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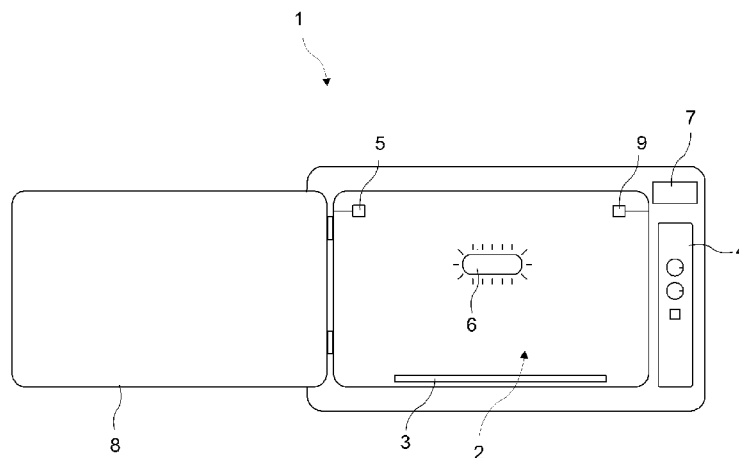
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- (54) **Title:** A COOKING DEVICE AND THE CONTROL METHOD THEREOF

Figure 1



(57) **Abstract:** The present invention relates to a cooking device (1) comprising a cooking chamber (2), a heater (3) that heats the cooking chamber (2), a user interface (4) whereby the user sets the cooking temperature (T_{set}), a temperature sensor (5) that detects the actual temperature ($T_{measure}$) of the cooking chamber (2), a lamp (6) that illuminates the interior of the cooking chamber (2) and a control unit (7) that enables the realization of a preheating phase at the beginning of the cooking process by continuously heating the heater (3) until reaching the cooking temperature (T_{set}) set by the user, and wherein the user is warned at the end of the preheating phase, wherein the control unit (7) enables the user to be warned by blinking the lamp (6) for a predetermined time (t_{warn}) when the actual temperature ($T_{measure}$) of the cooking chamber (2) reaches the set temperature (T_{set}) at the end of the preheating phase.

Description**A COOKING DEVICE AND THE CONTROL METHOD THEREOF**

- [0001] The present invention relates to a cooking device and to the control method thereof.
- [0002] In cooking devices, for example in household ovens, different food types are cooked at a temperature set by the user. In order to cook certain foods, for example pastries, a preheating phase is required. In a cooking process comprising a preheating phase, the user sets the temperature inside the oven to a desired degree and places the foodstuff into the oven when the temperature inside the oven reaches this degree.
- [0003] It is possible for the user to understand that the temperature inside the oven has reached the set value by making a time estimate. However, if the user is mistaken while following the time in ovens for which the user should follow the time, the oven operates for a long time and consumes excessive energy.
- [0004] In the state of the art, ovens comprising thermostat lamps are widely used. In this type of ovens, the user is generally informed by means of the thermostat lamp on the panel used in the oven that the temperature inside the oven has reached the temperature set by the user. The user understands that the temperature inside the oven has reached the desired value by following the moment when the thermostat lamp on the oven turns off. In this type of ovens, it may not be always possible for the user to continuously follow the thermostat lamp on the panel and if the user misses the moment when the lamp turns off, the oven operates for a long time and consumes excessive energy.
- [0005] Alternatively, ovens comprising digital displays are widely used. In this type of ovens, the user is informed by means of the digital display used in the oven that the temperature inside the oven has reached the temperature set by the user. The digital display substantially increases the production cost. Moreover, depending on the eyesight of the user and the dimensions of the digital display, errors may occur in reading the display. Producers design ovens that give visual as well as aural warnings. However, hearing impaired users cannot be informed by using aural

warnings.

- [0006] In the state of the art Japanese Patent Application No. JP58110926A, a cooking device is described, having a pair of indicating lamps that indicate that the temperature inside a cooking chamber has reached the set temperature.
- [0007] In the state of the art Japanese Patent Application No. JP59003517A, a cooking device is described, having a digital display that displays the temperature inside a cooking chamber.
- [0008] The aim of the present invention is the realization of a cooking device that enables the user to be effectively informed that the temperature inside the cooking chamber has reached the desired value.
- [0009] The cooking device realized in order to attain the aim of the present invention and explicated in the attached claims comprises a user interface whereby the user sets the cooking temperature, a temperature sensor that detects the actual temperature of the cooking chamber and a lamp that illuminates the interior of the cooking chamber; and the control unit enables the user to be warned by consecutively turning on and off the lamp for a predetermined time when the actual temperature of the cooking chamber reaches the set temperature at the end of the preheating phase preceding the cooking process.
- [0010] In an embodiment of the present invention, when the difference between the actual temperature of the cooking chamber measured by the temperature sensor and the temperature set by the user falls below a predetermined threshold value, the control unit decides that the temperature of the cooking chamber has reached the steady state and enables the lamp to be blinked for a certain time.
- [0011] In another embodiment of the present invention, when the door of the cooking device is opened, the control unit stops the warning process wherein the lamp is blinked at the end of the preheating phase and brings the lamp to its initial position, open or closed, at the beginning of the cooking process.
- [0012] In another embodiment of the present invention, the control unit enables the user to be warned by blinking the lamp at the end of the normal

