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(54) POWER INTERLOCKING METHOD AND INDUCTION COOKER

(57) The embodiments of the present disclosure provide a power interlocking method and an induction cooker. The induction cooker includes multiple heating zones. The method includes: obtaining a preset maximum power of each of the heating zones; obtaining a preset maximum total power of the multiple heating zones; adjusting a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power. In this way, the induction cooker can perform stable and continuous heating and will not enter an IGBT high-temperature protection mode at high voltage, improving the experiences of the users.

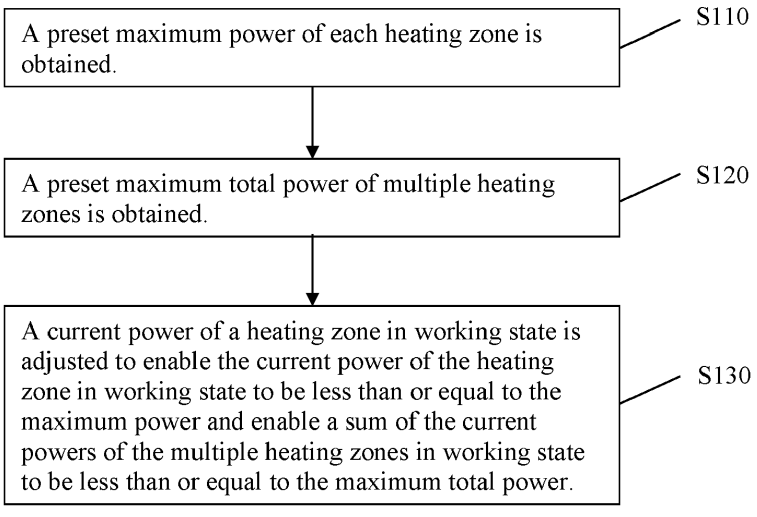

FIG.1

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Description

TECHNICAL FIELD

[0001] The embodiments of the present disclosure relates to but not limited to kitchen appliances and in particular to a power interlocking method and an induction cooker.

BACKGROUND

[0002] At present, the induction cookers mainly use single-transistor parallel resonance technology without limiting a heating power of a heating zone, which leads to generation of a step voltage at the levels between a minimum continuous power and a maximum power. The step voltage may increase along with increase of a grid voltage, which leads to high temperature of an Insulate-Gate Bipolar Transistor (IGBT) drive circuit. In this case, the induction cooker may enter an IGBT high-temperature protection mode and even the IGBT drive circuit is burned out, affecting the experiences of the users.

SUMMARY

[0003] The subject detailed in the specification is summarized below and the summary is not intended to limit the scope of protection of the claims.

[0004] An embodiment of the present disclosure provides a power interlocking method and an induction cooker.

[0005] According to embodiments of a first aspect of the present disclosure, there is provided a power interlocking method, which is applied to an induction cooker with multiple heating zones. The power interlocking method includes:

obtaining a preset maximum power of each of the heating zones;
obtaining a preset maximum total power of the multiple heating zones;
adjusting a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

[0006] In some embodiments of the first aspect of the present disclosure, the induction cooker is provided with a display device; and the power interlocking method further includes:
when the induction cooker is powered on for the first time, displaying the maximum total power by the display device.

[0007] In some embodiments of the first aspect of the present disclosure, the power interlocking method further includes:
when the maximum total power is zero, controlling all of the heating zones to be in an off state.

[0008] In some embodiments of the first aspect of the present disclosure, the power interlocking method further includes:

when a working voltage of the induction cooker is a first voltage value, controlling a first total power value of the induction cooker to be less than or equal to the maximum total power;
when the working voltage of the induction cooker is a second voltage value, controlling a second total power value of the induction cooker to be less than or equal to the first total power value of the induction cooker;
wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

[0009] In some embodiments of the first aspect of the present disclosure, the induction cooker is provided with an Insulate-Gate Bipolar Transistor (IGBT) drive circuit; the power interlocking method further includes:

obtaining a temperature of the IGBT drive circuit; when the temperature of the IGBT drive circuit is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit is greater than a preset temperature increase rate threshold, increasing a power of the induction cooker; when the temperature of the IGBT drive circuit is greater than a preset third temperature threshold, turning off the IGBT drive circuit, and outputting fault codes corresponding to the IGBT drive circuit;
obtaining a step voltage value of the IGBT drive circuit within a preset time interval; when the step voltage value is greater than a preset step voltage threshold, increasing the power of the induction cooker until the step voltage value is within a preset step voltage range;

wherein the third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

[0010] According to embodiments of a second aspect of the present disclosure, there is provided an induction cooker, which is provided with multiple heating zones and a controller; the controller includes an obtaining module and an adjusting module;

the obtaining module is configured to obtain a preset maximum power of each of the heating zones and a preset maximum total power of the multiple heating zones;
the adjusting module is configured to adjust a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

[0011] In some embodiments of the second aspect of the present disclosure, the induction cooker is provided with a display device; the display device is connected with the controller and the display device is configured to, when the induction cooker is powered on for the first time, display the maximum total power.

