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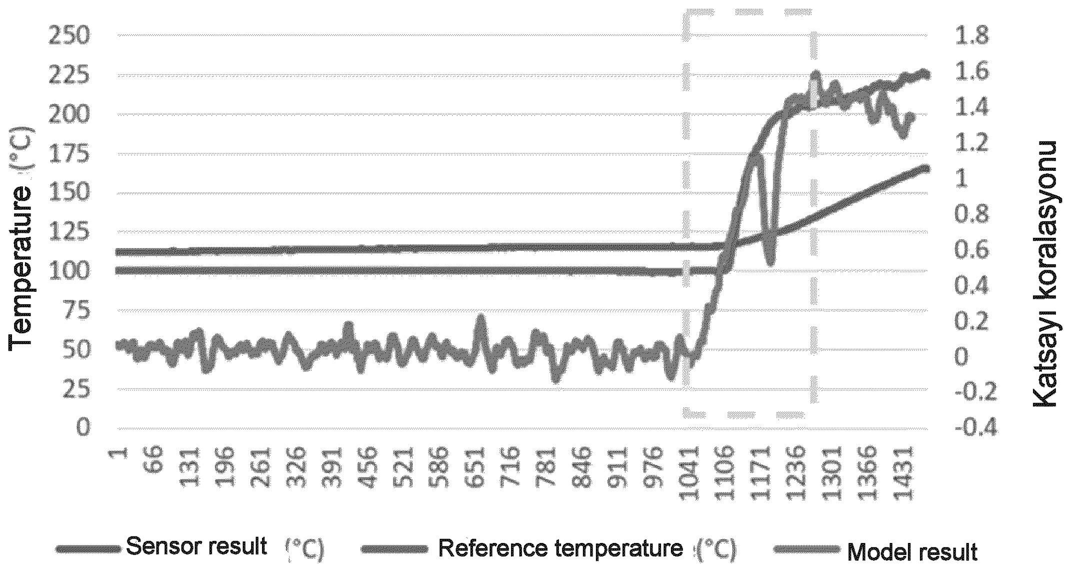
(71) Applicant: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventor: **ALTUNTAS, HAKAN**
34445 ISTANBUL (TR)

(54) AN INDUCTION HEATING COOKER

(57) The present invention relates to an induction heating cooker (1) comprising a cooker glass (2) whereon the cooking vessel is placed; at least one coil plate (3) which is positioned under the cooker glass (2) and which enables the heating of the cooking vessel; and at least one temperature sensor (4) which is positioned in the coil plate (3) and which detects the temperature of the cooking vessel; and a control member (6) which is configured to measure the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) and/or the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and/or the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) of the cooking pot at certain predetermined times (t_1, t_2, t_3, t_x), to compare at least one of the values obtained as a result of this measurement with the predetermined reference inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values corresponding to the predetermined times (t_1, t_2, t_3) and to turn off the power module (5) when the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and/or the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) and/or the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) are equal to the predetermined inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values.

Figure 4



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Description

Technical Field

[0001] The present invention relates to a control mechanism which prevents the cooking vessel from burning on the induction heating cookers.

State of the Art

[0002] In traditional state of the art induction heating cookers, a power level is generally selected from a range of 1 to 10. However, as a result of this selection, the induction heating cooker keeps the power at the selected level but cannot provide temperature control. Therefore, the temperature changes uncontrollably during the cooking process, and this change causes the foodstuffs to burn or be overcooked or not to be cooked as desired.

[0003] An induction coil is disposed at the lower side of the induction heating cooker. When the cooker is turned on, the coil creates a magnetic field, and this field directly affects the base of the vessel and heats the same. The induction heating cookers can only work with vessels with magnetic bases. The most critical parameter for healthy, quality and safe cooking is the cooking temperature of the foodstuff. Cooking at higher or lower temperatures than necessary may not provide the desired results in the foodstuff to be cooked, and may also adversely affect the health of persons consuming the foodstuff. The foodstuffs often burn due to the inability to control the temperature, and in some cases, the cooking vessel is permanently damaged due to burns.

[0004] Considering a standard cooking process on the induction heating cookers, the health and quality of the cooking process and the amount of power transferred to the cooking vessel are completely under the control of the user. The users usually choose the appropriate power level according to their experience from past cooking processes. To this end, many users increase the power level transferred to the cooking vessel when they want to increase the temperature, and decrease the power level when they want to decrease the temperature. Since the user cannot directly monitor the foodstuff temperature in such embodiments, they also encounter adverse results such as the foodstuff being undercooked or overcooked, or even burning and sticking to the bottom of the cooking vessel. Since consuming the foodstuff will not be suitable for health due to the said adverse results, the foodstuff is wasted, which in turns causes the energy consumed during the cooking process to be wasted.

[0005] In the traditional induction heating cookers, only the power level can be selected. As a result of this selection, the induction heating cooker transfers the power to the base of the cooking vessel at the selected level but cannot provide any temperature control. Therefore, the temperature increases uncontrollably throughout the cooking process. If the user does not intervene after a while, the foodstuffs may burn. In order to prevent this, the users need to control and monitor the cooking of the foodstuffs throughout the cooking process. This monitoring and control process creates a great difficulty for the users and causes loss of time.

