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(71) Applicant: **CANDY S.p.A.**
I-20052 Monza (Milano) (IT)

(72) Inventor: **Fumagalli, Silvano**
20052 Monza (IT)

(74) Representative: **Mittler, Enrico**
c/o Mittler & C. s.r.l.,
Viale Lombardia 20
20131 Milano (IT)

(54) Electric heating system for home oven

(57) A description is given of an electric heating system for a home oven, comprising a ceiling electric heating unit and a floor electric heating unit. The ceiling electric heating unit (4) consists of a single comb resistor (12), with wide loops, which occupies the whole cavity of the oven and has the teeth of the comb turned towards the front opening of the oven. The floor heating

unit (5) consists of an external resistor (13) which develops rectilinearly along the side walls and the front of the oven and, partially, along the rear wall of the oven itself, and of an internal resistor (14) which extends along a substantially pear-shaped path from the back of the oven up to a front area of the oven itself.

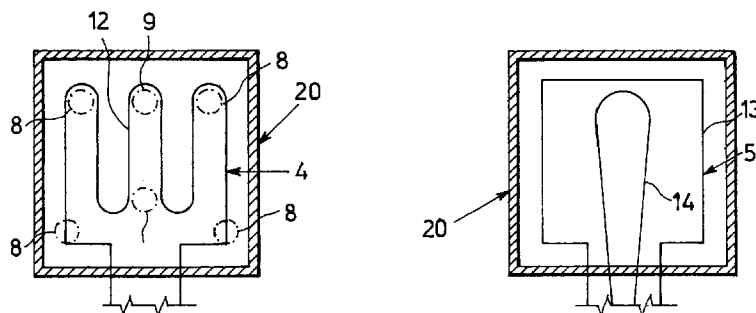


Fig. 2

Description

The present invention relates to an improved electric heating system for a home oven.

Electric ovens for home cooking have a top or ceiling electric heating unit and a bottom or floor heating unit.

Currently almost all ovens of that type use two separate resistors for ceiling heating, a more external one which develops rectilinearly along the front and the lateral walls of the oven and, partially, along the rear wall of the oven itself in order to involve the largest possible surface of the oven, and the other more internal one, defined as "grill", which has a higher specific electrical load than that of the first and develops in a comb shape with narrow loops in the centre of the cavity of the oven, with the tips of the comb turned towards the front opening of the oven.

Floor heating is however performed by a single resistor, which has substantially the shape of the external ceiling heating resistor, apart from a marked concave bending towards the inside of the oven at the centre line of the front of the oven.

In the function of cooking as a static oven, the external ceiling resistor and the floor resistor are operated, while in the function as grill only the internal ceiling resistor is operated. In certain cases a so-called "double-grill" function can be provided, and in this case both the ceiling resistors are operated simultaneously.

This known solution has the disadvantage of causing strong irradiation of the external ceiling resistor towards the oven door, in the area where the door opening handle is provided.

It also requires difficult machining processes of bending the resistor elements for the internal ceiling resistor and the single floor resistor.

Finally it involves difficulties for the proper working of the temperature sensors (test samples) obligatorily provided inside the oven cavity, near its ceiling, partly near the side walls of the oven and partly more to the centre of the cavity of the oven itself. In the grill function, which only involves the internal resistor of the ceiling unit, the more external sensors can in fact still detect a relatively low temperature, which therefore does not require reductions in electricity supply, whereas the more internal ones are now already burnt.

The object of the present invention is that of providing an electric heating system for home ovens which is improved in three ways: the reduced irradiation towards the oven door (in particular in the area of the handle), the simplicity of machining of the resistor elements and the proper operation during cooking, standardising the temperatures inside the oven.

In accordance with the invention this object is achieved with an electric heating system comprising a ceiling electric heating unit and a floor electric heating unit, characterised in that the ceiling electric heating unit consists of a single comb resistor with wide loops which occupies the entire cavity of the oven and has the

teeth of the comb turned towards the front opening of the oven, while the floor heating unit consists of an external resistor which develops rectilinearly along the side walls and the front of the oven and, partially, along the rear wall of the oven itself, and of an internal resistor which extends along a substantially pear-shaped path from the back of the oven to a front area of the oven itself.

The electric heating system according to the invention provides for operation of all three resistors for the static oven function, while for the function as grill only the ceiling resistor is operated. For the possible double grill function finally the ceiling resistor and the internal floor resistor are operated.

In this way the less contorted shape of the various resistor elements (characterised by wide radii of curvature) is suitable for a simpler and more economical machining of the same, while the irradiation of the upper unit towards the door is considerably reduced as a result of elimination of the external ceiling resistor. The increased irradiation of the lower unit towards the door on the other hand has less effect as it is aimed towards the door attachment hinge area. Moreover all the temperature test samples are involved in the same way by the single resistor of the ceiling unit and therefore both the external and internal ones supply homogeneous values.

