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(71) Applicant: **Effeuno S.r.l.**
35010 Limena (PD) (IT)

(72) Inventor: **TOGNARA, Andrea**
35010 Vigodarzere (PD) (IT)

(74) Representative: **Gallo, Luca et al**
Gallo & Partners S.r.l.
Via Rezzonico, 6
35131 Padova (IT)

(54) **OVEN FOR COOKING FOODS**

(57) Oven for cooking foods, which comprises a support structure (2) internally delimiting a cooking chamber (3), and a cooking surface (4), placed within the cooking chamber (3).

In addition, the oven comprises heating means (5), mechanically connected to the support structure (2) and placed to heat at least the cooking surface (4).

The oven also comprises a measurement instrument (6), placed outside the cooking chamber (3) and manually actuatable by a user in order to detect at least one first surface temperature value (Ts) of the cooking surface (4).

In addition, the oven is provided with a logic control unit (7), mechanically connected to the support structure (2) and comprising a first comparison module (CI) configured for comparing at least the first surface temperature value (Ts) with a threshold surface temperature value (Tss), and at least one user interface (8), configured for receiving a comparison signal from the first comparison module (CI) and emitting a warning signal based on the comparison signal.

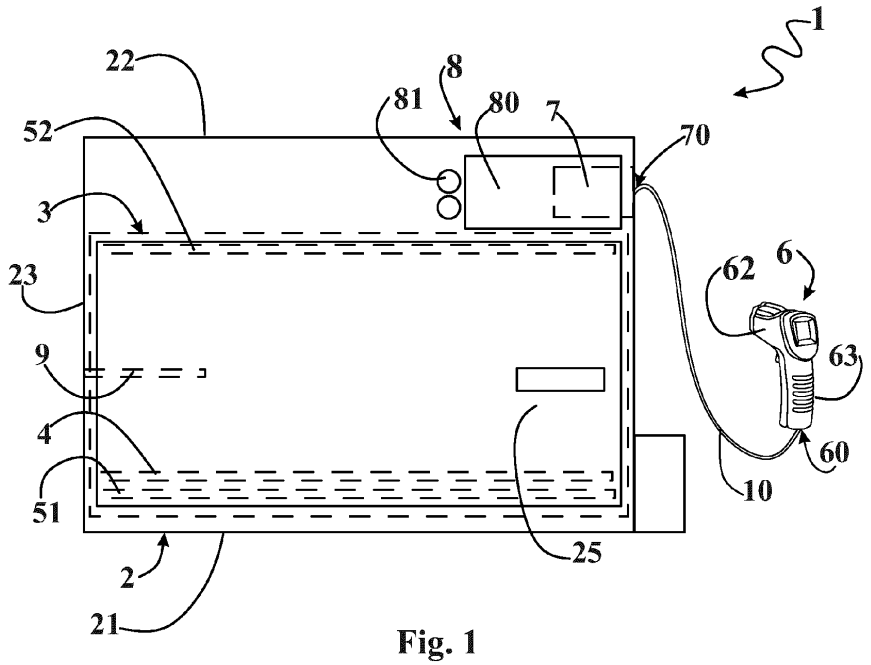

Fig. 1

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Description

Field of application

[0001] The present invention regards an oven for cooking foods according to the preamble of the independent claim 1.

[0002] The present oven is advantageously employable for cooking foods at its interior, preferably baked and is intended to be employed in a professional setting, for example in the bakery field, gastronomy field, pastry field and in the restaurant field in general.

[0003] Therefore, the present invention is inserted in the industrial field of production of apparatuses for cooking foods, in particular ovens, both of professional and home type.

State of the art

[0004] Known on the market are ovens for cooking foods provided with a support structure defining, at its interior, a cooking chamber. Such ovens comprise at least one cooking surface, made of steel or alternatively of refractory material and placed in proximity to a base wall of the support structure, and one or more electrical heating elements placed within the cooking chamber, usually on the upper wall and on the base wall delimiting the cooking chamber, in order to allow the cooking of the foods placed at the interior.

[0005] In addition, the aforesaid ovens comprise an ambient temperature sensor, usually a thermocouple, placed within the cooking chamber and arranged for measuring the temperature inside the oven, also known as chamber temperature.

[0006] More in detail, the ovens of known type, in an entirely conventional manner, allow the user to select a specific cooking program, which corresponds with a specific power of the electrical heating elements, and such ovens comprise a selector of the internal temperature of the chamber, by means of which the user can set the objective temperature that the cooking chamber must reach before putting the food in the oven.

[0007] The conventional ovens also comprise at least one signaling LED, operatively connected to the temperature sensor and arranged for communicating - for example by means of the turning off or turning on thereof - to the user when the cooking chamber reaches the temperature set by the user or the temperature corresponding to the preset program.

[0008] The ovens for cooking foods of known type have in practice shown that they do not lack drawbacks.