cooking process as well as the preheating phase.

[0013] In the cooking device of the present invention, especially in the process of cooking pastries placed into the cooking chamber after the preheating phase, the user is enabled to be warned by blinking the illumination lamp at the end of the preheating phase. The user understands that the preheating phase has ended and places the pastry into the cooking device without losing time, thus providing energy saving.

[0014] The cooking device realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

[0015] Figure 1 - is the front view of a cooking device.

[0016] Figure 2 - is the graphic showing the change, with respect to time (t), in the temperature (T) of the cooking chamber during the cooking process and showing the operation of the lamp that illuminates the cooking chamber. In the graphic, the durations wherein the lamp is on are shown with "1" and the durations wherein the lamp is off are shown with "0".

[0017] The elements illustrated in the figures are numbered as follows:

1. Cooking device
2. Cooking chamber
3. Heater
4. User interface
5. Temperature sensor
6. Lamp
7. Control unit
8. Door
9. Door switch

[0018] The cooking device (1), for example the oven, comprises a cooking chamber (2), a heater (3) that heats the cooking chamber (2), a user interface (4) whereby the user sets the cooking temperature (T_{set}), a temperature sensor (5) that detects the actual temperature ($T_{measure}$) of the cooking chamber (2), a lamp (6) that illuminates the interior of the cooking chamber (2) and a control unit (7) that enables the realization of a preheating phase at the beginning of the cooking process by continuously heating the heater (3) until reaching the cooking temperature (T_{set}) set by

the user.

[0019] The cooking device (1) of the present invention comprises the control unit (7) that enables the user to be warned by blinking the lamp (6) for a predetermined time (t_{warn}) when the actual temperature ($T_{measure}$) of the cooking chamber (2) reaches the set temperature (T_{set}) at the end of the preheating phase.

[0020] At the beginning of the cooking process, the user sets the cooking temperature (T_{set}) and starts the cooking process. During the preheating phase, the actual temperature ($T_{measure}$) of the cooking chamber (2) is measured by the temperature sensor (5) and the temperature of the cooking chamber (2) is brought to the set temperature (T_{set}) by the control unit (7) continuously operating the heater (3). When the interior of the cooking chamber (2) reaches the set temperature (T_{set}), the control unit (7) blinks the lamp (6) for a predetermined time (t_{warn}), thus enabling the user to be warned. Especially leavened foods and pastries are placed into the cooking device (1) after the preheating phase is completed. The user understands that the actual temperature ($T_{measure}$) of the cooking chamber (2) has reached the set temperature (T_{set}) with the warning given by the lamp (6) blinking at the end of the preheating phase and places the food into the cooking device (1) without losing time and causing excessive energy consumption.

[0021] In another embodiment of the present invention, when the difference between the actual temperature ($T_{measure}$) of the cooking chamber (2) measured by the temperature sensor (5) and the temperature (T_{set}) set by the user falls below a predetermined threshold value (ΔT), the control unit (7) decides that the temperature of the cooking chamber (2) has reached the steady state and remains almost constant and that the cooking chamber (2) is heated to the desired temperature, and enables the lamp (6) to be blinked for a certain warning time (t_{warn}). Thus, erroneous temperature measurements that may be caused by sudden changes in the temperature of the cooking chamber (2) during the preheating phase are prevented, and the user is enabled to be warned by blinking the lamp (6) when the cooking chamber (2) reaches the set temperature (T_{set}) in the

steady state.

