United States Patent

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[54] **ELECTRIC SMOOTH TOP RANGE**
2 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** ..... **219/460,** 126/21 A, 219/464, 219/467, 219/531, 219/544

[51] **Int. Cl.** **H05b 3/68,** H05b 3/06

[50] **Field of Search** ..... 219/464, 462–463, 460–461, 458–459, 466–467, 465, 468, 400, 453, 375, 531, 343–348, 530, 540, 552–553, 544, 522, 202, 218, 457; 126/21 A, 299

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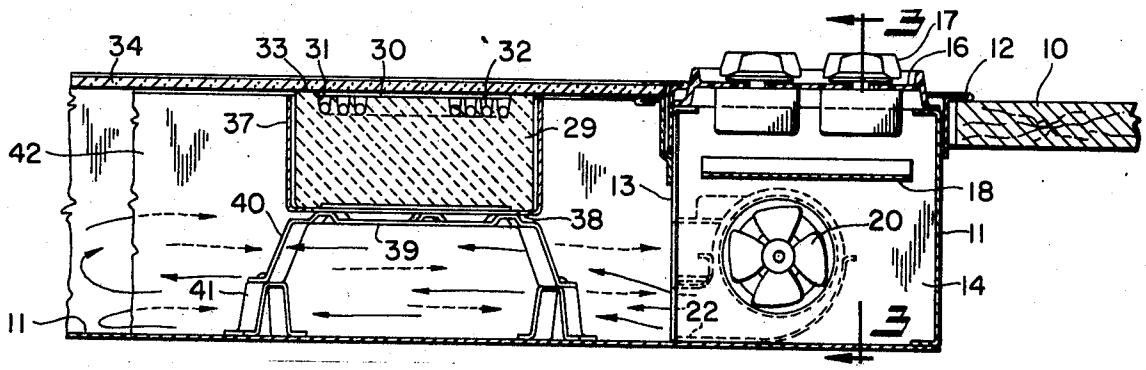
ABSTRACT: Each heating device, with several beneath a common glass-ceramic plate, includes a coiled resistance wire in a groove in an end face of a body of high-temperature insulation having a peripheral band at such end which projects above the groove area and sealingly engages the underside of the plate. The devices are in a rough-in box on elevated supports and a blower circulates ambient air over the same for cooling.



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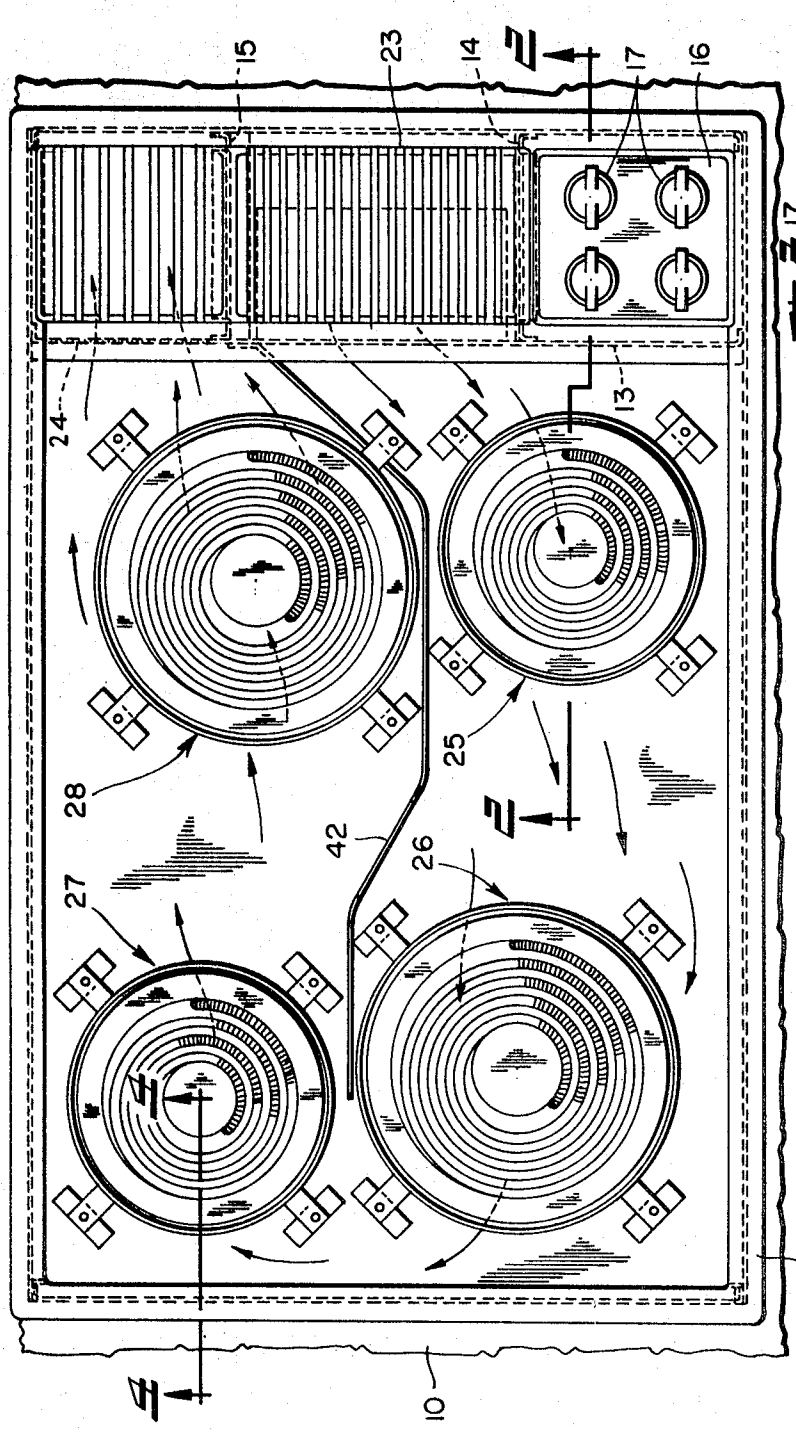