[0009] A first drawback of the ovens of known type is given by the fact that they do not allow obtaining a cooking of the foods that is always optimal and reproducible, in particular during multiple continuous cooking cycles.

[0010] Indeed, such ovens provide the user with a visual feedback, given by the signaling LED, indicative of the temperature inside the cooking chamber, which however is not a sufficient condition for attaining an optimal cooking that is reproducible over time.

[0011] It can in fact happen, in particular in the event in which the cooking surface is made of refractory material and hence provided with a high thermal inertia, that the internal temperature of the cooking chamber is very different from the temperature of the cooking surface, for example in the first starting steps of the oven (with the cooking surface that is situated at a temperature much lower than the temperature of the chamber).

[0012] In addition, a further drawback lies in the fact that such ovens do not allow an optimal cooking if it is necessary to cook products that require temperatures that are very different from each other. For example, in the event in which following the cooking of a first food for which high temperatures within the chamber are required, it is necessary to change cooking program in order to cook a second food at low temperatures, the user will tend to put the aforesaid second food in the oven as soon as he/she receives the visual feedback that the objective chamber temperature has been reached, without considering if also the cooking surface has reached or not reached such objective temperature.

[0013] In such situation, the cooking quality of the various foods to be baked and the reproducibility thereof will depend on the experience of the user and his/her capability in understanding the actual situation of the cooking chamber and the cooking surface before cooking the foods. Therefore, a further drawback lies in the fact that the ovens of known type have proven poorly adapted for home use, in which therefore the experience and the ability of the average user is certainly lower and not sufficient for reaching a high quality of cooking and a good reproducibility over time.

[0014] Also known from the document US 2021/404745 is an oven provided with a thermocouple embedded in the cooking surface in order to detect the internal temperature of the latter.

[0015] Also known from the document US 2017/332841 is grill for cooking foods which comprises a thermal camera, grippable and manually actuatable by a user, which is configured in order to detect the temperature of the foods placed on the grill and automatically recognize the shape of such foods such to be able to recognize which are the different foods that have been placed on the grill.

Presentation of the invention

[0016] In this situation, the problem underlying the present invention is therefore that of eliminating the problems of the prior art mentioned above, by providing an oven for cooking foods which allows obtaining an optimal cooking for the different foods to be cooked.

[0017] A further object of the present invention is that of providing an oven for cooking foods which allows obtaining a cooking which can be reproduced over time with precision.

[0018] A further object of the present invention is that of providing an oven for cooking foods which is simple to use.

[0019] A further object of the present invention is that of providing an oven for cooking foods which is adapted for the aforesaid objects even in a home environment for users without professional experience.

[0020] A further object of the present invention is that of providing an oven for cooking foods which allows guiding the user during the different cooking operations.

[0021] A further object of the present invention is that of providing an oven for cooking foods which are capable of operating in a highly automated manner.

Brief description of the drawings

[0022] The technical characteristics of the invention, according to the aforesaid objects, can be clearly found in the contents of the below-reported claims and the advantages thereof are more evident in the following detailed description, made with reference to the enclosed drawings, which represent a merely exemplifying and non-limiting embodiment of the invention, in which:

- figure 1 shows a front schematic view of the oven for cooking foods, object of the present invention;
- figure 2 shows a schematic view of a logic control unit of the oven for cooking foods of figure 1.

Detailed description of a preferred embodiment

[0023] With reference to the enclosed figures, reference number 1 overall indicates an oven for cooking foods according to the present invention.

[0024] The present oven is advantageously employable both in the home environment and in professional settings, e.g. in restaurants, pizzerias, bakeries or in other business enterprises that require the use of an oven for cooking foods.

[0025] In a non-limiting manner, moreover, the oven, object of the invention is particularly advantageous if employed for cooking baked products, such as for example pizza and focaccia, though it can also be used for cooking different food products.

[0026] The present oven 1 comprises a support structure 2, preferably made of metal, which internally delimits a cooking chamber 3.

[0027] More in detail, the support structure 2 is provided in a per se known manner with at least one lower wall 21, with an opposite upper wall 22, and a perimeter wall 23, which is extended projectingly from the aforesaid lower wall 21 up to the upper wall 22 and at least partially encloses, together with the lower and upper walls 21, 22, the cooking chamber 3.

[0028] Advantageously, the support structure 2 comprises an access opening to the cooking chamber 3, preferably made on the perimeter wall 23, which allows the insertion and the extraction of the foods from the cooking chamber 3 and the oven 1 advantageously also comprises a door 25, which is hinged to the support structure 2 and is movable for selectively opening and closing the aforesaid access opening.

[0029] The oven 1 also comprises at least one cooking surface 4, placed within the cooking chamber 3 and on which one or more foods is susceptible of being set.

[0030] In particular, the cooking surface 4 is placed preferably suspended within the cooking chamber 3, in particular connected to the perimeter wall 23 of the support structure 2.