[0006] In the state of the art, there will be a difference, which can cause the foodstuff to burn, between the time when the water runs out and the base of the cooking vessel starts to heat up, the sensor detects this change and the temperature value is calculated and the time the microcontroller circuit detects the situation that the water runs out and the foodstuff starts to burn and the energy transfer is reduced. However, trying to detect the point where the water runs out and the foodstuff starts to burn and/or stick to the base of the cooking vessel with measurement and prediction models using only coil temperature data is quite difficult due to the heat transfer occurring through multiple components and reaching the coil temperature sensor, and the sensor also having an internal response time. Since the cooker reacts late due to these delays, the foodstuff burns and becomes inedible. The examination of the state of the art process shows that the detection of the point where the water runs out and the foodstuff starts to burn and/or stick to the base of the cooking vessel is not possible with the outputs of the temperature sensors measuring only the coil temperature.

[0007] When the induction heating cooker and the cooking process are examined considering that the concept planned to be created is to detect the point where the foodstuff starts to burn, it is observed that, for stews, soups, etc., the temperature of the vessel base is at constant values until the water evaporates and runs out, and increases rapidly after the water runs out. At this stage, as mentioned above, since it is not possible for the temperature sensor measuring the cooking surface temperatures from the coil to detect the point where the temperature of the cooking vessel base starts to increase on its own, different parameters regarding the cooking process are also examined.

[0008] Considering the problems mentioned above, there is a need for an induction heating cooker structure which does not leave the power level setting to the user's control during the cooking process and which automatically adjusts the power level by detecting the vessel temperature.

[0009] In the state of the art Patent No. EP3196175B1, a cooker is disclosed, having a glass ceramic cooking surface with increased mechanical strength thanks to a simultaneously increased spectral transmittance in the infrared range, wherein the glass ceramic cooking surface makes it possible to use an infrared sensor to better determine the temperature of a cooking vessel and to perform an automated cooking process.

Brief Description of the Invention

[0010] The aim of the present invention is the realization of an induction cooker wherein the temperature in the cooker can be measured independently of the user without the need for any user intervention, and the magnetic power in the induction heating cooker can be controlled by working integrated with this measurement method so as to increase the comfort of the user during the cooking process and to facilitate the process.

[0011] Another aim of the present invention is the realization of an induction heating cooker which enables the cooking process to be monitored by carrying out estimation and control processes from inside the cooker without any direct contact with the cooking vessel and which prevents the foodstuffs from burning.

[0012] Another aim of the present invention is the realization of an induction heating cooker wherein the foodstuff temperature can be inferred with the said estimation process and thus, the point where the water of the foodstuff runs out is detected and the power transferred to the base of the cooking vessel is cut off at the point where the foodstuff starts to stick to the base of the cooking vessel.

[0013] Said figures are:

Figure 1: is the top perspective view of an induction heating cooker.

Figure 2: is the graph showing resistance (R) and inductance (L) measurements of a standard cooking vessel during the cooling process

Figure 3: is the graph showing resistance (R) and inductance (L) measurements of a standard cooking vessel during the heating process

Figure 4: is the graph showing the detection of the point where the foodstuff starts to stick to the cooking vessel base.

Figure 5: is the graph showing the change in resistance (R) measured at certain intervals for the cooking vessel base.

Figure 6: is the graph showing the change in inductance (L) measured for certain intervals for the cooking vessel base.

[0014] The following numerals are referred to in the description of the present invention:

1. Induction heating cooker
2. Cooker glass
3. Coil plate
4. Temperature sensor
5. Power module
6. Control member

$\Delta L_{1,2,3,x}$: cooking vessel inductance value changing at $t_{1,2,3,x}$

$\Delta R_{1,2,3,x}$: cooking vessel resistance value changing at $t_{1,2,3,x}$

$\Delta T_{1,2,3,x}$: cooking vessel base temperature value changing at $t_{1,2,3,x}$

ΔL_{alt} : a predetermined lower inductance value

ΔR_{alt} : a predetermined lower resistance value

ΔT_{alt} : a predetermined lower temperature value

Detailed Description of the Invention

[0015] The induction heating cooker (1) of the present invention comprises a cooker glass (2) whereon the cooking vessel is placed; at least one coil plate (3) which is positioned under the cooker glass (2) and which enables the heating of the cooking vessel; at least one temperature sensor (4) which detects the temperature of the cooking vessel; and a control member (6) which is configured to measure the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) and/or the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and/or the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) of the cooking pot at certain predetermined times (t_1, t_2, t_3, t_x), to compare at least one of the values obtained as a result of this measurement with the predetermined reference inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values corresponding to the predetermined times (t_1, t_2, t_3) and to turn off the power module (5) when the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and/or the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) and/or the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) are equal to the predetermined inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values.

[0016] In an embodiment of the present invention, the cooking vessel has magnetic properties.

