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Brucken

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[54] **HEAT-CLEANING RANGE CONSTRUCTION**

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[73] Assignee: **General Motors Corporation,** Detroit, Mich.

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[52] **U.S. Cl.** ..... **126/19 R,** 126/198, 126/273 R

[51] **Int. Cl.** **F24c 15/16**

[58] **Field of Search** ..... 126/19, 21, 39 C, 126/273, 198

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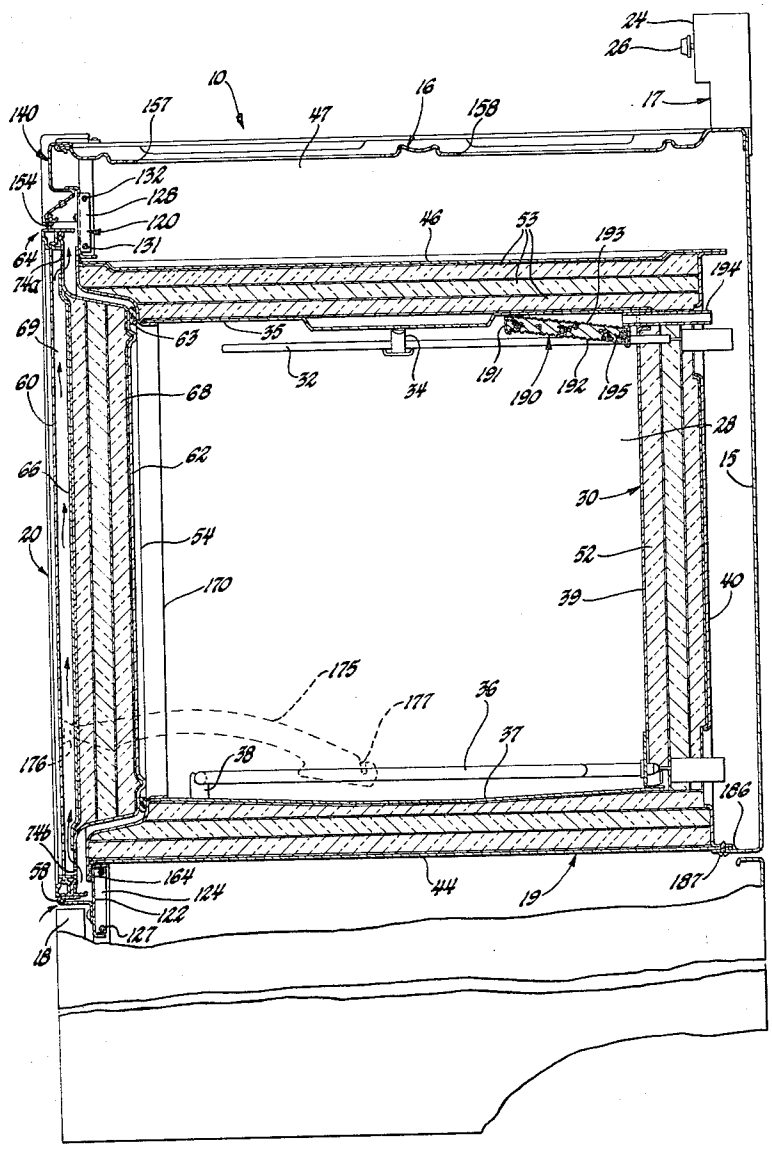
Primary Examiner—Edward G. Favors

Attorney—William S. Pettigrew et al.

[57] **ABSTRACT**

A venting structure for a domestic range having a heat-cleaning oven wherein maximum cooling room air flow maintains reduced range cabinet surface temperatures during a heat-cleaning cycle. An oven liner is cantilevered from the front wall of the range and separated therefrom by a stainless steel throat member positioned around the oven liner access opening. Air channel means are provided to vent heated air from a vertical air passageway in the oven door to a plenum chamber beneath the range cooktop for exhausting via the surface heating units or back panel vents.