[0031] Advantageously, the cooking surface 4 is made of a refractory material, e.g. clay or cordierite bisque, in order to allow the attainment of high temperatures, ensuring a cooking flexibility for a vast range of foods.

[0032] The oven 1 also comprises heating means 5, placed at least partially within the cooking chamber 3 in order to heat at least the cooking surface 4 and preferably also the air present in the cooking chamber 3.

[0033] Advantageously the heating means 5 comprise a first electrical heating element 51, which is mounted on the support structure 2, in particular on the upper wall 22, and at least one second electrical heating element 52, which is mounted on the support structure 2, in particular on the lower wall 21.

[0034] In accordance with the idea underlying the present invention, the oven 1 comprises a temperature measurement instrument 6, in particular provided with a first temperature sensor, and such temperature measurement instrument 6 is placed outside the cooking chamber 3, manually actuatable by a user in order to detect at least one first surface temperature value Ts of the cooking surface 4.

[0035] The oven 1 also comprises at least one user interface 8, configured for receiving the comparison signal from the first comparison module C1 and emitting a warning signal based on the aforesaid comparison signal.

[0036] In accordance with the preferred embodiment the first temperature sensor of the temperature measurement instrument 6 is a remote temperature sensor, i.e. adapted to measure the temperature without direct contact between itself and the cooking surface 4. For example, the first temperature sensor of the measurement instrument 6 is selected between an infrared pyrometer, a laser pyrometer, an optical pyrometer, or a multi-technology instrument. Of course, without departing from the protective scope of the present invention, the first temperature sensor can be a sensor of infrared type or a thermal camera.

[0037] In this manner, it is sufficient for the user to direct the measurement instrument 6 towards the cooking surface 4 in order to carry out a measurement of the surface temperature Ts of the latter, without having to come into contact with the cooking surface 4 itself.

[0038] Advantageously, the temperature sensor is capable of detecting the temperature within an interval preferably comprised between -50°C and 1030°C, and op-

erates in a spectrum range comprised between 8 and 14 μm.

[0039] Advantageously in addition, the temperature sensor is provided with an average accuracy of 1.0 °C.

[0040] More in detail, according to the preferred embodiment of the present invention, the temperature sensor employed is the sensor CSmicro LT/LTH sold by Optris®.

[0041] In this manner, the user can actuate the measurement instrument 6 even without having to open the door 25, allowing the limitation of the thermal exchange between the cooking chamber 3 and the external environment, thus reducing the energy consumption of the oven 1.

[0042] Advantageously, the first (remote) temperature sensor is sensitive to electromagnetic radiations, in particular in the visible spectrum and/or infrared spectrum, susceptible of being emitted by the cooking surface 4, in particular when the heating means 5 of the oven are turned on.

[0043] Preferably, the support structure 2 of the oven comprises at least one reading window, which faces the cooking chamber 3 and is made of a material transparent to the electromagnetic radiations (in particular of the visible spectrum and/or infrared spectrum) to which the first temperature sensor of the measurement instrument 6 is sensitive. In particular, the aforesaid reading window comprises at least one sheet of the aforesaid transparent material which is capable of being traversed by the aforesaid electromagnetic radiations coming from the interior of the cooking chamber 3.

[0044] Advantageously, the reading window is placed in a manner such to be traversed by the electromagnetic radiations susceptible of being emitted by the cooking surface 4 and, in particular, it is at least partially directed towards the latter.

[0045] For example, the reading window can be made on the door 25, and in particular it can constitute the inspection glass of the latter, or the reading window can be made on another part of the support structure 2 of the oven 1, for example on a perimeter wall 23 thereof or on the upper wall 22 thereof.

[0046] For example, in a non-limiting manner, the reading window can be made of a borosilicate glass, in particular tempered, and/or optionally in double glazing form.

[0047] More in detail, the measurement instrument 6 is configured in a manner such that the first temperature sensor defines a measurement cone, which is extended along a corresponding pointing axis X, which in turn defines the direction along which the latter is pointed. Advantageously, the pointing axis X is placed to traverse the reading window and intercepts the surface of the cooking surface, in order to detect the surface temperature value Ts of the cooking surface 4.

[0048] Advantageously, the measurement instrument 6 is a movable instrument, which in particular can be moved freely by a user both during the step of measuring the temperature, for example in order to be able to point with greater precision the surface of the cooking surface 4, both at the end of the aforesaid measurement step, in order to be able to put the measurement instrument 6 back in a safe position that is spaced from the support structure 2, in order to avoid obstructing the access to the cooking chamber 3 for the user in the subsequent steps of insertion and extraction of the food product.

[0049] Advantageously, the measurement instrument 6 is susceptible of being manually positioned in order to point the first temperature sensor towards the cooking surface 4 such to be able to measure the surface temperature of the latter and be able to obtain, as better illustrated hereinbelow, information for a correct insertion timing of the food product.

[0050] In particular, the measurement instrument 6 can be positioned, in a manual manner, such that its first temperature sensor is directed towards the reading window so as to intercept the electromagnetic radiations which are emitted by the cooking surface 4 that traverse the reading window itself.