[0012] In some embodiments of the second aspect of the present disclosure, the controller is further configured to, when the maximum total power is zero, control all of the heating zones to be in an off state.

[0013] In some embodiments of the second aspect of the present disclosure, the adjusting module is further configured to. when a working voltage of the induction cooker is a first voltage value, control a first total power value of the induction cooker to be less than or equal to the maximum total power, and when the working voltage of the induction cooker is a second voltage value, control a second total power value of the induction cooker to be less than or equal to the first total power value of the induction cooker; wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

[0014] In some embodiments of the second aspect of the present disclosure, the induction cooker is provided with an Insulate-Gate Bipolar Transistor (IGBT) drive circuit; the controller further comprises an IGBT drive circuit regulating module which is connected with the IGBT drive circuit;
the IGBT drive circuit regulating module is configured to obtain a temperature of the IGBT drive circuit; when the temperature of the IGBT drive circuit is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit is greater than a preset temperature increase rate threshold, increase a power of the induction cooker; when the temperature of the IGBT drive circuit is greater than a preset third temperature threshold, turn off the IGBT drive circuit, and output fault codes corresponding to the IGBT drive circuit; obtain a step voltage value of the IGBT drive circuit within a preset time interval; when the step voltage value is greater than a preset step voltage threshold, increase the power of the induction cooker until the step voltage value is within a preset step voltage range; wherein the third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

[0015] The above technical solutions at least have the following beneficial effects: limitation is made to the power of the heating zones of the induction cooker and the current powers of the heating zones in working state are adjusted such that the current power of the heating zones in working state is less than or equal to the preset maximum power of the heating zones, and the sum of the current powers of the multiple heating zones in working state is less than or equal to the preset maximum total power of the multiple heating zones. In this case, the induction cooker can perform stable and continuous heating and will not enter the IGBT high-temperature protection mode at a high voltage, improving the experiences of the users.

BRIEF DESCRIPTION OF DRAWINGS

[0016] The accompanying drawings used to provide further understanding for the technical solutions of the present disclosure and constitute a part of the specification explain the technical solutions of the present disclosure together with the embodiments of the present disclosure, without limiting the technical solutions of the present disclosure.

FIG. 1 is a step schematic diagram illustrating a power interlocking method according to one or more embodiments of the present disclosure.
FIG. 2 is a sub-step diagram of step S200.
FIG. 3 is a step diagram of step S300.
FIG. 4 is a step diagram of step S400.

FIG. 5 is a step diagram of step S511, step S512 and step S513.
FIG. 6 is a step diagram of step S521 and step S522.
FIG. 7 is a structural schematic diagram illustrating a heating zone of an induction cooker.

DETAILED DESCRIPTION

[0017] In order to make the objects, technical solutions and advantages of the present disclosure clearer and more intelligible, the present disclosure will be further detailed below in combination with the drawings and embodiments. It should be understood that the specific embodiments described herein are used only to interpret the present disclosure rather than limit the present disclosure.

[0018] It should be noted that although functional modules have been divided in the apparatus diagrams and the logic sequence is also illustrated in the flowcharts, the illustrated or described steps may be performed with a module division different from the apparatus or in a sequence different from the flowcharts. The terms "first" and "second" and the like in the specification, the claims and the drawings are used to distinguish similar objects and are not necessarily used to describe a specific sequence or precedence.

[0019] The embodiments of the present disclosure will be further set forth below in combination with the drawings.

[0020] According to an embodiment of the present disclosure, there is provided an induction cooker.

[0021] The induction cooker includes multiple heating zones and a controller 10.

[0022] The induction cooker is provided with a display device which specifically is a touch display screen.

[0023] As shown in FIG. 7, an Insulate-Gate Bipolar Transistor (IGBT) drive circuit 30, a coil disk L, a resonant capacitor C1, a resonant capacitor C2, and a relay 20 are disposed in the heating zones of the induction cooker. Both ends of the coil disk L are respectively connected to both ends of the resonant capacitor C1, and the other end of the resonant capacitor C1 is connected to one port of the controller 10. The resonant capacitor C2 is series-connected with the relay 20 and then parallel-connected with the resonant capacitor C1. The IGBT drive circuit 30 is provided with an IGBT transistor, where a gate electrode G of the IGBT transistor is connected to another port of the controller 10, a collector electrode C of the IGBT transistor is connected to one end of the resonant capacitor C2, and an emitter electrode E of the IGBT transistor is connected to another port of the controller 10.