3 Claims, 5 Drawing Figures



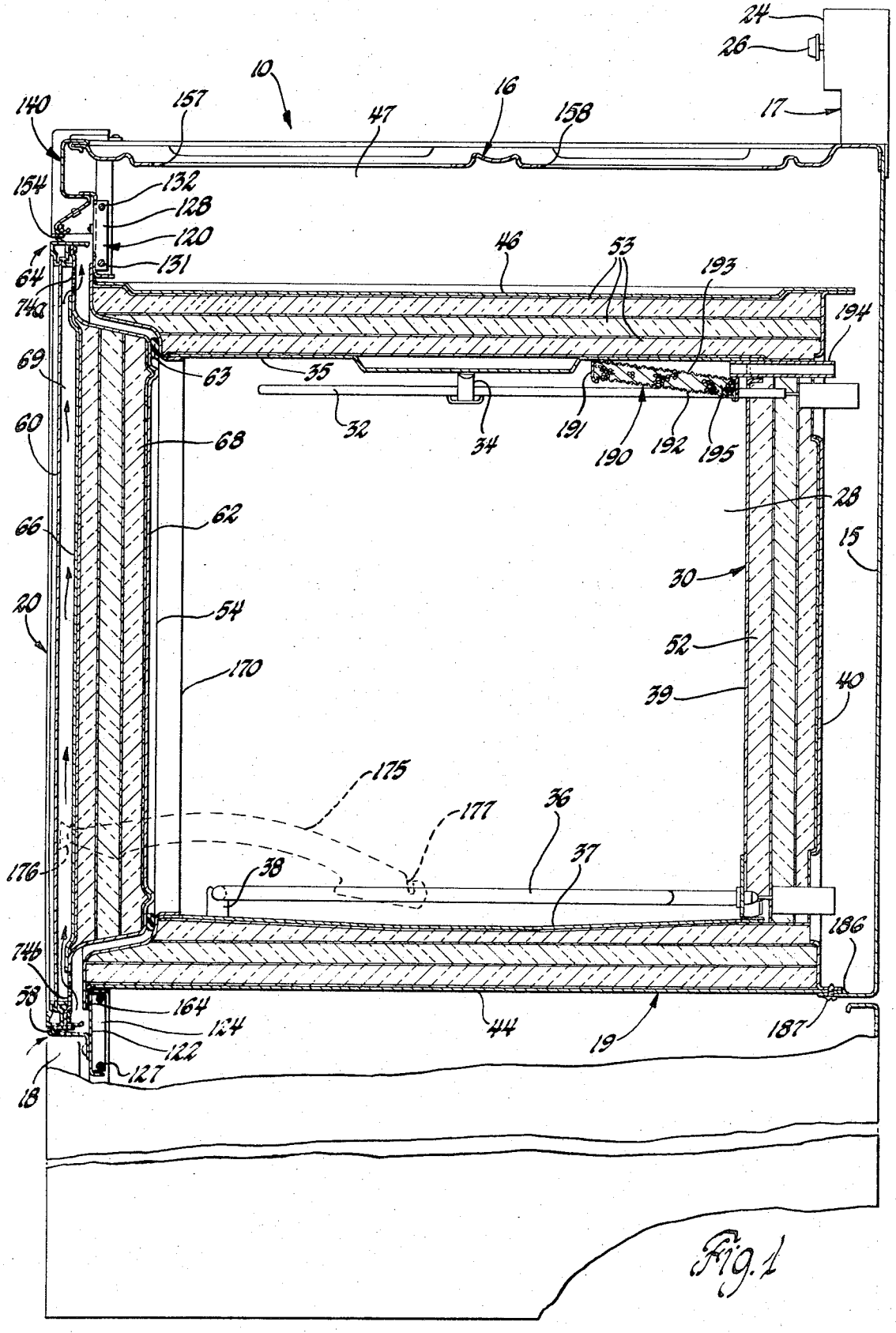

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Fig. 1

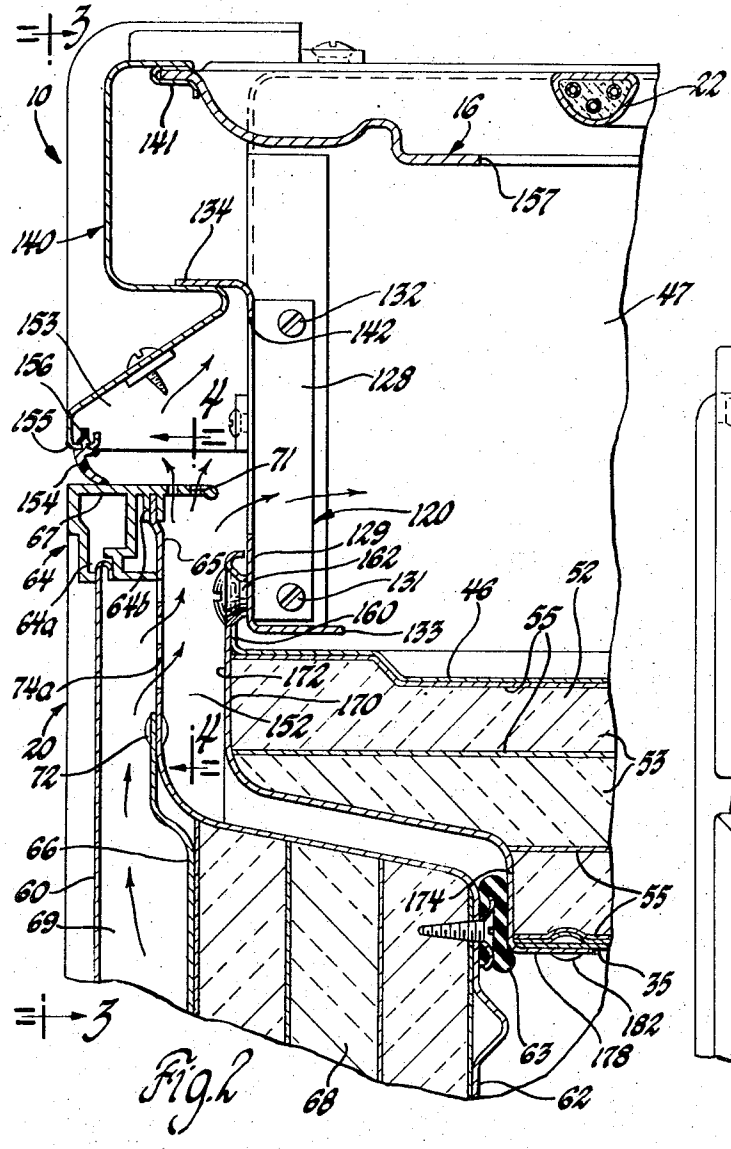


Fig. 2

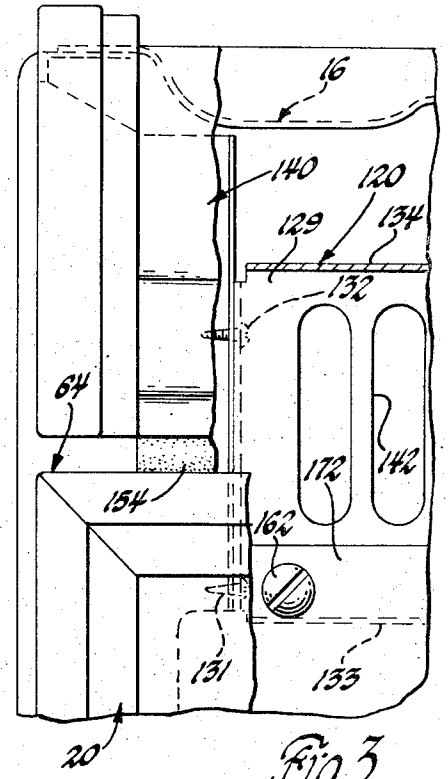


Fig. 3

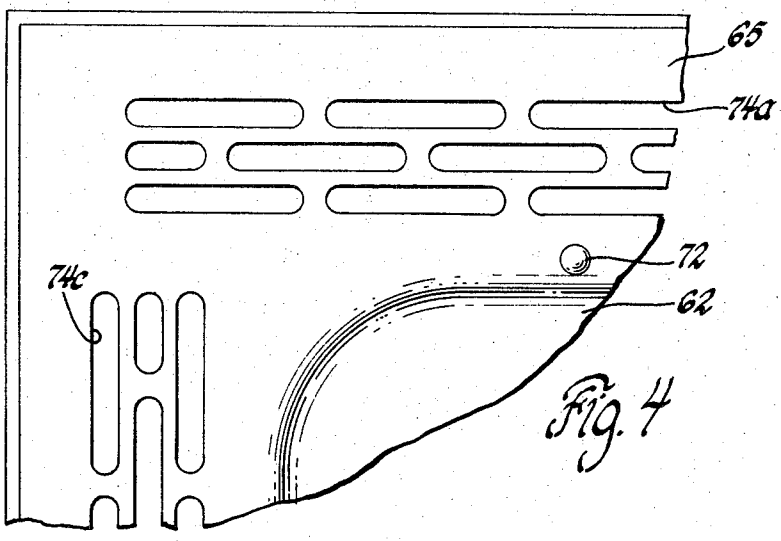


Fig. 4

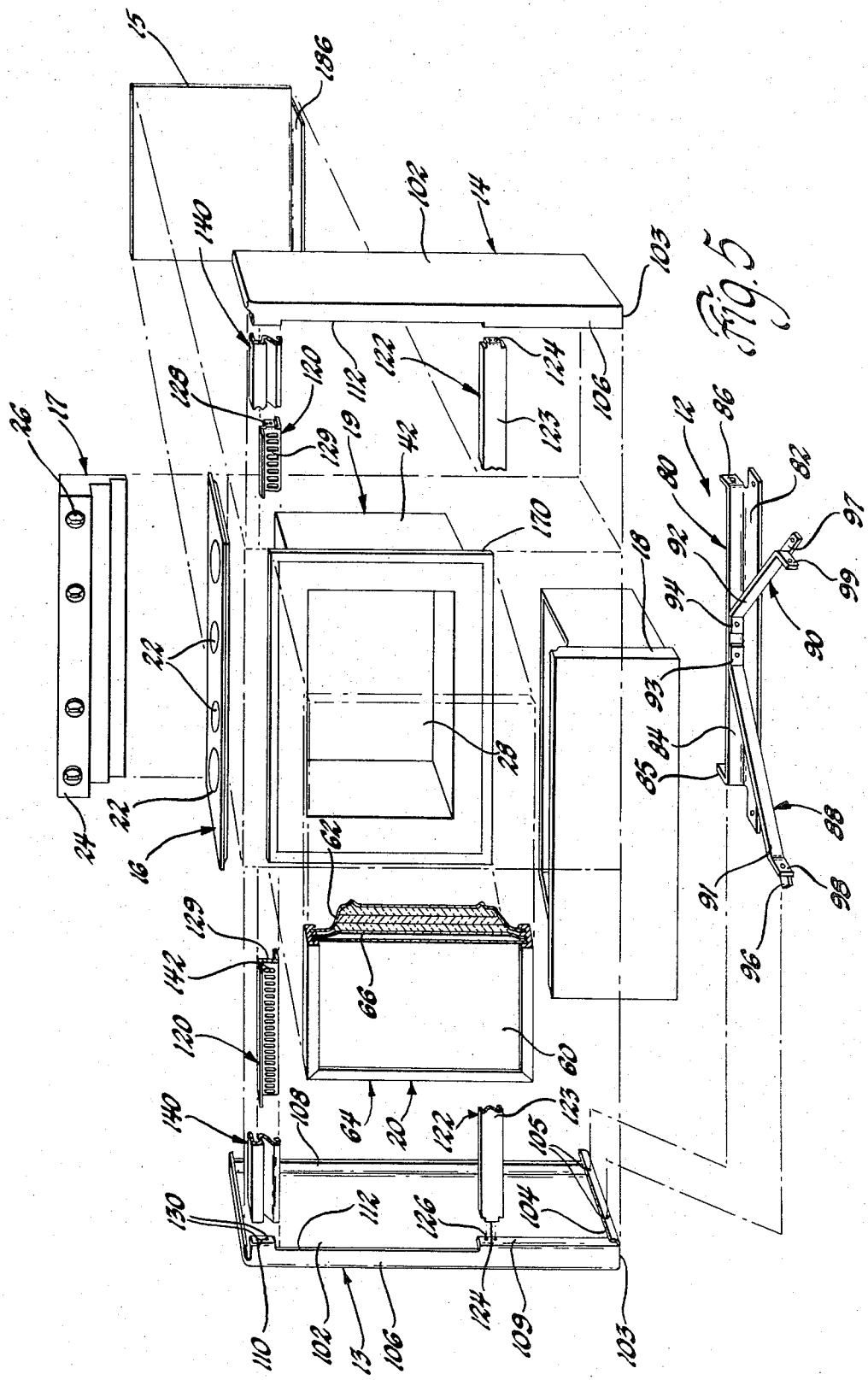

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Fig. 5

HEAT-CLEANING RANGE CONSTRUCTION

This invention relates to a domestic high temperature range construction and more particularly to an improved reduced weight free-standing domestic range incorporating a heat-cleaning oven venting system wherein low outer surface temperatures are attained without the use of an exhaust fan.

It is an object of this invention to provide a low cost construction for a free-standing reduced weight domestic range having an oven liner supported in a cantilevered manner from the front wall of the range by means of a thin sectioned stainless steel throat member positioned around the access opening of the oven chamber in which an airflow passageway in the oven door vents to the plenum space beneath the range cooktop to minimize heat loss to the outer surfaces of the range during pyrolytic cleaning of the oven.

It is another object of this invention to provide a lightweight free-standing range including a self cleaning oven allowing the weldless construction of prepainted panels for construction of the range cabinet by means of a reduced surface temperature venting structure including sealing means between the oven door and the surrounding cabinetry to direct the heated air venting from a passageway in the oven door rearwardly under the cooktop from which it can exhaust to the atmosphere whereby the exposed surfaces of the range are maintained below a predetermined temperature level without the employment of exhaust fan means.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

FIG. 1 is a fragmentary side sectional view with parts broken away to show features of the invention;

FIG. 2 is an enlarged fragmentary side sectional view of a portion of FIG. 1;

FIG. 3 is an enlarged fragmentary front sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary front view taken on the line 4—4 of FIG. 2;

FIG. 5 is an exploded isometric view showing the various range components.