[0017] In an embodiment of the present invention, the induction heating cooker (1) comprises a measurement system which can measure the electrical parameters of the cooking vessels to which power is transferred by the coils, namely the resistance (R) and inductance (L) values which define the characteristics of the load. The said measurement system is based on the calculation of the resistance (R) and inductance (L) values of the cooking vessel with the periodical sampling of the said values by exposing the cooking vessel base to electrical voltage at different frequencies. As a result of this calculation, the resistance (R) and inductance (L) values of the cooking vessel base can be estimated. The resistance (R) and inductance (L) measurements of a standard cooking vessel base during the cooling and heating processes are shown in Figures 1 and 2. In an embodiment of the present invention, the resistance (R) and inductance (L) parameters of the cooking vessel regarding the power transferred to the cooking vessel base during the cooking process on the induction heating cooker (1) vary according to the type and condition of the cooking vessel, and by taking the measurements of the cooking vessel with different resistance (R) and inductance (L) values at different base temperatures, it is observed that the resistance (R) and inductance (L) values increased as the temperature increased. Figure 2 shows the graph showing resistance (R) and inductance (L) measurements of a standard cooking vessel during the cooling process Figure 3 shows the graph showing resistance (R) and inductance (L) measurements of a standard cooking vessel during the heating process As shown in the graphs of Figures 2 and 3, there is an inverse proportion between the temperature (T) and the resistance (R) and inductance (L) values. Thus, by means of the present invention, the point where the water in the cooking vessel runs out and the foodstuff starts to burn and/or sticks to the base of the cooking vessel is detected and the burning is prevented with an algorithm wherein the cooking vessel resistance (R) and inductance (L) measurements and the values of the temperature sensor (4) measuring the cooking vessel surface temperature are used as input.

[0018] In an embodiment of the present invention, in the induction heating cooker (1), the cooking vessel instantaneous inductance change value (ΔL1) measured at a predetermined time t_1 is smaller than the cooking vessel instantaneous inductance change value (ΔL2) measured at a predetermined time t_2, and the cooking vessel instantaneous inductance change value (ΔL2) measured at a predetermined time t_2 is smaller than the cooking vessel instantaneous inductance change value (ΔL3) measured at a predetermined time t_3. The control member (6) is configured to observe the largest cooking vessel temperature change (ΔL_3) stage and to understand when the instantaneous inductance change value (ΔL_3) approaches the determined reference inductance (ΔL) value and to increase the measurement time interval (t_x) and to ensure that the induction heating cooker (1) is turned off by communicating with a power module (5) when the instantaneous inductance change value (ΔL_x) is equal to the determined reference inductance (ΔL) value.

[0019] In an embodiment of the present invention, in the induction heating cooker (1), the cooking vessel instantaneous resistance change value (ΔR_1) measured at a predetermined time t_1 alone or together with the instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) explained above is smaller than the cooking vessel instantaneous resistance change value (ΔR_2) measured at a predetermined time t_2, and the cooking vessel instantaneous resistance change value (ΔR_2) measured at a predetermined time t_2 is smaller than the cooking vessel instantaneous resistance change value (ΔR3) measured at a predetermined time t_3. The control member (6) is configured to observe the largest cooking vessel temperature change (ΔR_3) stage and to understand when the instantaneous resistance change value (ΔR_3) approaches the determined reference resistance (ΔR) value and to increase the measurement time interval (t_x) and to ensure that the induction heating cooker (1) is turned off by communicating with a power module (5) when the instantaneous resistance change value (ΔR_x) is equal to the determined reference resistance (ΔL) value.

[0020] In an embodiment of the present invention, in order to estimate the point at which the foodstuff starts to stick to the base of the cooking vessel, Figure 4 shows the graph of the temperature change (T) measured at certain intervals for the base of the cooking vessel, Figure 5 shows the graph of the resistance change (R) measured at certain intervals for the base of the cooking vessel, and Figure 6 shows the graph of the inductance change (L) measured at certain intervals for the base of the cooking vessel.

[0021] In an embodiment of the present invention (1), a predetermined lower inductance value (ΔL_{alt}) is defined as a control parameter in the control member (6) in order to prevent the cooking vessel surface inductance value from being at a value that may correspond to a false foodstuff burn detection signal. The control member (6) compares the lower inductance value (ΔL_{alt}), the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) and the predetermined cooking vessel surface inductance (ΔL) values in order to detect the point where the foodstuff is burning and/or sticking to the base of the cooking vessel. In this comparison, the lower inductance value (ΔL_{alt}) should be smaller than the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x), and the cooking vessel instantaneous inductance change values (ΔL_1, ΔL_2, ΔL_3, ΔL_x) should be smaller than the predetermined cooking vessel surface inductance value (ΔL).

[0022] In an embodiment of the present invention (1), a predetermined lower resistance value (ΔR_{alt}) is defined as a control parameter in the control member (6) in order to prevent the cooking vessel surface resistance value from being at a value that may correspond to a false foodstuff burn detection signal. The control member (6) compares the lower resistance value (ΔR_{alt}), the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and the predetermined cooking vessel surface resistance (ΔR) values in order to detect the point where the foodstuff is burning and/or sticking to the base of the cooking vessel. In this comparison, the lower resistance value (ΔR_{alt}) should be smaller than the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x), and the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) should be smaller than the predetermined cooking vessel surface resistance value (ΔR).

