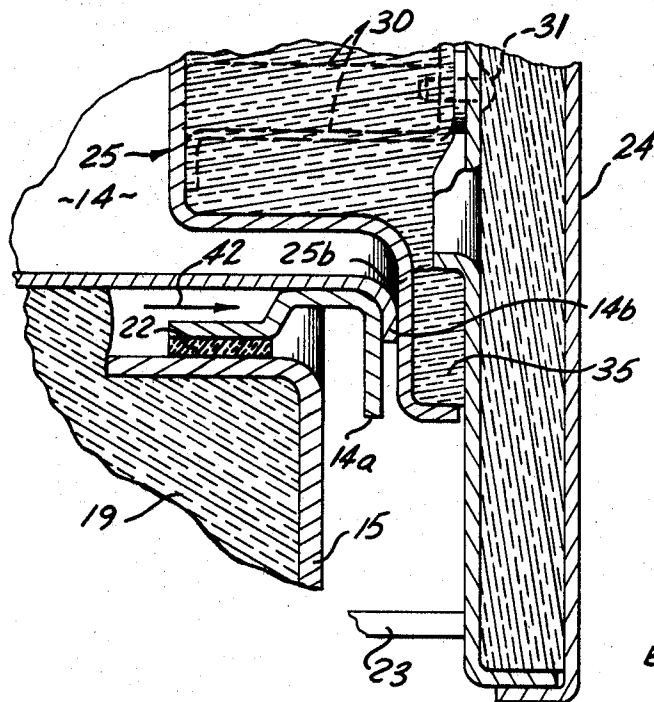
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SELF-CLEANING OVEN

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2 Sheets-Sheet 2



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3,387,601

SELF-CLEANING OVEN

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Filed June 3, 1966, Ser. No. 555,078

7 Claims. (Cl. 126—21)

This invention relates to a self-cleaning oven and more particularly to such a device in which cleaning is achieved by heating the oven to a high enough temperature to burn off food soil accumulated therein.

Electric ovens are often provided with means for cleaning the interior portions thereof by raising the oven to an elevated temperature whereby food soil is effectively disintegrated with the gaseous products of the resultant burning of such material being exhausted through an appropriate vent. This technique for eliminating food soil, while highly effective in achieving the desired end results, poses several problems. Firstly, to avoid an explosion or fire hazard, it is essential that the burning mixture be kept very rich, i.e., that there be very little air permitted in the oven during the cleaning operation. Secondly, the high temperatures involved tend to cause buckling of the door and oven housing where there is a wide variation of temperature over the heated areas. Further, precautions must be taken to minimize the transfer of heat to the outside housing and door portions of the oven which might pose a hazard to persons in the vicinity.

Self-cleaning ovens of the prior art have several shortcomings with respect to the aforementioned undesirable conditions. These include the use of destructible elastic seals such as of Fiberglas or elastomeric material for sealing the oven door plug to the oven shell. Such seals tend to wear out with continued use, thus posing the hazard of air entry into the oven during the self-cleaning operation which might form a dangerous explosive mixture. Further, such elastic seals generally seal the oven not only during the self-cleaning operation but also in normal cooking, obviating the desirable entry of air into the oven between the oven door and shell or "can" with normal cooking. Further, many of the prior art devices utilize a door plug which is thermally connected to the inner and outer door portions. This tends to result in wide temperature variations from the center portions to the outer portions of the door plug which often leads to buckling of such plug at the elevated temperatures utilized in self-cleaning.

The aforementioned shortcomings of prior art self-cleaning ovens are overcome in the device of this invention by providing a door plug member which forms a surface-to-surface seal with the oven can without the use of a flexible sealing strip. This seal is formed by virtue of the metallic expansion of the oven can as its temperature is raised to the self-cleaning temperature which is such that at normal cooking temperatures a proper air gap is provided between the door plug and the can for cooking. Means are further provided to insulate the oven can and the door plug from surrounding members, so that warpage is avoided and heat transfer to the outer portions of the oven which might pose a hazard is minimized.

This improvement is achieved in the device of the invention by providing an oven can member which is supported on the oven housing and insulated therefrom by means of thermally insulating material. The oven can is rigidly attached to the oven housing solely at the rearward portions thereof with the remaining portions of the can being left floating so that such oven can is free to expand forwardly in the oven housing as its temperature is raised. The oven door plug member is thermally insulated from the inner and outer door members by means of thermally insulating material and has a sealing flange integrally

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formed therewith which mates with the forward lip of the oven can to form a seal therewith when the oven can is in its fully forwardly expanded condition at the elevated self-cleaning temperature. The combustible mixture generated in the cleaning operation is allowed to escape through small venting slits formed in the oven can lip.