FIG. 1

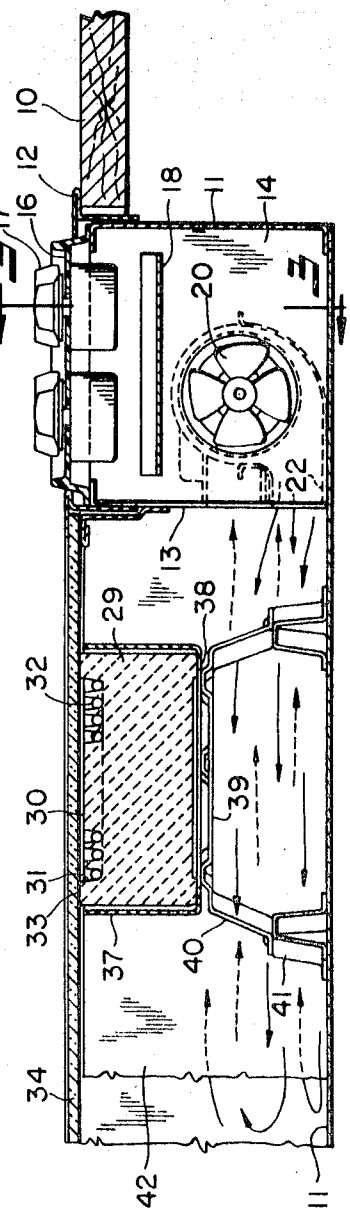

FIG. 2

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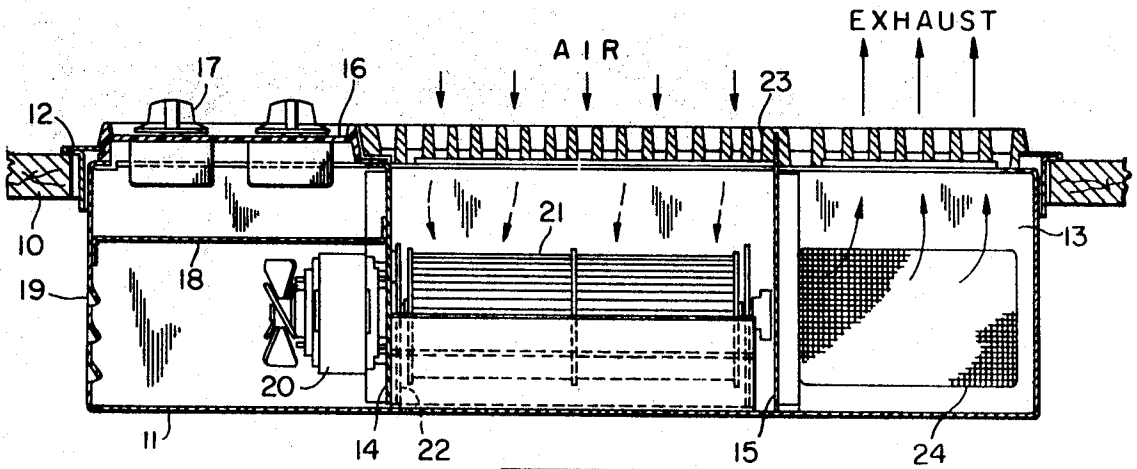