[0051] In accordance with the preferred embodiment, the measurement instrument 6 advantageously comprises a support body 62, preferably provided with a main portion, within which the aforesaid first temperature sensor is placed, and a grip portion 63, grippable by a user in order to direct the measurement instrument towards the cooking surface 4. In particular, the measurement instrument 6 comprises at least one manual actuator, preferably placed on the grip portion and operatively connected to the first temperature sensor.

[0052] More in detail, the manual actuator is manually actuatable by a user in order to actuate the first temperature sensor of the measurement instrument 6 to carry out at least one first temperature measurement, and in particular with the measurement instrument pointed on the cooking surface 4 in order to carry out a first measurement of a first surface temperature value Ts of the aforesaid cooking surface 4.

[0053] The oven 1 also comprises a logic control unit 7, mechanically connected to the support structure 2 and comprising at least one first comparison module C1 configured for comparing at least the first surface temperature value Ts with a threshold surface temperature value Tss and sending a corresponding comparison signal based on the aforesaid comparison.

[0054] More in detail, the measurement instrument 6 is configured for sending a first measurement signal, indicative of the detected first surface temperature value Ts and the logic control unit 7 is advantageously provided with a reception module, configured for receiving the aforesaid measurement signal and operatively connected to the first comparison module C1. Advantageously, in accordance with a first programmed logic in which the heating means 5 operate for heating the cooking surface 4 of the oven 1, the user interface 8 emits the aforesaid warning signal when the first surface temperature Ts is preferably equal to or greater than 90% of the value of the threshold surface temperature Tss.

[0055] Otherwise, in accordance with a second programmed logic in which the heating means 5 are turned off or operate at a reduced power in order to allow reducing the surface temperature of the cooking surface 4 of the oven 1, the user interface 8 emits the aforesaid warning signal when the first surface temperature Ts is preferably equal to or lower than 110% of the value of the threshold surface temperature Tss.

[0056] In this manner, it is therefore possible to employ the measurement instrument both in order to decide when to put a product in the oven during the step of heating the oven 1 (e.g. during a first turning on) and during the step of "cooling" the oven (e.g. following a change of the objective temperature at which one bakes), allowing a quick and precise reading of the surface temperature Ts of the cooking surface 4 in every situation.

[0057] Advantageously, the user interface 8 comprises an actuation module, operatively connected to the first comparison module C1, and a light source, electrically connected to the actuation module and arranged for being controlled based on the aforesaid comparison signal. For example, in a non-limiting manner, the light source is preferably turned on the comparison signal meets the requirement set by the corresponding comparison logic, in order to warn the user that the detected surface temperature Ts meets the aforesaid requirement and that therefore the user can proceed to bake the desired food.

[0058] Of course it is also possible that the user interface 8 comprises an acoustic emitter, as an alternative to or in combination with the light source aforesaid, electrically connected to the actuation module and arranged for being controlled based on the aforesaid comparison signal. For example, in a non-limiting manner, the acoustic emitter is preferably actuated when the comparison signal meets the requirement set by the corresponding comparison logic, in order to warn the user that the detected surface temperature Ts meets the aforesaid requirement and that therefore the user can proceed to bake the desired food.

[0059] Advantageously, the logic control unit 7 comprises a memory unit M, containing at least two stored cooking programs, each of which associated with a corresponding threshold surface temperature Tss, and the user interface 8 is actuatable by a user in order to set, by the memory unit M, one of the cooking programs.

[0060] Preferably, the user interface 8 comprises a control panel 80, which can be of physical type or alternatively of touch screen type, mechanically associated with the support structure 2, in particular on the perimeter wall in proximity to the door 25. The aforesaid control panel 80 is preferably a screen, intended to signal to a user that the cooking program is correctly set. In addition, the user interface 8 advantageously comprises at least one first button 81, which if pressed sends a drive signal to the logic control unit 7 in order to actuate a new cooking program. Of course, the button 81 can be integrated in the control panel 80 if the latter is a touchscreen. The first comparison module C1 is advantageously configured for comparing at least the first surface temperature value Ts with the threshold surface temperature Tss corresponding to the set cooking program and sending a corresponding comparison signal to the user interface 8. Advantageously, the logic control unit 7 is operatively connected to the heating means 5 and is configured for driving the heating means 5 on the basis at least of the comparison signal.

[0061] In such a manner, it is therefore possible to limit from the start the power of the heating means 5 if the surface temperature of the cooking surface 4 is already at the desired value, preventing the baked products from being burnt.

[0062] Preferably, the electrical heating elements 51, 52 of the heating means 5 are composed of multiple sectors actuatable independently from each other and the control unit 7 comprises a power regulation module, electrically connected to the aforesaid sectors, and arranged for selectively actuating the latter based on the selected program and based on the programmed logic. For example, during heating the power regulation module will activate all the sectors of the electrical heating elements 51, 52, and during turn-off or temperature reduction it can deactivate all or some of the aforesaid sectors.