Referring now to FIGS. 1 and 5 of the drawing wherein an electric range 10 is illustrated, the range components include a base member 12, side panels 13 and 14, a back panel 15, a cooktop 16, a backguard or backsplash panel 17, a bottom drawer 18, and an oven assembly 19 including an oven door 20. The range in the form shown has four surface heating elements 22 removably mounted in the cooktop of a conventional type such as disclosed in U.S. Pat. No. 3,353,004 issued to Alexander and assigned to the same assignee as the present application.

A control panel assembly generally indicated at 24 is mounted on the front face of the backsplash panel 17 and is again of a conventional type such as, for example, that disclosed in the Alexander patent. Suitable control knobs such as indicated at 26 are provided for controlling the surface elements 22. Heating elements are mounted within the oven cavity 28 defined by an oven liner 30 of a self-cleaning oven in the form of a broil heating element 32 carried by a bracket 34 to the liner top wall 35 and a bake heating element 36 at the bottom of the oven supported on the liner bottom wall 37 by a bracket member 38.

As explained in the Alexander patent, accumulated oven soil must be degraded at a temperature of 750° F. to 950° F. to effect a high temperature cleaning process consisting of partial oxidation of soil in the oven with a restricted air supply. To achieve cabinet outer surface temperatures that will not exceed 140° F. during the oven cleaning cycle, applicant has designed an oven liner vented support structure in which the oven liner 30 is cantilevered from the front wall of the range.

The oven assembly 19 includes insulation retainer means comprised of a back retainer wall 40, side retaining walls, such as 42, on each side thereof and spaced inwardly from the range side panels 13 and 14, a bottom retainer wall 44 and a top wall 46 spaced from the underside of cooktop 16 to define an air passage 47 therebetween.

The oven forming liner 30, having a finish coating of acid resistant porcelain, is positioned within the insulation retainer walls 40, 42, 44 and 46 and spaced therefrom to form a space therebetween for composite insulation pad 52 which completely envelops the oven liner 30 except for the front opening 54 thereof which is closed by the oven door 20 hingedly mounted at 58 for opening and closing the oven liner to gain access to the oven cavity 28. The composite insulation pad 52 comprises a plurality of layers 53 which in the disclosed form comprises three mats of glass wool material having a thickness of about five-eighths inches with four sheets of reflective aluminum foil sandwiched therebetween as indicated at 55 in FIG. 2 to break the heat convective paths to the outer cabinet walls into thirds.

The oven door 20 includes an outer panel 60 and an inner door plug panel 62 which carries a fiberglas seal or gasket 63 for sealing the jointure between the door plug panel and the oven liner at the front access opening 54. An insulation retainer panel 66 is disposed between the door plug panel 62 and the outer door panel 60 to retain composite insulation pad 68 therebetween and to form an airflow passageway 69. The insulation pad 68 is identical to the insulation pad 52. The oven door includes a peripheral frame member 64 provided with inner groove portions 64a, 64b for securing the respective edges of front panel 60 and forwardly off-set flange 65 of door plug panel 62 in spaced relationship to define vertical air passageway 69 therebetween. The frame member 64 has its bight or web portion 67 inner distal end provided with air openings 71 for a purpose to be described while the frame element may be formed of a suitable material such as an extruded metal. The door plug panel 62, riveted at 72 to panel 66, has an off-set peripheral flange 65 which includes a pattern of staggered elongated upper, lower and side slots 74a, 74b and 74c respectively located therein such that approximately 90 percent of the material in the defined slotted area is removed or lanced out to allow maximum air flow therethrough for communication with vertical air passageway 69.

Referring now to FIG. 5, which shows the major range components in exploded perspective view, K-shaped base support 12 comprises a transverse floor angle element 80 adapted to be mounted on the floor adjacent the bottom edge of the back panel 15. The transverse L-cross section angle 80 has its base or wide flange 82 extending forwardly from its upstanding narrow flange 84 with the upstanding narrow flange having

its end portions lanced and rearwardly bent at right angles thereto forming side panel securing tabs **85** and **86.** A pair of diagonal L-cross section angle braces are adapted to be mounted on the floor so as to be symmetrically positioned about the longitudinal centerline of the range with the diagonal angle braces **88** and **90** having their upstanding narrow flanges **91** and **92** lanced to form oblique securing tabs **93** and **94** which are secured to the transverse angle narrow flange **84** adjacent its midpoint such that the diagonal braces **88** and **90** extend forwardly and outwardly therefrom. The diagonal braces **88** and **90** have their base wide flanges **96** and **97** extending rearwardly from their respective upstanding narrow flanges **91, 92** with the outer ends thereof being lanced and forwardly bent forming front securing tabs **98** and **99** such that the tabs **98** and **99** lie in common vertical planes with the end tabs **85** and **86** of the transverse angle element **80.**

The right side panel **14** is a mirror image of left side panel **13** and common reference numerals are used to refer to corresponding parts.