[0023] In an embodiment of the present invention (1), a predetermined lower temperature value (ΔT_{alt}) is defined as a control parameter in the control member (6) in order to prevent the value generated by the temperature sensor (4) measuring the surface temperature of the cooking vessel from being at a value that may correspond to a false foodstuff burning detection signal for low temperatures. The control member (6) compares the lower temperature value (ΔT_{alt}), the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) and the predetermined cooking vessel surface temperature (ΔT) values in order to detect the point where the foodstuff is burning and/or sticking to the base of the cooking vessel. In this comparison, the lower temperature value (ΔT_{alt}) should be smaller than the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x), and the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) should be smaller than the predetermined cooking vessel surface temperature value (ΔT).

Claims

1. An induction heating cooker (1) **comprising** a cooker glass (2) whereon the cooking vessel is placed; at least one coil plate (3) positioned under the cooker glass (2) and enabling the heating of the cooking vessel; and at least one temperature sensor (4) which detects the temperature of the cooking vessel, **characterized by** a control member (6) configured to measure the cooking vessel instantaneous inductance change values (ΔL1, ΔL2, ΔL3, ΔLx) and/or the cooking vessel instantaneous resistance change values (ΔR1, ΔR_2, ΔR3, ΔRx) and/or the cooking vessel instantaneous temperature change values ΔT1, ΔT2, ΔT3, ΔTx) of the cooking pot at certain predetermined times (t1, t2, t3, tx), to compare at least one of the values obtained as a result of this measurement with the predetermined reference inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values corresponding to the predetermined times (t1, t2, t3) and to turn off the power module (5) when the cooking vessel instantaneous resistance change values (ΔR1, ΔR2, ΔR3, ΔRx) and/or the cooking vessel instantaneous inductance change values (ΔL1, ΔL2, ΔL3, ΔLx) and/or the cooking vessel instantaneous temperature change values (ΔT1, ΔT2, ΔT3, ΔT_x) are equal to the predetermined inductance (ΔL) and/or resistance (ΔR) and/or temperature (ΔT) values.

2. An induction heating cooker (1) as in Claim 1, **characterized in that** the cooking vessel instantaneous inductance change value (ΔL1) measured at a predetermined time t_1 is smaller than the cooking vessel instantaneous inductance change value (ΔL_2) measured at a predetermined time t_2, and the cooking vessel instantaneous inductance change value (ΔL_2) measured at a predetermined time t_2 is smaller than the cooking vessel instantaneous inductance change value (ΔL_3) measured at a predetermined time t_3.

3. An induction heating cooker (1) as in Claim 1 or 2, **characterized in that** the cooking vessel instantaneous resistance change value (ΔL1) measured at a predetermined time t_1 is smaller than the cooking vessel instantaneous resistance change value (ΔR_2) measured at a predetermined time t_2, and the cooking vessel instantaneous resistance change value (ΔR_2) measured at a predetermined time t_2 is smaller than the cooking vessel instantaneous resistance change value (ΔR_3) measured at a predetermined time t_3.

4. An induction heating cooker (1) as in Claim 2, **characterized by** a control member (6) configured to understand when the instantaneous inductance change value (ΔL_3) approaches the determined reference inductance (ΔL) value and to increase the measurement time interval (t_x) and to ensure that the induction heating cooker (1) is turned off by communicating with a power module (5) when the instantaneous inductance change value (ΔL_x) is equal to the determined reference inductance (ΔL) value.

5. An induction heating cooker (1) as in Claim 3, **characterized by** a control member (6) configured to understand when the instantaneous resistance change value (ΔR_3) approaches the determined reference resistance (ΔR) value and to increase the measurement time interval (t_x) and to ensure that the induction heating cooker (1) is turned off by communicating with a power module (5) when the instantaneous resistance change value (ΔR_x) is equal to the determined reference resistance (ΔR) value.

6. An induction heating cooker (1) as in any one of the above claims, **characterized by** a control member (6) wherein a predetermined lower inductance value (ΔLalt) as a control parameter and which compares the lower inductance value (ΔLalt), the cooking vessel instantaneous inductance change values (ΔL1, ΔL2, ΔL3, ΔL_x) and the predetermined cooking vessel surface inductance (ΔL) values.

7. An induction heating cooker (1) as in any one of the above claims, **characterized by** a control member (6) wherein a predetermined lower resistance value (ΔR_{alt}) as a control parameter and which compares the lower resistance value (ΔR_{alt}), the cooking vessel instantaneous resistance change values (ΔR_1, ΔR_2, ΔR_3, ΔR_x) and the predetermined cooking vessel surface resistance (ΔR) values.