[0063] Preferably the regulation module has control of PID type, whose operating logic is well known to the man skilled in the art and hence will not be described hereinbelow.

[0064] Advantageously, the regulation module is capable of repeatedly modifying the power of the electrical heating elements 51, 52 each time a user executes a new measurement of the temperature.

[0065] Advantageously, as an alternative to that described above, the regulation module can repeatedly modify the power of the aforesaid electrical heating elements 51, 52 based on a series of automated temperature measurements by a measurement instrument 6 pointed towards the cooking surface 4 outside the door 25 of the oven 1.

[0066] In particular, the logic control unit 7 will receive a second surface temperature value Ts and the first comparison module C1 will send a new signal to the regulation module, and a new comparison signal to the user interface 8 based on the comparison between the second surface temperature measurement Ts and the threshold surface temperature Tss associated with the current program.

[0067] Preferably, the regulation module is in data communication with the user interface 8, in order to provide a time estimate based on the calculation of the PID controller, and the comparison signal of the comparison module C1 contains the surface temperature value Ts measured by the measurement instrument 6 and the threshold surface temperature value Tss.

[0068] Preferably in addition, the regulation module is capable of regulating the power of the electrical heating elements 51, 52 by means of the PID controller in a manner such to heat the cooking surface 4 in a pre-estab-

lished time set by a user by means of the user interface.

[0069] Advantageously, the oven 1 comprises a second temperature sensor 9, fixed to the support structure 2 and placed within the cooking chamber 3, which is configured in order to detect at least one first ambient temperature value Ta of the cooking chamber 3 and sending, to the logic control unit 7, the detected first ambient temperature value Ta.

[0070] Advantageously, the logic control unit 7 comprises a second comparison module C2, configured for comparing at least the first ambient temperature value Ta detected by the second temperature sensor 9 with a value of threshold ambient temperature Tas and configured for sending a corresponding confirmation signal.

[0071] Advantageously moreover the user interface 8 is configured for receiving the confirmation signal and emitting the warning signal based on the comparison signal and on the confirmation signal.

[0072] For example, in a non-limiting manner, the second temperature sensor 9 is a Pt100 probe, which is arranged for sending a measured ambient temperature value Ta, at regular intervals, to the logic control unit 7. Preferably the second temperature sensor 9 is configured for carrying out and sending an ambient temperature measurement Ta per second, in a manner such to emit the warning signal in a reliable manner.

[0073] More in detail, in accordance with the first programmed logic described above, the user interface 8 emits the aforesaid confirmation signal when the first ambient temperature value Ta is preferably equal to or greater than 90% of the value of the threshold ambient temperature Tas. Otherwise, in accordance with the second programmed logic, the user interface 8 emits the aforesaid confirmation signal when the first ambient temperature value Ta is preferably equal to or lower than 110% of the value of the threshold surface temperature Tas.

[0074] Advantageously, the actuation module of the user interface 8 is operatively connected to the second comparison module C2, and is arranged for being controlled based on the comparison signal and on the confirmation signal. For example, still in a non-limiting manner, the light source of the actuation module is preferably turned on when both the comparison signal and the confirmation signal meet the requirement set by the corresponding comparison logic, in order to warn the user that the detected surface temperature Ts and the ambient temperature Ta are within the desired range, and that therefore the user can proceed to bake the food.

[0075] Advantageously, each of the cooking programs is associated with at least one corresponding threshold ambient temperature Tas, and the second comparison module C2 is configured for comparing the first ambient temperature signal Ta with the threshold ambient temperature Tas corresponding to the set cooking program and sending a corresponding confirmation signal to the user interface 8.

[0076] Advantageously, the regulation module of the logic control unit 7 receives the signal of the first ambient temperature value Ta and calculates, by means of the PID controller, a division of power to be provided respectively to the first electrical heating element 51 and to the second electrical heating element 52, in a manner such to be able to reach, in the least possible time (or within a time set by the user as long as greater than the calculated minimum time) the threshold ambient temperature Tas and the threshold surface temperature Tss.

[0077] For example, when a specific cooking program is associated with a threshold surface temperature Tss of 450°C and a threshold ambient temperature Tas of 300°C, the aforesaid regulation module will provide more energy to the first electrical heating element 51, which is closer to the cooking surface 4 and must meet a greater thermal gradient, or it can delay the activation of the second heating element 52, in order to start the heating of the cooking chamber 3 later than the heating of the cooking surface 4.

[0078] Advantageously, each of the cooking programs contained in the memory unit M contains a predetermined cooking time TC, and the logic control unit 7 advantageously comprises a timer module.

[0079] Of course without departing from the protective scope of the present invention, the aforesaid cooking time TC can be manually set by a user by means of the control panel 80.