As seen for the side panel **13** in FIG. **5,** its main plate section **102** is return bent at the bottom thereof to form bottom or floor flange **103** and a longitudinal return bend flange **104** generally parallel spaced relation to the main plate **102.** Spaced apertures **105** in return bend flange **104** are adapted to receive fasteners mounted on and extending outwardly from the forward and rear securing tabs **98** and **85,** respectively, of the K-shaped base support **12.** The end portion of the diagonal angles secured to the transverse floor angle **80** is undercut to allow the wide flanges **96, 97** to lie in a common horizontal plane with the wide flange **82.** The range side panels **13** are each provided with forward and rear inwardly directed vertical flanges **106** and **108** with the forward flange **106** rearwardly bent to form vertical return bend trims **109** and **110** separated by lanced out notch portion **112** dimensioned to accommodate the oven assembly **19** therein.

The side panels **13** and **14** are secured together by means of upper and lower transverse front stringer elements **120** and **122.** The lower stringer element is in the form of channel member **123** and has its vertical web **123** lanced and rearwardly bent to provide lower tabs **124** which abut the side panel vertical trims **109** so as to be mounted therebetween by means of apertures therein aligned with apertures **126** in the trim flanges **109** for receiving fasteners commonly designated at **127** in FIG. **1.** As seen in FIG. **5,** the upper Z-sectioned stringer **120** has its extremities formed with rearwardly projecting securing tabs **128** integral with its vertical web portion **129** for flush abutment with the trim flange **110** which are apertured as indicated at **130** for receiving threaded fasteners commonly designated at **131** and **132** in FIG. **1.** The Z-section stringer **120** has an inwardly directed leg **133** and outwardly directed leg **134** affixed to a coextensive generally channel-sectioned outer front cover panel **140** that has a decorative external finish such as chrome plate or the like to enclose the upper portion of the range between the cooktop **16** and the oven door **20.** The panel **140** has a retroverted top flange **141** formed by a pair of horizontally disposed reverse folds defining a transversely extending channel for receiving the forward edge of the cooktop **16.**

As seen in FIG. **3,** the web portion **129** of the Z-section stringer **120** includes a series of spaced air inlet slots **142** therein. It will be noted in FIG. **2** that the cover panel **140** is positioned in spaced relation with the upper stringer **120** to allow heated air moving upwardly within door passageway **69,** and which exits through the pattern of slotted upper air openings **74a** in the upper portion of off-set peripheral flange **65,** to communicate with plenum chamber **47.** By means of positive convection flow the air moves into upper air flow channel **152** thereof defined by the space between the upper portion of the off-set flange **65** and the outer throat flange **172** of oven throat member **170** and an elbow-like duct or baffle **153** formed by the front cover panel **140** and the leg **134** of upper stringer **120.** A second sealing means in the form of flexible wiper seal **154** made of suitable resilient material, preferably of silicone rubber, is carried in the return bend flange **155** of the panel **140** to close the gap or space between the bight portion **67** of door frame **64** and the panel **140.** In the range shown a series of slots are formed in the flange **155** for receiving a series of integral securing portions **156** which are snapped within the slots and allow the wiping seal **154** to be readily flexed in opposite directions during opening and closing of the oven door.

It will be seen in FIGS. **1** and **4** that by virtue of the staggered slotted air openings **74***a*, **74***b* and **74***c* in offset flange **65** a tortuous or indirect conduction heat flow path is presented to minimize heat transfer from the panel **62** to the outer surface of the range. In addition the slotted openings **74***b* and **74***c* in the lower and side offset flange **65** allow for room air to enter through the side and lower spaces between the oven door off-set flange **65** and the aligned portions of the cabinet outer throat flange **172** to place the oven door passageway **69** in maximum communication with the atmosphere. Thus, during an oven heat cleaning cycle, airflow in passageway **69** will rise by positive convection flow or chimney effect to maintain the outer panel **60** of the oven door at a reduced temperature below 140° F. The air heats as it rises and passes through the pattern of slots **74a** in offset flange **65** into air channel **152** and thence through air flow slots **142** either directly or via the openings **71** in bight portion **67** of the frame **64.** The seal **154** prevents the escape of the heated air over the front face of panel **140** whereby it is directed rearwardly into the horizontally extending plenum **47** under the cooktop to a point in back of the range where it can exhaust either through the various heating element openings **157, 158** or suitable venting means (not shown) in the rear wall of the range.