[0024] The following power interlocking method is applied to the induction cooker.

[0025] With reference to FIG. 1, the power interlocking method includes the following steps.

[0026] At step S 110, a preset maximum power of each heating zone is obtained.

[0027] At step S120, a preset maximum total power of multiple heating zones is obtained.

[0028] At step S130, a current power of a heating zone in working state is adjusted to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

[0029] The maximum power of each heating zone may be set, limited, selected and locked by operating combination buttons on the touch display screen such that the induction cooker can perform stable and continuous heating and will not be enter an IGBT high-temperature protection mode at a high voltage, thereby improving the experiences of the users.

[0030] Specifically, the maximum power of a single heating zone can be set in the following manner:

[0031] When the induction cooker is in an off state, any "heating zone" button of the touch display screen is held and then the "timing" button is pressed three times, so as to enable the induction cooker to enter a compensation power debugging state. When the induction cooker is in the compensation power debugging state, the induction cooker works with the largest power; at this time, the digital tube displays the compensation power "PX (X range: 0 to 9)", and the maximum power of the heating zone can be adjusted by pressing "0" and "9" buttons and then the "power" button is pressed for saving and the compensation power debugging state is exited.

[0032] Similarly, the maximum total power of the multiple heating zones can be set, limited, selected and locked by operating combination buttons on the touch display screen.

[0033] Specifically, the maximum total power of the multiple heating zones may be set in the following manner:
When the induction cooker is in an off state, the "timing" button on the touch display screen is held and the "child lock" button is pressed three times to enable the induction cooker to enter an interlocking power adjusting state. At this time, the digital tubes of the heating zones 2 and 3 display "interlocking power (e.g. "28" represents interlocking 2800W)", and the dual-digit digital tube flashes "Po". The maximum total power of the heating zones can be adjusted by pressing the "0" and "9" buttons and then the "power" button is pressed for saving.

[0034] For a heating zone without the relay 20 switching the LC single tube of the resonant capacitor, it is guaranteed that a step voltage of a minimum continuous heating power P5 within the ranges of 220 to 230VAC, 240 to 250VAC and 260 to 285VAC is lower than 100VDC while the temperature of the P5 is not higher than a temperature of the 230VAC maximum heating power P9.

[0035] For a heating zone with the relay 20 switching the LC single tube of the resonant capacitor, it is guaranteed that a step voltage of the minimum continuous heating power level P5 within the ranges of 220 to 230VAC, 240 to

250VAC and 260 to 285VAC at the time of the relay 20 being disengaged is lower than 100VDC, while the temperature of the level P5 is not higher than the temperature of the 230VAC maximum heating power P9 at the time of the relay 20 being engaged; a step voltage of a continuous heating power level P6 within the ranges of 220 to 230VAC and 240 to 250VAC at the time of the relay 20 being engaged is lower than 100VDC while the temperature of the level P6 is not higher than the temperature T9 of the 230VAC maximum heating power P9 at the time of the relay 20 being engaged; and finally, the power values of levels P5 to P9 within the range of 260 to 285VAC are same and equal to the power value of the level P5.

[0036] Furthermore, For a heating zone without the relay 20 switching the LC single tube of the resonant capacitor, at the normal voltage of 220 to 250VAC, the power values of the levels P6 to P8 are to be set between the power values of the levels P5 to P9; at the high voltage of 260 to 285VAC, the power values of the levels P5 to P9 are same and equal to the power value of the level P5. Thus, the high-voltage interlocking power is lower than the normal-voltage interlocking power.

[0037] For a heating zone with the relay 20 switching the LC single tube of the resonant capacitor, at the normal voltage of 220 to 250VAC, the relay 20 is disengaged at the level P5 and engaged at the levels P6 to P9, and thus, the powers of the P5 to P9 gradually increase; at the high voltage of 260 to 285VAC, the relay 20 is disengaged at the levels of P5 to P9 and the power values of the levels P5 to P9 are same and equal to the power value of the level P5. Thus, the high-voltage interlocking power is lower than the normal-voltage interlocking power.

[0038] Furthermore, within a broad voltage range of 85 to 285VAC, continuous, stable and reliable operation can be achieved.

[0039] For example, in a specific example, at the voltage of 220 to 230VAC, a correspondence between the levels and the powers of the induction cooker is as shown in Table 1.