[0080] According to the preferred embodiment variant of the present invention, the actuation module is operatively connected to the timer module, and upon reaching the requirement set by the above-described programmed logics, the actuation module sends a start signal to the timer module. Advantageously, the timer module is arranged for driving the regulation module in a manner such that the latter provides power to the heating elements 51, 52 such to maintain the temperature of the cooking chamber 3 at the threshold ambient temperature Tas and the temperature of the cooking surface 4 at the threshold surface temperature Tss for a time equal to the cooking time TC.

[0081] Of course, without departing from the protective scope of the present invention, each cooking program can be provided with multiple cooking times TC1, TC2 etc., each of which associated with a pair of values of threshold ambient temperature Tas and threshold surface temperature Tss. The above-described solution is particularly suitable for large-volume foods, which require heating/cooling curves even during the cooking thereof.

[0082] Advantageously, moreover, the regulation module is placed in data communication with the control panel 80 in order to signal to a user the need to detect a new surface temperature Ts, for example following the change of the cooking program.

[0083] According to a first embodiment of the present invention, the temperature measurement instrument 6 comprises a first data communication port 60 and the logic control unit 7 comprises a second data communication port 70.

[0084] Preferably, the first and the second data communication port 60, 70 are ports of USB type, and still more preferably ports of USB-C or USB-A type.

[0085] Advantageously, moreover, the oven 1 comprises a data connection cable 10, connected to the first data communication port 60 and to the second data communication port 70 in order to transmit a signal containing information relative to the detected first surface temperature value Ts.

[0086] Preferably, the data connection cable 10 is a cable capable of electrically power supplying the measurement instrument, and is connected electrically to the electrical power supply of the oven 1.

[0087] According to an embodiment variant of the present invention, the temperature measurement instrument 6 advantageously comprises a first wireless data connection module 61 and the logic control unit 7 comprises a second wireless data connection module 71, which are operatively remotely connected in order to transmit a signal containing information relative to the detected first surface temperature Ts.

[0088] In such a manner, the oven 1 will therefore lack the data connection cable 10, and the measurement instrument will be provided with a battery, preferably rechargeable. Advantageously, the user can recharge the measurement instrument far away and separately from the oven 1 when the latter is inoperative.

[0089] According to an embodiment variant of the present invention, the first data connection module 61 and the second data connection module 71 are based on a communication technology selected from among: radio waves, Bluetooth, Wi-Fi, NFC.

[0090] Advantageously, the logic control unit 7 comprises a printed circuit board, on which the memory unit M, the data communication port 70, and a processor are connected.

[0091] More in detail, the aforesaid processor preferably comprises a program for managing the comparison modules C1, C2, the reception module, the timer module, the actuation module, the regulation module and the data communication modules 61, 71.

[0092] Advantageously the printed circuit board of the logic control unit 7 is electrically connected to at least the control panel 80 of the user interface 8 and is placed at least partially within a seat made in a depression on the perimeter wall 23 of the support structure 2. Suitably, if the logic control unit 7 is provided with the second data communication port 70, this will be advantageously directed towards the exterior of the oven and accessible by means of an opening made on the perimeter wall 23.

[0093] Such processor ensures the management of the oven 1 in a highly automated manner, requiring a small number of measurements and input data by a user.

[0094] Advantageously in addition, the oven 1 can comprise ventilation means (not represented in the enclosed figures) mechanically associated with the support structure 2 and intended to move an air flow within the cooking chamber 3.

[0095] Such ventilation means allow uniformly distributing the heat generated by the heating elements 51, 52, allowing the cooking of the foods at lower temperatures and with reduced cooking times. Also described hereinbelow is a method for cooking a food product 100 with the oven 1 of the above-described type. Such method comprises a heating step in which, at least before inserting a food to be cooked in the cooking chamber 3, the heating means 5 heat at least the cooking surface 4, and preferably also the cooking chamber 3, a measurement step, in which the measurement instrument 6 is manually actuated by a user, in order to detect, from outside the cooking chamber 3, at least one first surface temperature value Ts of the cooking surface 4. Advantageously, the measurement step is executed during the cooking step, hence when the heating means 5 are heating the cooking surface 4, such to identify the present state of the surface of the cooking surface 4 on which the food product is intended to be abutted. Such method advantageously also comprises a comparison step, in which the first comparison module C1 compares the surface temperature value Ts of the cooking surface 4 detected by the first temperature sensor 6 with the first threshold surface temperature value Tss1 of the cooking surface 4 and sends a corresponding comparison signal to the user interface 8, which emits a warning signal based on the aforesaid comparison signal. Advantageously, in accordance with a first programmed logic in which the heating means 5 operate for heating the cooking surface 4 of the oven 1, the user interface 8 emits the aforesaid warning signal when the first surface temperature Ts is preferably equal to or greater than 90% of the value of the threshold surface temperature Tss. Otherwise, in accordance with a second programmed logic in which the heating means 5 are turned off or operate at a reduced power in order to allow reducing the surface temperature of the cooking surface 4 of the oven 1, the user interface 8 emits the aforesaid warning signal when the first surface temperature Ts is preferably equal to or lower than 110% of the value of the threshold surface temperature Tss.