In relation to the known art, according to which (as described previously) in the static oven function the ceiling heating is performed by an external resistor with a rectilinear development along the side walls and the front of the oven, the heating system according to the present invention provides for the ceiling heating to be performed, both in the static oven and grill functions, by the single ceiling comb resistor with wide loops which occupies the entire cavity of the oven. This ensures that also in the static oven function the distribution of the temperature is more even: the area of greater heat irradiation by the ceiling resistor is not (as in the case of the known art) along the periphery of the cavity of the oven. This allows the use of a ceiling resistor of lower power compared to present ceiling resistors, and reduces the temperature outside the oven.

The features and advantages of the present invention will be made clearer by referring to the accompanying drawings, in which:

Figure 1 shows schematically, on the left and right respectively, the ceiling part and the floor part of an electric oven with a heating system according to the known art;

Figure 2 shows schematically, on the left and right respectively, the ceiling part and the floor part of an electric oven with a heating system according to the invention.

In accordance with the teachings of the known art (Figure 1) an electric oven 20, schematically represented by a rear wall 1, two side walls 2 and a front

opening closed by a door 3 which can be angled on lower hinges with a horizontal axis, is provided with an electric heating system formed by a ceiling unit 4 and by a floor heating unit 5.

The ceiling unit 4 comprises two separate electric resistors, a more external one 6 which develops rectilinearly along the side walls and the front of the oven and, partially, along the rear wall of the oven itself, and the other more internal one 7, defined as "grill", which has a higher specific electrical load (1500 W) than that of the first (800 W) and develops in a comb shape with narrow loops in the centre of the cavity of the oven with the tips of the comb turned towards the front opening of the oven. Temperature sensors are shown in dots and dashes and denoted by reference numerals 8 (the more external ones) and 9 (the more internal ones).

The floor unit 5 however comprises a single electric resistor 10 (typically 1300 W), which has substantially the shape of the external ceiling heating resistor except for a marked concave bending 11 towards the interior of the oven at the centre line of the front of the oven.

In the static oven cooking function the external ceiling resistor 6 and the floor resistor 10 are operated, whereas in the grill function only the internal ceiling resistor 7 is operated, which clearly affects the external sensors 8 differently compared to the internal ones 9. In the "double grill" function finally both the ceiling resistors 6 and 7 are operated.

According to the teachings of the present invention (Figure 2) the same electric oven has however a ceiling heating unit 4 formed by a single electric resistor 12 in the shape of a comb with wide loops, which occupies the entire cavity of the oven and has the teeth of the comb turned towards the front opening of the oven. The reference numerals 8 and 9 denote again the external and internal temperature sensors, all within the range of influence of the resistor 12.

The floor heating unit 5 consists in turn of an external resistor 13 which develops rectilinearly along the side walls and the front of the oven and, partially, along the rear wall of the oven itself, and of an internal resistor 14 which extends along a substantially pear-shaped path from the back of the oven to a front area, further back however in relation to the front part of the external resistor 13, of the oven itself.

In the static oven function all the resistors 12, 13 and 14 are operated, which as a whole absorb typically 2100 W at 230 V, while in the grill function only the ceiling resistor 12 is operated, which typically absorbs 1860 W at 230 V, and whose heating affects similarly both the external sensors 8 and the internal ones 9.

A further operating mode, midway between the static oven operating mode and the grill operating mode, provides for operation both of the ceiling resistor 12 and of the internal floor resistor 14, exploiting the contribution made by the internal floor resistor 14 in order to lower the power absorbed by the ceiling resistor 12: for example the internal floor resistor 14 can absorb 375 W and the ceiling resistor 1250 W. This mode

allows even cooking of products of considerable thickness.

The operating mode which in traditional ovens is referred to as "double grill" can also be implemented by operating both the ceiling resistor 12 and the internal floor resistor 14.

Thanks to its special configuration, the single ceiling resistor 12 ensures, in the static oven function, a more even distribution of the temperature inside the oven than the external ceiling resistor 6 in Figure 1, which irradiates along the periphery of the oven more than the cooking area.

Moreover, since the ceiling resistor 12 is characterised by wide radii of curvature, it is simpler to machine and hence of lower cost compared to the internal ceiling resistor 7 of Figure 1. The wide radii of curvature of the resistor 12 also reduce the internal tensions of the resistor itself, and this evens out the electrical load in the resistor itself, to the full advantage of its lifespan.

It should be underlined that the heating system described may advantageously be used in self-ventilated ovens; the more even distribution of temperature inside the oven guaranteed by the heating system according to the present invention will improve the effect of the ventilation, or may even reduce the use of the latter.