In this manner, a tight non-destructible seal is provided during the self-cleaning operation and at the same time normal intake of air is permitted between the oven plug and oven can during normal cooking. Further, the transfer of heat to the outer portions of the oven is minimized and warpage of the oven door and housing substantially eliminated by providing means for avoiding wide temperature variations over the areas in question.

It is therefore an object of this invention to provide an improved self-cleaning oven.

It is a further object of this invention to provide a self-cleaning oven having a non-destructible seal formed between the oven door plug and the oven can.

It is still another object of this invention to increase the safety of self-cleaning ovens.

It is still a further object of this invention to provide a self-cleaning oven in which the warpage of oven parts is minimized.

It is still another object of this invention to provide a self-cleaning oven in which optimum sealing action is achieved between the oven door and the oven can during the self-cleaning operation and the proper air intake is provided between such plug and can during normal cooking.

It is still another object of this invention to provide a self-cleaning oven in which the oven can member expands forwardly when heated to the self-cleaning temperature to form a seal with a flange on the oven door plug.

Other objects of this invention will become apparent from the following description taken in connection with the accompanying drawings, of which:

FIG. 1 is a perspective view illustrating the overall features of a preferred embodiment of the device of the invention,

FIG. 2 is a front elevational view illustrating the can member of the embodiment of FIG. 1,

FIG. 3 is a cross sectional view taken along the plane indicated by 3—3 in FIG. 1,

FIG. 4 is an elevational view of the preferred embodiment of the device of the invention showing the oven door in its closed position.

FIG. 5 is an elevational cross-sectional view illustrating the relationship between the oven can and oven door plug with the oven at a relatively low temperature, and

FIG. 6 is an elevational view partially in cross section showing the relationship between the oven can and oven door plug members with the oven at the self-cleaning temperature.

Referring now to FIGS. 1-3, a preferred embodiment of the device of the invention is illustrated. Oven compartment 11 is formed by oven can member 14 which is supported on oven housing 15. Oven can member 14 is attached to bracket members 16 by means of bolts 17, brackets 16 being rigidly attached to housing 15 by suitable means such as welding. The rear portion of can member 14 is thus rigidly connected to housing 15. Other than for the attachment to brackets 16, the can member is otherwise free or "floating" with respect to housing 15.

Can member 14 is thermally insulated from housing 15 by means of insulating material 19, which may be of Fiberglas, which is packed between the walls of can 14 and which partially surrounds the can and container 20 attached to housing 15. Further thermal insulation is provided by means of insulating strips 22 which may be of asbestos, which separate the forward portions of the can from the housing. Can member 14 is thus effectively ther-

mally insulated from the housing and other surrounding members with its top, bottom and side portions floating with respect to the housing.

Attached to the forward edges of can member 14 is a flange portion 14a. Running around the inner edges of flange portion 14a is a lip portion 14b formed by bending over the edge of the can member, which, as to be explained further on in the specification, forms a seal with the oven door plug. Formed in lip portion 14b are a pair of venting slits 14c.

Oven door 24 is hingedly supported on housing 15 by means of hinges 23. Mounted on door 24 is oven plug 25 which comprises a centrally located flat raised portion 25a and an edge portion 25b surrounding the central portion. Plug member 25 is attached to the door 24 by means of brackets 30 which are welded to the plug, and screws 31 which threadably engage the brackets to attach them to the door (see FIG. 5). Thermal insulation is provided between the brackets and the door by means of washers 32 which are fabricated of a thermally insulating material. The plug member is thermally insulated from the door by means of insulating strips 35, which may be fabricated of asbestos and separate the edge portion 25b thereof from the door.

The oven door is latched closed by means of latch 39. With the oven at room temperature and latched closed there is a gap 40, as shown in FIG. 4, between the oven plug 25 and can 14. Gap 40 typically is of the order of $\frac{3}{32}$ of an inch along the bottom edge of the can with the oven at ambient room temperature.

Referring now to FIGS. 5 and 6, the operation of the sealing mechanism of the device of the invention is illustrated. FIG. 5 illustrates the bottom part of the oven sealing portion with the oven in a non-heated condition, while FIG. 6 illustrates the sealing portions with the oven heated for self-cleaning. With the oven not heated, as shown in FIG. 5, flange 14a abuts against housing 15 while there is an air gap 40 between the bottom and side parts of lip portion 14b of the can and edge portion 25b of the plug. The top part of lip portion 14b abuts against the edge portion of the plug as shown in FIG. 4. It is to be noted that in the non-heated condition, while edge portion 14a is touching housing 15, this is a light contact with no significant pressure.