- [0022] In another embodiment of the present invention, the cooking device (1) comprises a door (8) providing access into the cooking chamber (2) and a door switch (9) that detects the opening/closing of the door (8). When the door switch (9) detects that the door (8) is opened during the warning time (twarn) after the preheating phase, the control unit (7) ends the warning time (twarn) and brings the lamp (6) to its initial position, open or closed.
- [0023] In another embodiment of the present invention, the control unit (7) enables the user to be warned by blinking the lamp (6) for a predetermined time (twarn) after the cooking program selected by the user completely ends. In this embodiment, the user is enabled to be warned at the end of the normal cooking process as well as at the end of the preheating phase.
- [0024] In the cooking device (1), only preheating is sufficient for short-term processes such as drying food or leavening dough. The user ends the operation of the cooking device (1) after being warned by means of the lamp (6) blinking at the end of the preheating phase.
- [0025] Especially in pastry cooking process realized in the cooking device (1) of the present invention, the user is effectively warned by means of the blinking lamp (6) and is informed that the preheating phase has ended. The user understands that the preheating phase has ended and places the pastry into the cooking chamber (2) without losing time, thus the cooking device (1) is prevented from operating unnecessarily for long time periods and energy saving is provided.

Claims

1. A cooking device (1) comprising a cooking chamber (2), a heater (3) that heats the cooking chamber (2), a user interface (4) whereby the user sets the cooking temperature (T_{set}), a temperature sensor (5) that detects the actual temperature ($T_{measure}$) of the cooking chamber (2), a lamp (6) that illuminates the interior of the cooking chamber (2) and a control unit (7) that enables the realization of a preheating phase at the beginning of the cooking process by continuously heating the heater (3) until reaching the cooking temperature (T_{set}) set by the user, **characterized in that** the control unit (7) that enables the user to be warned by blinking the lamp (6) for a predetermined time (t_{warn}) when the actual temperature ($T_{measure}$) of the cooking chamber (2) reaches the set temperature (T_{set}) at the end of the preheating phase.
2. A cooking device (1) as in Claim 1, **characterized in that** the control unit (7) that, when the difference between the actual temperature ($T_{measure}$) of the cooking chamber (2) measured by the temperature sensor (5) and the temperature (T_{set}) set by the user falls below a predetermined threshold value (ΔT), decides that the temperature of the cooking chamber (2) has reached the steady state and enables the lamp (6) to be blinked.
3. A cooking device (1) as in Claim 1 or 2, **characterized in that** a door (8) providing access into the cooking chamber (2), a door switch (9) that detects the opening/closing of the door (8) and the control unit (7) that ends the warning time (t_{warn}) and brings the lamp (6) to its initial position, open or closed, when the door switch (9) detects that the door (8) is opened during the warning time (t_{warn}) after the preheating phase.
4. A cooking device (1) as in any one of the above claims, **characterized in that** the control unit (7) that enables the user to be warned by blinking the lamp (6) for a predetermined time (t_{warn}) after the cooking program selected by the user completely ends.