8. An induction heating cooker (1) as in any one of the above claims, **characterized by** a control member (6) wherein a predetermined lower temperature value (ΔT_{alt}) as a control parameter and which compares the lower temperature value (ΔT_{alt}), the cooking vessel instantaneous temperature change values (ΔT_1, ΔT_2, ΔT_3, ΔT_x) and the predetermined cooking vessel surface temperature (ΔT) values.

Figure 1

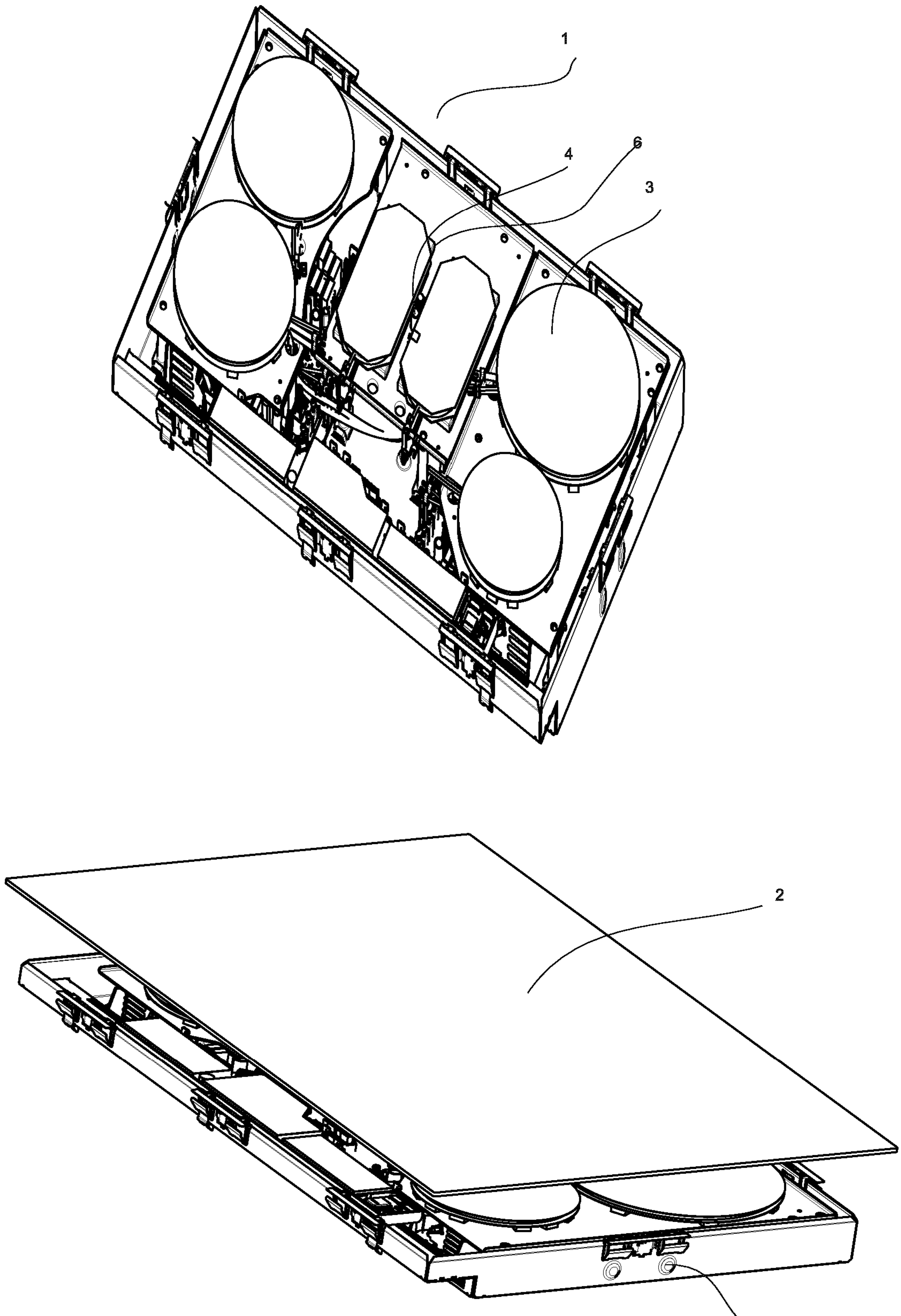


Figure 2