The oven assembly **19** is mounted between the upper and lower horizontal stringers **120** and **122** and is of a depth so as to be slidably received within the notched portions **112** of the side panel members **13** and **14.** As best seen in FIG. **2,** the oven top retainer wall **46** is provided with an upwardly directed peripheral flange **160** which is adapted to abut the vertical web section of the upper Z-section stringer **120** and is secured thereto by means of fasteners in the form of screws **162.** In a similar manner the bottom retainer wall **44** has a downwardly directed peripheral flange portion **164** secured to the lower stringer **122** by threaded fasteners (not shown).

The unitary collar or throat member **170,** having a generally double-L cross section, extends entirely around the front of the oven compartment and is formed preferably of relatively thin section stainless

steel which in the disclosed form has a thickness in the range of 0.0010 to 0.0015 inches. By forming the throat member of thin section stainless steel applicant has minimized heat transfer between the oven and the outer surface of the cabinet. As best seen in FIG. 2 the outer L portion of said throat 170 has a vertically extending outer throat flange 172 of the collar 170 which is secured to the peripheral flange 160 and the upper stringer 120 by suitable fasteners such as at 162. The inner L portion of said collar 170 having a vertically extending inner throat flange portion 174 forming an oven door jamb about the oven cavity such that the door plug panel peripheral gasket 63 is adapted to abut against the throat flange to seal the access opening of the oven compartment. It will be noted that the door structure includes a door actuator arm 175 pivotally secured to the interface of the door panel by bracket 176 while its inner end has a slot 177 for receiving suitable spring biasing means not shown. The thin stainless steel throat 170 has its inwardly directed flange 178 riveted to the upper wall 35 of the oven cavity as indicated, for example, by rivet 182 in FIG. 2.

It will be noted in FIG. 5 that the back panel 15 included an inwardly directed support flange 186 which underlies the bottom retainer wall 44 and is secured thereto by suitable fasteners 187 to support the oven assembly 19 while the oven liner 30 is supported in cantilevered fashion by throat element 170 in conjunction with the composite insulation 52 positioned between the retainer walls and the liner.

To accommodate the smoke and products of combustion from either an oven cooking operation or an oven cleaning operation a catalytic oxidizing unit 190 is positioned below liner top wall 35 to receive the exhaust from the oven chamber 28. More particularly the catalytic oxidizing unit 190 is comprised of a peripheral housing 191 having an inlet screened bottom cover 192 in communication with the chamber 28 and an outlet screened top cover 193 in communication with the atmosphere via the duct 194 extending through the liner back wall 39 and the retainer wall 40. Catalyst beads 195 such as disclosed in U.S. Pat. no. 3,553,425 issued Jan. 5, 1971 to Millard E. Fry, the disclosure of which is incorporated by reference herein, are located in the housing 191 to catalytically alter the smoke exiting from the oven. The unit 190 is in contact with upper heating element 32 which heats the catalyst beads 195 during the heat cleaning cycle.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

I claim:

1. A domestic range having a heat-cleaning oven with an oven cavity formed by a box-like oven liner and an oven door, a box-like insulation retainer inner cabinet surrounding said oven liner and spaced therefrom, insulation in the space between said oven liner and said inner cabinet surrounding said oven liner, a unitary stainless steel throat member extending around the access opening of said oven cavity having a double-L cross section, the inner L portion of said throat member having a vertically extending inner throat flange providing an oven door jamb, the outer L portion of said throat member having a vertically extending outer throat flange, an outer cabinet covering said inner cabinet and spaced therefrom including a cooktop supporting a plurality of surface heating units above aligned openings therein, the space between said cooktop and the horizontally extending top wall of said inner cabinet providing a plenum chamber, said oven door comprising a front panel, a rear door plug panel and intermediate insulation retainer panel, said door plug panel having a forwardly off-set peripheral flange, a door frame member securing the edges of said door plug panel and said front panel in spaced relation defining a vertical air passageway therebetween, first sealing means bordering said door plug panel operative to sealingly engage said inner throat flange upon closure of said oven door, said off-set peripheral flange including apertures therein bordering all four sides of said oven door vertical passage and communicating therewith, said off-set peripheral flange aligned in opposed spaced relation with said outer throat flange defining an upper convection air flow channel together with lower and side room air inlet flow spaced therebetween, a front cover panel positioned between the forward edge of said cooktop and the upper edge of said oven door frame member, second sealing means for sealing the gap between the lower edge of said front cover panel and the upper edge of said door frame member upon the closure of said oven door to prevent the exit of the heated air in said air flow channel through said gap, aperture means at the forward end of said plenum chamber providing air flow communication between said upper air flow channel and said plenum chamber, whereby room air entering said door vertical passage through said off-set flange apertures moves upwardly therein by reason of a heated air chimney effect during an oven heat-cleaning operation so as to flow into said plenum chamber, heated air exhaust openings in said range communicating with said plenum chamber such that said door front panel and said outer cabinet are maintained at reduced temperatures during the heat-cleaning operation.