[0096] The method also advantageously comprises an insertion step executed based on the warning signal, and in such insertion step at least one food product 100 is placed on the cooking surface 4 within the cooking chamber 3, so as to allow inserting the food product 100 with the right timing, when the surface temperature Ts is in an optimal interval (for example between 90% and 110% of the threshold surface temperature Tss) for the subsequent cooking of such food product. The invention thus conceived therefore attains the pre-established objects.

Claims

1. Oven for cooking foods, which comprises:

- a support structure (2) internally delimiting a cooking chamber (3);

- at least one cooking surface (4), placed within said cooking chamber (3) and on which one or more foods is susceptible of being abutted;
- heating means (5), mechanically connected to said support structure (2) and placed to heat at least said cooking surface (4);

said oven being **characterized in that it comprises:**

- a temperature measurement instrument (6), placed outside said cooking chamber (3) and manually actuatable by a user in order to detect at least one first surface temperature value (Ts) of said cooking surface (4);
- a logic control unit (7), mechanically connected to said support structure (2) and comprising at least one first comparison module (C1) configured for comparing said at least first surface temperature value (Ts) with at least one preset threshold surface temperature value (Tss) and generating a corresponding comparison signal based on said comparison; and
- at least one user interface (8), configured for receiving said comparison signal from said first comparison module (C1) and emitting a warning signal based on said comparison signal.

2. Oven for cooking foods according to claim 1, **characterized in that** said logic control unit (7) comprises:

- a memory unit (M), containing at least two cooking programs stored therein, each of which associated with a corresponding threshold surface temperature (Tss);
- said user interface (8) being actuatable by a user in order to set, by said memory unit (M), one of said cooking programs;

said first comparison module (C1) being configured for comparing at least said first surface temperature with the threshold surface temperature (Tss) corresponding to said set cooking program and sending a corresponding comparison signal to said user interface (8).

3. Oven for cooking foods according to claim 1 or 2, **characterized in that** it comprises a second temperature sensor (9), fixed to said support structure (2) and placed within said cooking chamber (3), which is configured for detecting at least one first ambient temperature (Ta) of said cooking chamber (3) and sending to said logic control unit (7) said detected first ambient temperature (Ta);

said logic control unit (7) comprising a second comparison module (C2), configured for comparing at least the first ambient temperature detected by said second temperature sensor (9) with a threshold ambient temperature (Tas) and configured for sending a corresponding confirmation signal;

said user interface (8) being configured for receiving said confirmation signal and emitting said warning signal based on said comparison signal and said confirmation signal.

4. Oven for cooking foods according to claim 2 and 3, **characterized in that** each of said cooking programs is associated with at least one corresponding threshold ambient temperature (Tas), said second comparison module (C2) being configured for comparing said first ambient temperature signal (Ta) with the threshold ambient temperature (Tas) corresponding to said set cooking program and sending a corresponding confirmation signal to said user interface (8).

5. Oven for cooking foods according to any one of the preceding claims, **characterized in that**

said temperature measurement instrument (6) comprises a first data communication port (60) and said logic control unit (7) comprises a second data communication port (70);

said oven (1) comprising a data connection cable (10), connected to said first data communication port (60) and to said second data communication port (70) in order to transmit a signal containing information relative to said detected first surface temperature (Ts).

6. Oven for cooking foods according to any one of the claims from 1 to 4, **characterized in that** said temperature measurement instrument (6) comprises a first wireless data communication module (61) and said logic control unit (7) comprises a second wireless data communication module (71), which are operatively remotely connected in order to transmit a signal containing information relative to said detected first surface temperature (Ts).

7. Oven for cooking foods according to any one of the preceding claims, **characterized in that** said logic control unit (7) is operatively connected to said heating means (5) and is configured for driving said heating means (5) on the basis at least of said comparison signal.

8. Oven for cooking foods according to claim 1 or 2, **characterized in that** said first temperature sensor (6) is a sensor selected from among: an infrared pyrometer, a laser pyrometer, an optical pyrometer, a thermal camera.

9. Oven for cooking foods according to any one of the

preceding claims, **characterized in that** said first data communication module (61) and second data communication module (71) are based on a communication technology selected from among: radio waves, Bluetooth, Wi-Fi, NFC.

10. Oven for cooking foods according to any one of the preceding claims, **characterized in that** said cooking surface (4) is made of a refractory material.