Fig. 3

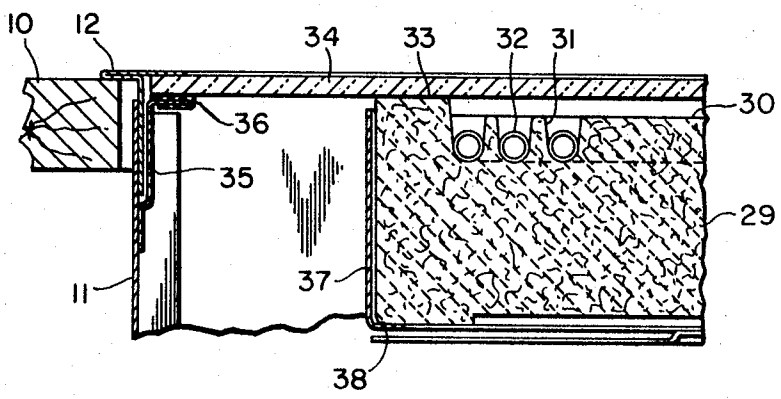

Fig. 4

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ELECTRIC SMOOTH TOP RANGE

This invention relates to an improved electric range unit of the type in which the top is made of a high-temperature glass-ceramic material to provide a smooth cooking surface.

The heating elements are designed and arranged to provide discrete localized sources of energy beneath the top plate, which readily transmits radiant energy with little diffusion laterally through the material, and the coupling of the elements to the plate has been a primary concern in developing a unit which will be both efficient in delivering the energy needed for cooking in the accustomed manner and will reliably withstand the high-temperature conditions which are needed over the expected long periods of use. For example, if a conventional sheathed element is used, in noncontacting proximity to the plate, the usual time lag in the initial heating of the element becomes an emphasized disadvantage in that the sheath must reach a temperature of useful emission of radiant thermal energy before cooking in the utensil on the plate con commence, and the delay would probably be objectionable to a housewife in most instances. A direct coupling in which the element is actually in contact with the glass is likewise limited, since in this case the element temperature must be held to the maximum safe temperature of the glass-ceramic and thus operate at a relatively reduced wattage, again with impairment of the efficiency of the heating.

It is, accordingly, a primary object of the present invention to provide an assembly of an electric heating element and glass top distinguished by an improved coupling of the two for the development of the energy at the top surface for cooking.

Another object is to provide such an assembly in which there is relatively rapid heating of the element to incandescence and concentration of the energy beneath the top surface cooking area.

It is an additional object of the invention to provide a range comprising a smooth glass-ceramic top and a plurality of such improved element assemblies in a configuration suitable for mounting in a kitchen counter or the like.

A further object is to provide such a range including a circulating air system for positive cooling of the unit and particularly the bottom of the same.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends the invention, then, comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a top plan view of a smooth top range in accordance with the present invention, with the top cooling surface removed to fully expose the electric heating elements therebeneath;

FIG. 2 is a vertical sectional view of a portion of the range at the line 2—2 in FIG. 1;

FIG. 3 is another vertical section as viewed from the plane of the line 3—3 in FIG. 2; and

FIG. 4 is a still further vertical section of another portion of the range at the plane of the line 4—4 in FIG. 1.

Referring now to the drawings in detail, the illustrated embodiment of the new range is in the form of a counter top unit or one that is suspended in an opening provided in a kitchen counter 10 or the equivalent. The range comprises a metal rough-in box 11 and, about its open top, a finish ring 12 which overlies the counter about the opening.

The interior of the box is divided unequally by a major vertical partition 13 which extends from the front wall to the rear wall of the box, and the section to the right thereof as viewed from the front is subdivided, by two further partitions 14 and 15 which extend to the adjacent box sidewall, into forward, central, and rear compartments.

The front or forward compartment at the right of the range is closed by a decorative top plate 16 in which four controls 17 are mounted, with these being basically on-off switches, and below the same there is a horizontal baffle 18. The front box wall below such baffle is provided with louvers 19 and an electric motor 20 is mounted in this space on the partition 14 to drive a transverse blower 21 which is shown spanning the central compartment. The major partition 13 is provided with an opening coincident with the discharge 22 of the blower, and a horizontally slotted cover 23 is applied over the tops of both the central and rear compartments. The partition section which forms a wall of the latter is provided with a screen 24 for airflow in a manner which will be more fully described below.

The main section of the box, to the left of the partition 13, contains four electric heating units designated generally as 25, 26, 27, and 28, arranged in front and rear pairs. The units 25 and 27 are shown as being of smaller size than the other two to provide two different wattages in each pair, and it will be understood that these units are adapted to be connected to an available energy source respectively through the controls 17 for on-off regulation in the simplest version of the range and without need to include the wiring therefor in the drawings. With the exception of such variation in size and wattage, each unit is the same in detail and comprises a cylindrical body 29 made of a high-temperature insulation material and having at its upper face a circular depressed portion 30 in which a spiral groove 31 is formed. A bare coiled resistance wire 32 is extended along the groove with its inner and outer ends, not shown, brought downwardly or through the wall of the body 29 for connection in the energization circuit, and the groove can be shaped if desired to provide a snapping in and positive retention of the element, for example, by protrusions reducing the top width at intervals along the groove length.