Figure 1

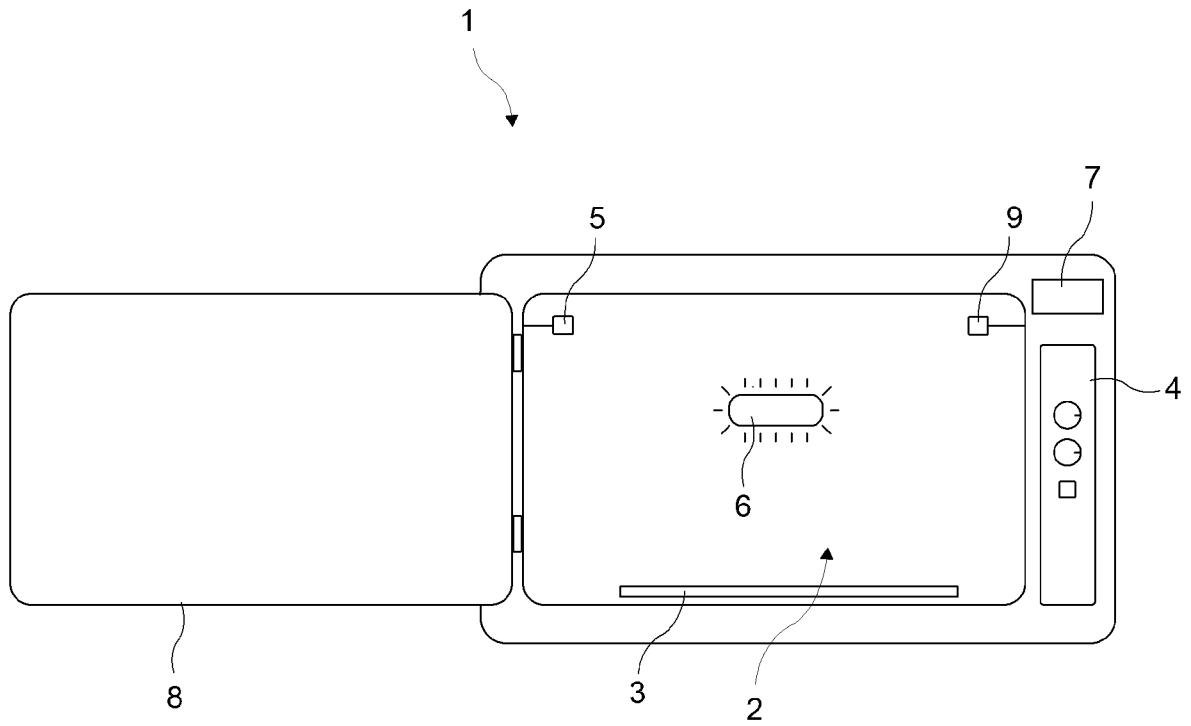
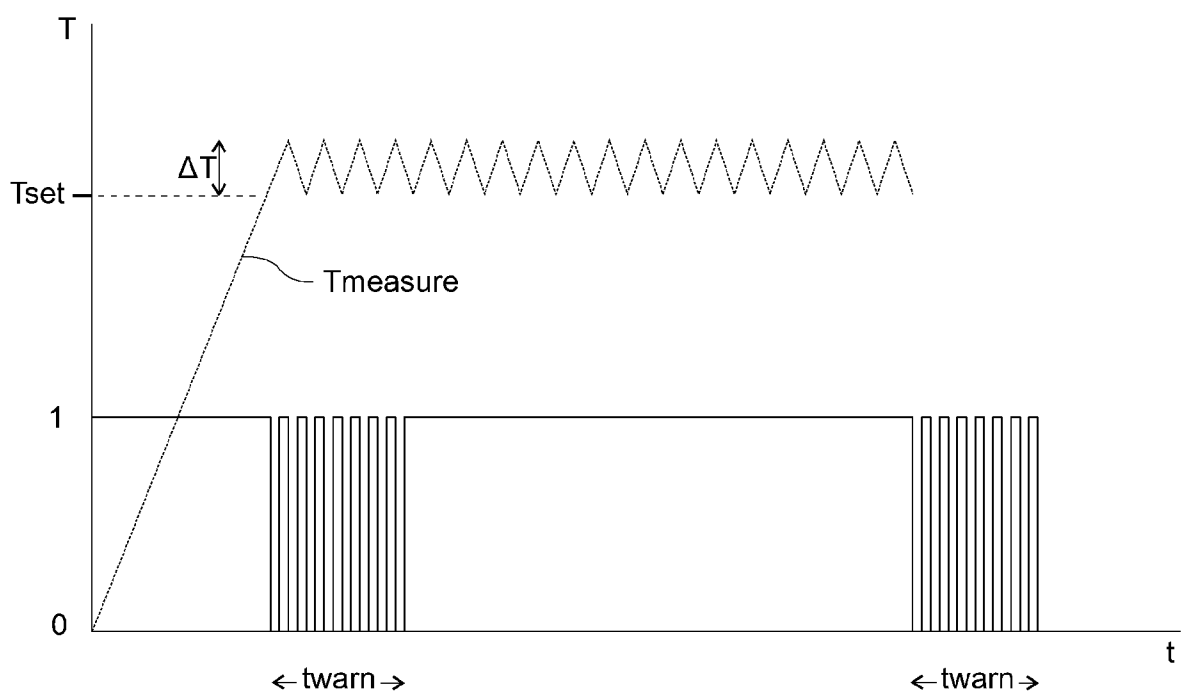


Figure 2



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/055742

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24C7/08 F24C15/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24C H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 146 290 A2 (AEG HAUSGERAETE GMBH [DE]) 17 October 2001 (2001-10-17)	1,2,4
Y	paragraphs [0005] - [0010], [0012] - [0024]; figures 1,2	3
X	US 2006/070612 A1 (HORTON WILLARD H [US] ET AL HORTON WILLARD HENRY [US] ET AL) 6 April 2006 (2006-04-06)	1,4
	paragraphs [0009], [0010], [0024], [0028], [0030]; figures 1,2	
Y	US 2 839 649 A (MACOICZ EDWARD L) 17 June 1958 (1958-06-17)	3
A	column 5, lines 29-60; figure 1	1
A	FR 2 850 532 A1 (PREMARK FEG LLC [US]) 6 August 2004 (2004-08-06)	1,4
	pages 2,3,6	
	-/--	

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2014/055742

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