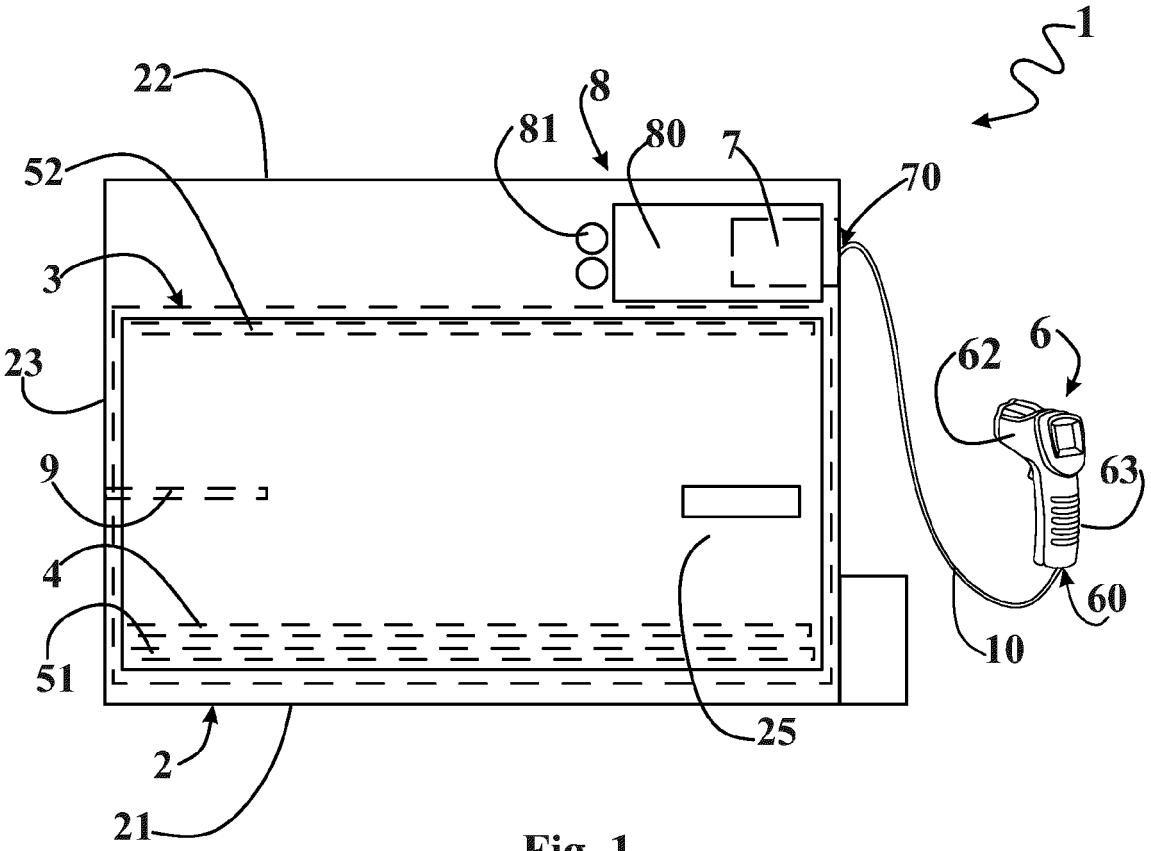
1
22
8
81
80
7
70
52
3
23
62
6
63
9
4
60
10
51
25
2
21

Fig. 1

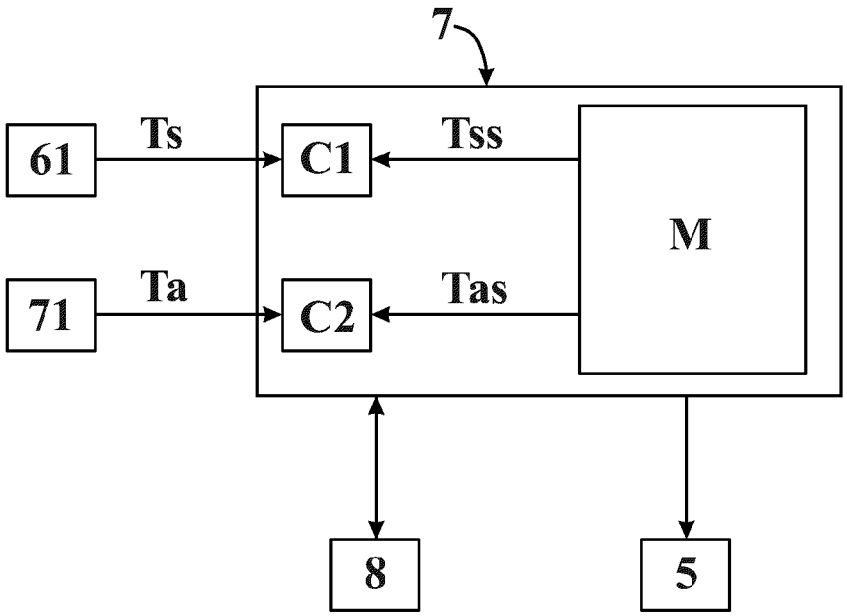
7
61
Ts
C1
Tss
M
71
Ta
C2
Tas
8
5

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 23 16 5678

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 August 2023	Jalal, Rashwan

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X : particularly relevant if taken alone
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