Referring now to FIG. 6, as the oven is heated, the metal of the can member expands and flange portion 14a and lip portion 14b move forwardly in the direction indicated by arrow 42 until finally at the self-cleaning temperature (about 900 degrees F.), the entire lip portion 14b is abutting tightly against the edge portion 25b of the plug to form a seal therewith. It is to be noted that in this condition, flange 14a has moved away and is separated from housing 15 by an air gap, thus avoiding the transfer of heat from the flange to the housing at such elevated temperatures. At normal cooking temperatures, flange portion 14a and lip portion 14b will be positioned about half way between the housing and the door plug, thus providing an air gap for the oven while at the same time avoiding the transfer of heat from flange 14a into the housing. In normal cooking, air gap 40 is typically of the order of $\frac{1}{16}$ of an inch along the bottom edge of the can.

Thus the device of the invention provides means for effectively sealing the oven as necessary during the self-cleaning operation while automatically providing for an ideal airflow between the oven can and the door plug during normal cooking. Venting slits 14c are formed in lip portion 14b to allow the gaseous products of combustion to escape during the self-cleaning operation. These slits are relatively narrow and thus do not permit a significant air flow into the oven.

The device of this invention thus provides an improved self-cleaning oven having highly effective means incorporated therein for sealing during the self-cleaning operation. Means are provided to effectively thermally insulate the oven can and door plug from surrounding members so

as to avoid the buckling thereof and to minimize the undesirable transfer of heat to the outside portions of the oven. Further, an air gap between the can and the door plug is automatically varied as a function of the oven temperature such that proper air flow is provided to the oven during the normal cooking operation while during self-cleaning, the necessary sealing action is afforded so as to avoid the formation of a dangerous combustible mixture in the oven.

While the device of the invention has been described and illustrated in detail, it is to be clearly understood that this is intended by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of this invention being limited only by the terms of the following claims.

What is claimed is:

1. In a self cleaning oven including a housing, an oven can member supported on said housing and an oven door hingedly supported on said housing for providing a closure for said can member, the improvement comprising means for rigidly supporting the rearward portions of said can member on said housing with the remaining portions of said can member being left floating with respect to said housing, means for thermally insulating said can member from said housing, said can member having sealing means running around the forward edges thereof, a door plug member attached to the inner portions of said oven door, and means for thermally insulating said plug member from said door, said plug member having a sealing surface which mates with said can member sealing means to form a seal therewith when the oven is at self cleaning temperature, said can member being adapted to move forwardly relative to said housing as the oven temperature is increased to provide an air intake gap between the door and the can at normal cooking temperatures and a substantial seal between the door and the can at self cleaning temperatures, the sealing means of said can member separating from said housing as said can member moves forwardly.
2. The oven as recited in claim 1 wherein said plug member sealing means comprises a flange integrally formed with said plug member and running around the perimeter thereof.
3. In a self cleaning oven including a housing, an oven can member supported on said housing and an oven door hingedly supported on said housing for providing a closure for said can member, the improvement comprising means for rigidly supporting the rearward portions of said can member on said housing with the remaining portions of said can member being left floating with respect to said housing, means for the thermally insulating said can member from said housing, said can member having a flange portion running around the forward edges thereof and a sealing lip portion running around the inner edges of said flange portion, a door plug member attached to the inner portions of said oven door, and means for thermally insulating said plug member from said door, said plug member having a sealing flange which mates with said can member lip portion to form a seal therewith when the oven is at self cleaning temperature, said can member being adapted to move forwardly relative to said housing as the oven temperature is increased to provide an air intake gap between the door and the can at normal cooking temperatures

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and a substantial seal between the door and the can at self cleaning temperatures, the flange portion of said can member separating from said housing as said can member moves forwardly.

4. The oven as recited in claim 3 wherein the lip portion of said can member has venting slit means formed therein for venting the gaseous combustion products during the self cleaning operation.

5. The oven as recited in claim 3 wherein said means for thermally insulating said can member from said housing comprises insulating material packed between said housing and said can member and insulating strips running along said flange portion and separating said can member from said housing.

6. The oven as recited in claim 3 wherein said means for thermally insulating said plug member from said door comprises insulating strips running along the inner walls of said plug member sealing flange between said flange

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and said door, said strips separating said plug member from said door.

7. The oven as recited in claim 1 wherein said means for rigidly attaching the rearward portions of said can member to the housing comprises rigid bracket members attached to the back portions of said housing and protruding forwardly therefrom and bolt means for rigidly attaching the rear portions of said can member to said bracket members with the flange portion of said can member lightly in contact with said housing.

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