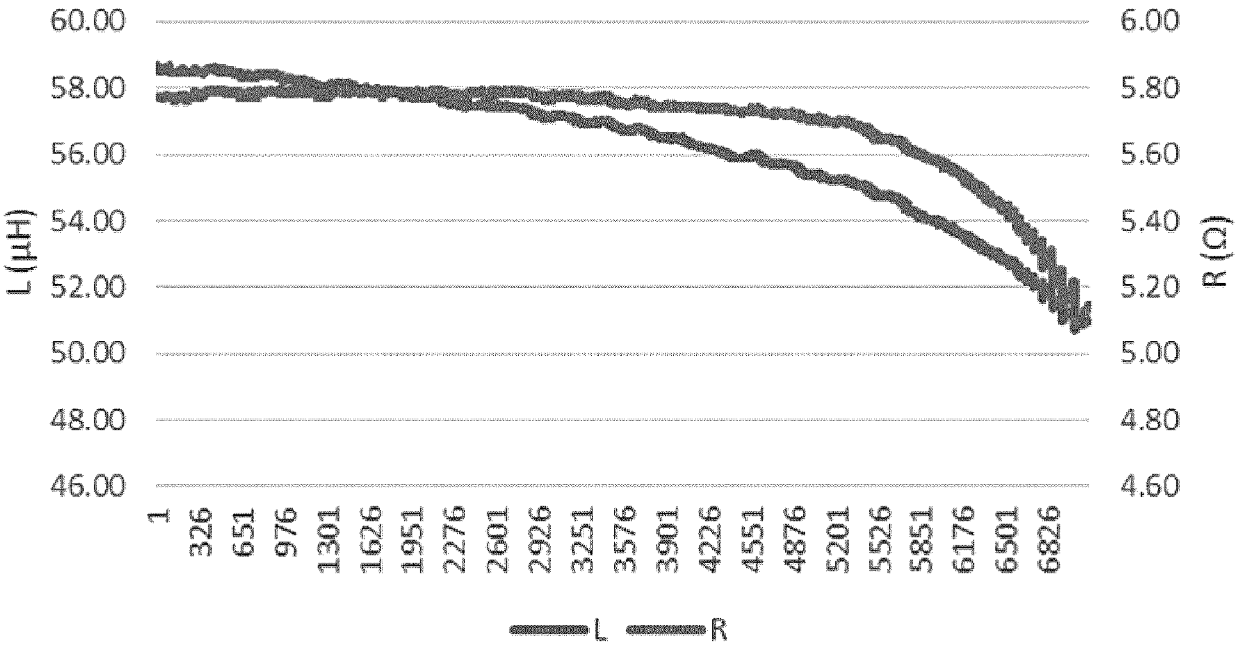


Figure 3

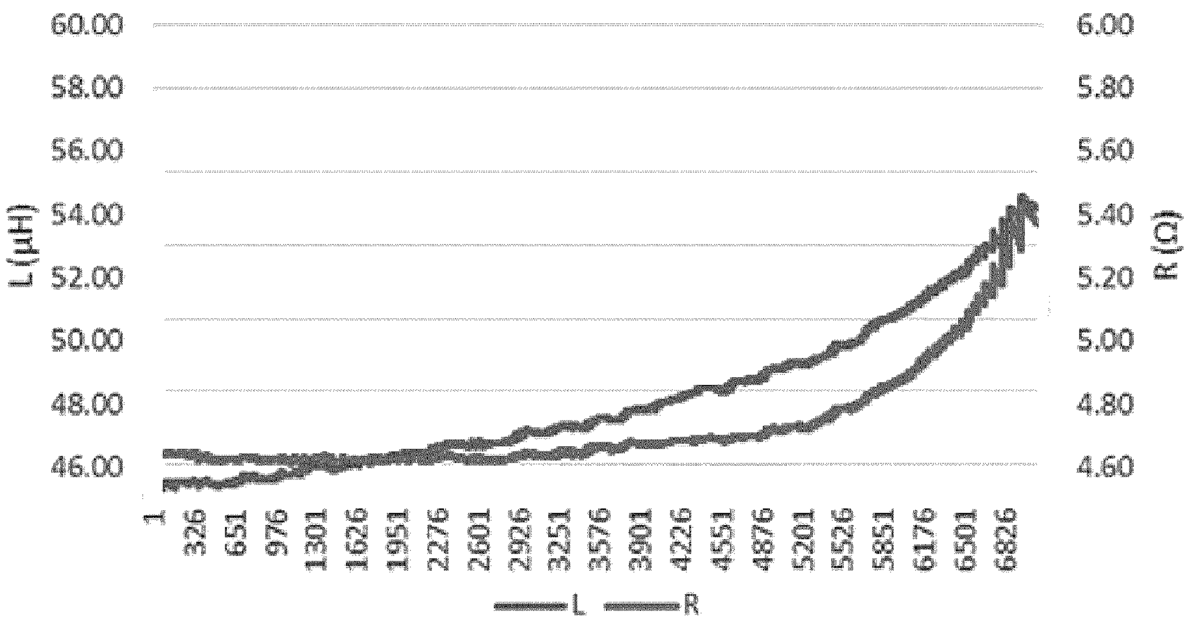


Figure 4

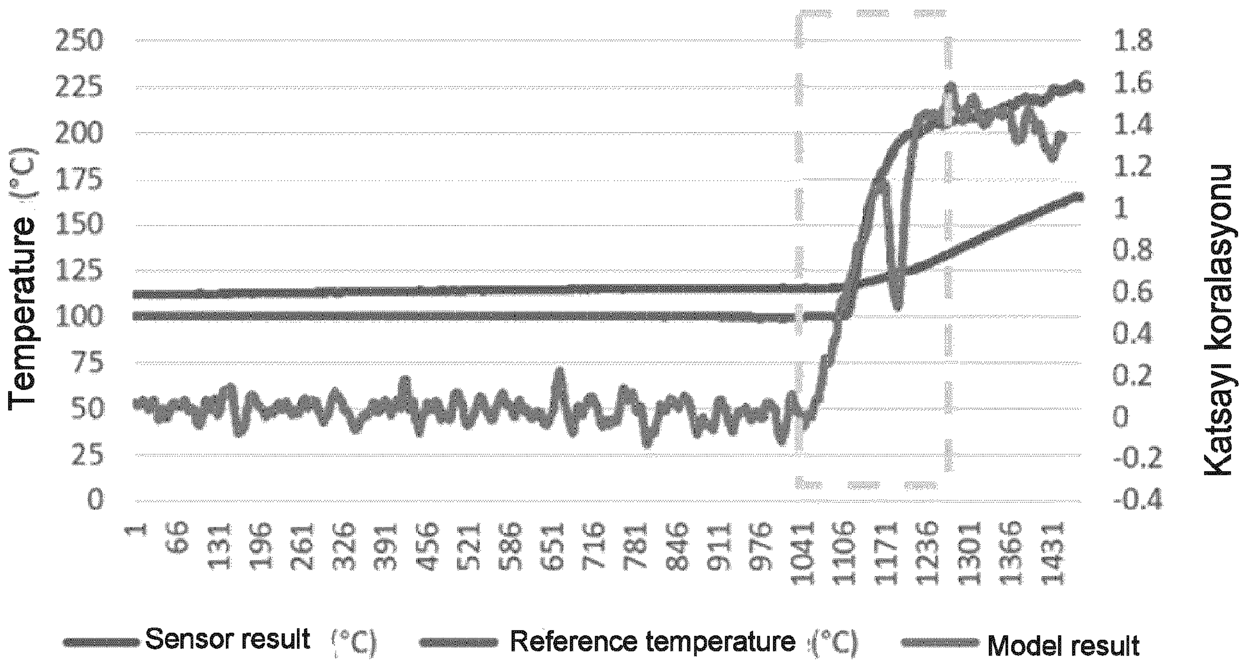


Figure 5

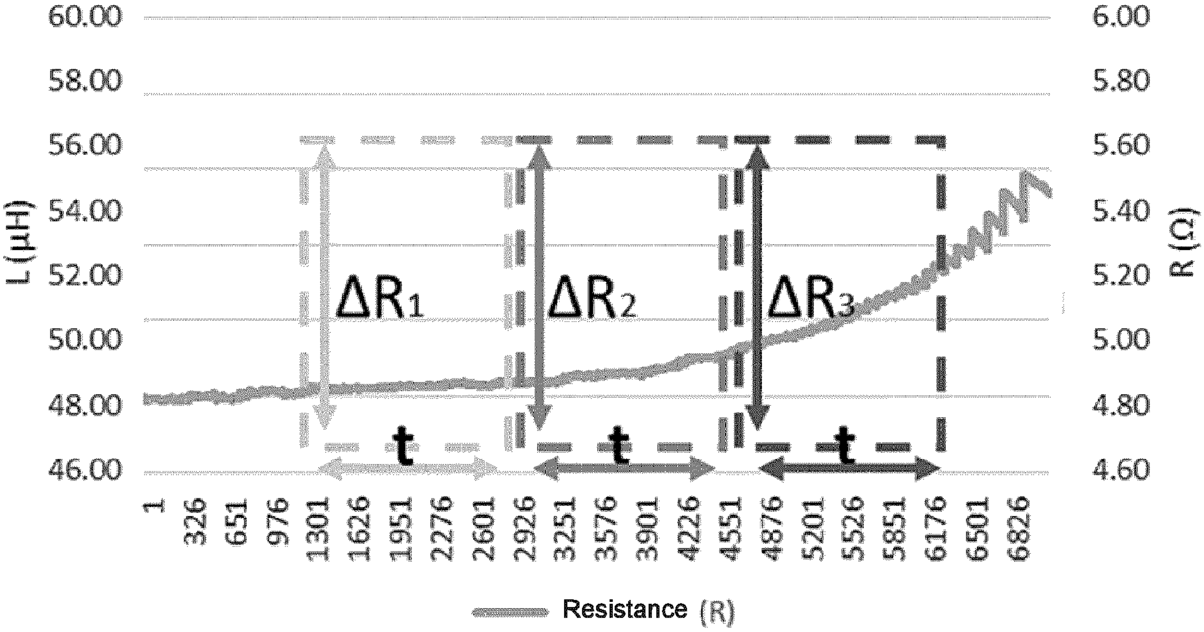
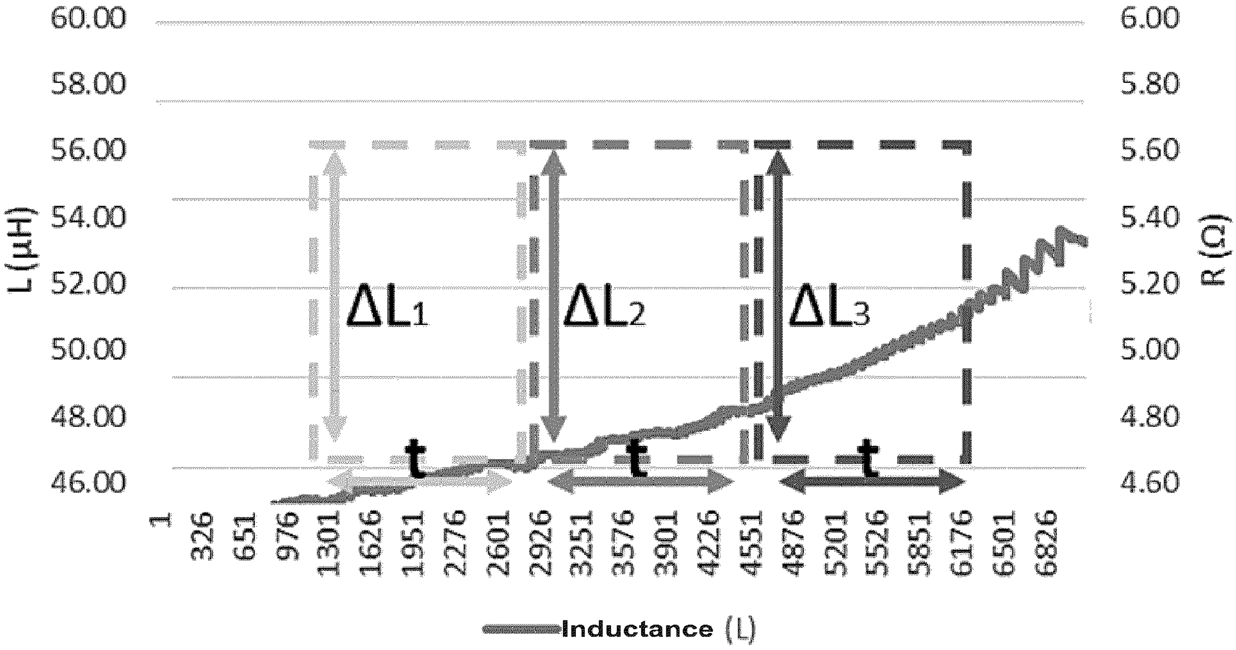