2. A domestic range having a heat-cleaning oven with an oven cavity formed by a box-like oven liner and an oven door, a box-like insulation retainer inner cabinet surrounding said oven liner and spaced therefrom, insulation in the space between said oven liner and said inner cabinet surrounding said oven liner, a unitary stainless steel throat member extending around the access opening of said oven cavity having a double-L cross section, the inner L portion of said throat member having a vertically extending inner throat flange providing an oven door jamb, the outer L portion of said throat member having a vertically extending outer throat flange, an outer cabinet covering said inner cabinet and spaced therefrom including a cooktop supporting a plurality of surface heating units above vented openings therein, the space between said cooktop and the horizontally extending top wall of said inner cabinet providing a plenum chamber, said oven door comprising a front panel, a rear door plug panel and intermediate insulation retainer panel, said door plug panel havint a forwardly off-set peripheral flange substantially co-planar with said door intermediate panel, a door frame member securing the edges of said door plug panel and said front panel in spaced relation defining a vertical air passageway therebetween, gasket means bordering said door plug panel operative to sealingly engage said inner throat flange upon closure of said oven door, said off-set peripheral flange including a pattern of staggered elongated slots formed therein bordering all four sides of said oven door vertical pas-

sage and communicating therewith, said off-set peripheral flange aligned in opposed spaced relation with said outer throat flange defining an upper heated air flow channel together with lower and side air flow spaces therebetween, a front cover panel positioned between the forward edge of said cooktop and the upper edge of said oven door frame member, a flexible sealing strip on the lower edge of said front cover panel operative to sealingly engage the upper edge of said door frame member upon the closure of said oven door, a stringer member coextensive with said front cover panel the lower portion of which being secured to the upper edge of said outer throat flange, aperture means in said stringer member providing air flow communication between said upper air flow channel and said plenum chamber, whereby ambient air entering said door vertical passage through said lower and side air flow spaces and their associated off-set flange slots moves upwardly therein by reason of a heated air chimney effect into said upper air flow channel via the upper off-set flange slots and thence into said plenum chamber for exit through cooktop openings beneath said surface heating units such that said door front panel and said outer cabinet are maintained at reduced temperatures during the heat-cleaning operation.

3. A light-weight range construction comprising a free standing outer cabinet including rear and side panels and a front cover panel, a K-shaped base including a transverse floor angle support element adapted to lie on the floor adjacent the rear edge of said range outer cabinet, said transverse floor angle having its base flange extending forwardly from its upstanding flange, said upstanding flange having its end portions lanced and rearwardly bent forming rear securing tabs, said K-shaped base including a pair of diagonal floor angle support elements adapted to lie on the foor in a symmetrical fashion about the longitudinal centerline of said range, each said diagonal angle having one end secured to said transverse floor angle adjacent its midpoint, each said diagonal angle having its base flanges extending rearwardly from its upstanding flange, the free ends of each said diagonal angle upstanding flange being lanced and forwardly bent forming a front securing tab, each pair of respective front and rear tabs aligned in a common longitudinal plane for securing engagement with return bend flanges along the bottom edges of their associated side panel, the front edge of each of said side panels including vertically disposed return bend trim flanges thereon, upper and lower vertically spaced stringer members extending between said side panels having their ends secured to respective ones of said side panel trim flanges, means for supporting a heat-cleaning oven assembly between said upper and lower stringer members, said oven assembly including an oven liner enclosed in spaced relation by an inner insulation retainer cabinet, said oven support means including a double-L shaped unitary stainless steel throat member extending around the front access opening of said oven liner, said throat member having an inner L section portion and an outer L section portion, said outer L section portion having an outer throat flange extending vertically so as to overlap in a secured manner associated portions of said upper and lower stringers and said side panel front edge return bend trim flange, and said inner L-section secured to said oven liner access opening so as to support said liner in a cantilevered manner within said inner casing to minimize the conductive heat flow between said oven assembly and said range outer casing.

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