Claims

1. Electric heating system for home oven, comprising a ceiling electric heating unit and a floor electric heating unit, characterised in that the ceiling electric heating unit (4) consists of a single comb resistor (12) with wide loops which occupies the entire cavity of the oven and has the teeth of the comb turned towards the front opening of the oven, while the floor heating unit (5) consists of an external resistor (13) which develops rectilinearly along the side walls and the front of the oven and, partially, along the rear wall of the oven itself, and an internal resistor (14) which extends along a substantially pear-shaped path from the back of the oven as far as a front area of the oven itself.
2. Electric heating system according to claim 1, characterised in that it provides a first operating mode wherein said comb resistor (12), said external resistor (13) and said internal resistor (14) are simultaneously operated, and a second operating mode wherein only the comb resistor (12) is operated.
3. Electric heating system according to claim 2, characterised in that it provides a third operating mode wherein the comb resistor (12) and the internal resistor are simultaneously operated, the comb resistor (12) absorbing less electrical power compared to the electrical power absorbed in the second operating mode.

4. Heating system according to claim 1, characterised in that said oven is of the self-ventilated type.

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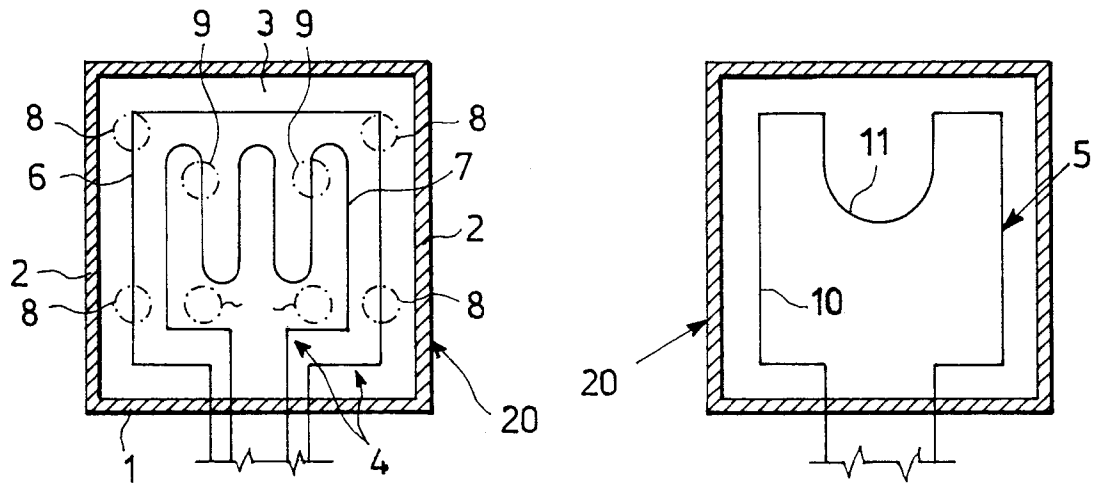


Fig. 1

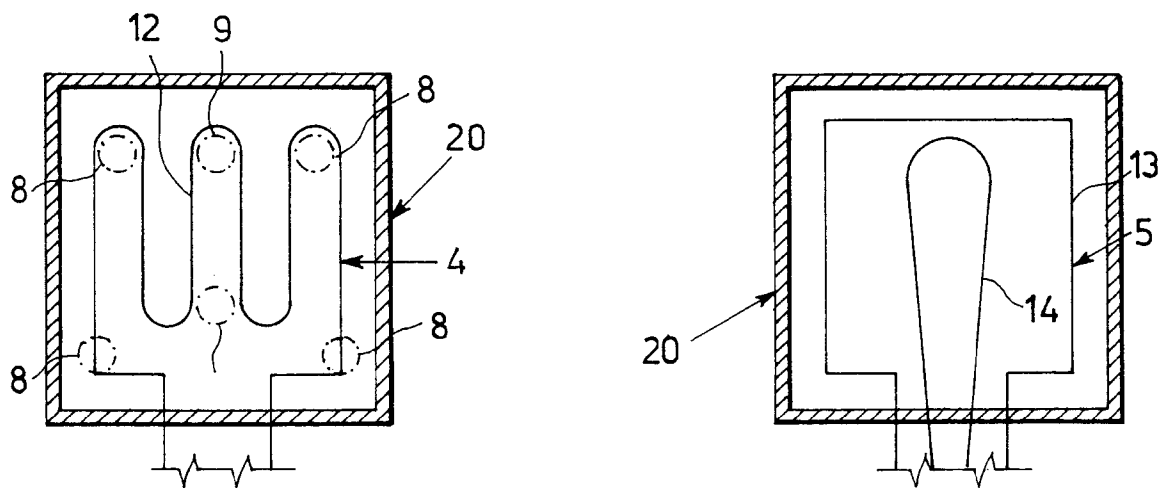


Fig. 2