Figure 6



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EUROPEAN SEARCH REPORT

Application Number
EP 24 20 8677

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 4 274 381 A1 (LG ELECTRONICS INC [KR]) 8 November 2023 (2023-11-08) * paragraph [0099]; figures 5-7 * * paragraph [0118] - paragraph [0127] *	1-7	INV. H05B6/06
X	EP 4 231 778 A1 (LG ELECTRONICS INC [KR]) 23 August 2023 (2023-08-23) * paragraph [0120]; figure 1 *	1,2,4,6	
X	EP 1 028 602 B1 (SCHOTT AG [DE]) 30 March 2005 (2005-03-30) * paragraph [0029] - paragraph [0038]; figure 2 *	1,8	
X	US 4 493 981 A (PAYNE THOMAS R [US]) 15 January 1985 (1985-01-15) * column 8, line 14 - column 10, line 14 *	1,8	
X	WO 2009/112150 A2 (EGO ELEKTRO GERAETEBAU GMBH [DE]; THIMM WOLFGANG [DE]) 17 September 2009 (2009-09-17) * page 11 - page 12; figure 3 *	1,8	TECHNICAL FIELDS SEARCHED (IPC)
X	US 4 740 664 A (PAYNE THOMAS R [US] ET AL) 26 April 1988 (1988-04-26) * column 10, line 9 - line 32 *	1,8	H05B

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
Munich	13 March 2025	Gea Haupt, Martin

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 24 20 8677

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-03-2025

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 4274381 A1	08-11-2023	EP 4274381 A1	08-11-2023
		KR 20220095898 A	07-07-2022
		US 2024114601 A1	04-04-2024
		WO 2022145569 A1	07-07-2022
EP 4231778 A1	23-08-2023	EP 4231778 A1	23-08-2023
		KR 20230126127 A	29-08-2023
		US 2023269836 A1	24-08-2023
EP 1028602 B1	30-03-2005	DE 19906115 C1	31-08-2000
		EP 1028602 A2	16-08-2000
		ES 2238809 T3	01-09-2005
		JP 2000240949 A	08-09-2000
		US 6300606 B1	09-10-2001
US 4493981 A	15-01-1985	CA 1232312 A	02-02-1988
		JP H0684819 B2	26-10-1994
		JP S60227721 A	13-11-1985
		US 4493981 A	15-01-1985
WO 2009112150 A2	17-09-2009	DE 102008014268 A1	17-09-2009
		WO 2009112150 A2	17-09-2009
US 4740664 A	26-04-1988	DE 3744372 A1	14-07-1988
		FR 2609357 A1	08-07-1988
		GB 2199999 A	20-07-1988
		IT 1223433 B	19-09-1990
		JP 2730898 B2	25-03-1998
		JP S63174611 A	19-07-1988
		KR 880009530 A	15-09-1988
		US 4740664 A	26-04-1988

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

- EP 3196175 B1 **[0009]**