It is to be particularly noted, in both FIGS. 2 and 4, that the relative offsetting inwardly of the groove area of the body from the upper end of the same leaves an annular peripheral band 33 of the insulation material which is in contact with, and preferably slightly deformed against, the underside of a top glass-ceramic plate 34 applied over the cooking section of the box. A suitable spring, not shown, can be applied to exert an upward force against the insulation body to ensure sealing of the same at the band 33 to the glass top. The edges of such plate are engaged between an inner flange of the trim ring 12 and an inner ledge 35 preferably covered with a high-temperature resilient gasket or seal 36.

Each coil-insulation body assembly is contained by a metal cylindrical pan 37 open at the top and having a relatively short inturned flange 38 at the bottom. The top edge of the pan is below the upper end of the body as illustrated, so as not to interfere with the engagement of the latter and the top plate 34 or contact such plate. Each pan is supported on a base 39 which is in the form of a circular ring having angular feet 40, and these feet are fastened to upstanding loops 41 secured in registry to the bottom of the rough-in box.

The previously described blower 21 is operative to create a flow of ambient air to the cooking section of the unit, and the flow is directed in particular manner by a vertical baffle 42 which extends from partition 13 at the rear end of the blower discharge toward the opposite end wall of the box between the front and rear pairs of the heating units, but terminating approximately at the center line of the left-hand units as shown. This baffle extends from the bottom of the box substantially fully to the top glass-ceramic plate, and the airflow from the blower must proceed through the box in the manner indicated by the arrows, whereby it is first confined to traverse the forward portion of the element area and then flows reversely through the rear portion and through screen 24 for exhaust upwardly through the rear compartment and top grill or cover 23.

As a more specific example of the invention, a range of the construction shown and described has been constructed with a top plate of translucent "Hercuvit" supplied by PPG Indus-

tries, with resistance elements of 1,200 and 1,800 watts respectively. These elements were made of "Kanthal" wire supplied by the Kanthal Corporation of Bethel, Connecticut, and the element insulation formed of "Cerafelt," which is a felted and bonded refractory fibrous body supplied by Johns-Manville Corporation. The temperature of the bottom of the box does not exceed approximately 140° F., the maximum exhaust temperature will be about 125° F., and 1 liter of water will boil (150° F.) in about 10 minutes or only about 20 percent slower than what is normally obtained with exposed surface elements.

It will be appreciated that other glass-ceramics can be employed for the top plate, such as the "Pyro-Ceram" glass supplied by Corning Glass Works, and also that other high-temperature insulation might be employed. The blower, which may also vary as to specific form, should be connected to be operative whenever any element is energized, and may desirably be programmed to run, for example, by an appropriate temperature response, for an interval after deenergization to accelerate cooling.

While the temperature of the Hercuvit top cannot exceed roughly about 1,300° F., the element temperature will be as high as 2,00° F., so that the aforementioned difference between these two temperatures and the advantage of having a noncontacting relation of the two will be better appreciated. The open coil disclosed of course provides a quicker response to energization and deenergization, as compared for example to a sheathed element, and the exposure to the glass is considered significant. It has been found that a fully imbedded coil has a tendency to burn out, but with the open coil the temperature at the bottoms of the turns which are relatively enclosed usually will not be more than about 20° hotter than the tops, and this is a tolerable variation which will not adversely affect the operation of the element. While an open coil is thus used exposed and out of contact with the glass, it is obvious that the peripheral sealing of each element and the mass of the insulation away from the glass provide extremely good concentration of the energy.

I, therefore, particularly point out and distinctly claim as my invention:

1. A smooth top electric cooker comprising enclosure means having a substantially flat top of high-temperature glass, an electric heater device within the enclosure means, said device including a body of high-temperature insulating material the top of which is formed to provide a relatively recessed part and a relatively projecting continuous peripheral part enclosing such recessed part, electric resistance means supported in the recessed part of said body out of contact with the glass top for heating through the latter, mounting means for holding the body of insulation material spaced above the bottom of the enclosure means, with limited heat conductive connection thereto, and with the projecting peripheral part of the body firmly against the underside of the glass top, thereby to enclose the heating means cooperably with the glass top, and means for circulating cooling air through the enclosure means fully about the body of insulation material, said last-named means including blower means operatively connected to the enclosure means to produce the aforesaid circulation of cooling air through the same.

2. A smooth top electric cooker as set forth in claim 1, wherein at least one additional heater device with a glass top is provided of the same form and mounting as the first, and the same blower means circulates cooling air similarly over such additional device.

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