Table 1 Correspondence between levels and powers of the induction cooker at the voltage of 220 to 230VAC

Position	Setting	P1	P2	P3	P4	P5	P6	P7	P8	P9
Upper left heating zone	1500W	1100	1100	1100	1100	1100	1200	1300	1400	1500
Lower left heating zone	2000W	1300	1300	1300	1300	1300	1400	1600	1800	2000
Right heating zone	2600W	1100	1100	1100	1100	1100	1600	1900	2200	2600
Heating ratio (10S)		1S	3S	5S	8S	continuous heating				

[0040] At the voltage of 260 to 285VAC, correspondence betweenlevels and powers of the induction cooker is as shown in Table 2.

Table 2 Correspondence between levels and powers of the induction cooker at the voltage of 260 to 285VAC

Position	Setting	P1	P2	P3	P4	P5	P6	P7	P8	P9
Upper left heating zone	1500W	1200	1200	1200	1200	1200	1200	1200	1200	1200
Lower left heating zone	2000W	1700	1700	1700	1700	1700	1700	1700	1700	1700
Right heating zone	2600W	1400	1400	1400	1400	1400	1400	1400	1400	1400
Heating ratio (10S)		1S	3S	5S	8S	continuous heating				

[0041] In the step S130, a current power of a heating zone in working state is adjusted to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

[0042] As shown in FIG. 2, the power interlocking method further includes the following steps.

[0043] At step S210, when a working voltage of the induction cooker is a first voltage value, a first total power value of the induction cooker is controlled to be less than or equal to the maximum total power.

[0044] At step S220, when the working voltage of the induction cooker is a second voltage value, a second total power value of the induction cooker is controlled to be less than or equal to the first total power value of the induction cooker. wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current

powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

[0045] In this embodiment, the first voltage value is a normal voltage and the second voltage value is a high voltage. For example, the first voltage value is a voltage of 220 to 230VAC and the second voltage value is a voltage of 260 to 285VAC.

[0046] Specifically, when the maximum total power is set to 2.8KW, if, at the normal voltage, the power value of the level P6 of the upper left heating zone is 1200W and the power value of the level P6 of the right heating zone is 1600W, the sum of the current powers of the upper left heating zone and the right heating zone is 2800W, which is equal to the maximum total power. If, at the high voltage, the power value of the level P6 of the upper left heating zone is 1200W and the power value of the level P6 of the right heating zone is 1400W, the sum of the current powers of the upper left heating zone and the right heating zone is 2600W, which is less than the maximum total power.

[0047] When the maximum total power is set to 3.4KW, if, at the normal voltage, the power value of the level P9 of the upper left heating zone is 1500W and the power value of the level P7 of the right heating zone is 1900W, the sum of the current powers of the upper left heating zone and the right heating zone is 3400W, which is equal to the maximum total power. If, at the high voltage, the power value of the level P9 of the upper left heating zone is 1200W and the power value of the level P7 of the right heating zone is 1400W, the sum of the current powers of the upper left heating zone and the right heating zone is 2600W, which is less than the maximum total power.

[0048] When the maximum total power is set to 6.1KW, if, at the normal voltage, the power value of the level P9 of the upper left heating zone is 1500W and the power value of the level P9 of the lower left heating zone is 2000W and the power value of the level P9 of the right heating zone is 2600W, the sum of the current powers of the upper left heating zone, the lower left heating zone and the right heating zone is 6100W, which is equal to the maximum total power. If, at the high voltage, the power value of the level P9 of the upper left heating zone is 1200W and the power value of the level P8 of the lower left heating zone is 1700W, and the power value of the level P7 of the right heating zone is 1400W, the sum of the current powers of the upper left heating zone, the lower left heating zone and the right heating zone is4300W which is less than the maximum total power.

[0049] The above is repeated like this, so as to achieve more free combinations compliant with safety regulations, thus improving the experiences of the users.

[0050] Under a set interlocking power, the power of the entire machine is not more than the set maximum total power. If the level of heating zones is increased to enable the power of the entire machine to exceed the maximum total power, the buzzer will give a sound prompt and the level increase operation is invalid.

[0051] As shown in FIG. 3, the power interlocking method further includes the step S300: when the induction cooker is powered on for the first time, the maximum total power is displayed by the display device. This helps the user to view and make corresponding operation. The induction cooker being powered on for the first time may be the induction cooker being turned on.

[0052] Specifically, when the induction cooker is powered on for the first time, the buzzer will give one short sound, and the digital tubes and the indicator lamps of the display device all are turned on for about 2 seconds (no response to button press action in the all-on display process), displaying software version number for about one second (the unit digital tube of the heating zones displays "main board version number", the time dual-digit digital tube displays "display board version number", for example, "1,1,1,1,01"), then displaying main board model for about one second ("b, b, b, b, 01") and the interlocking power segment for about one second (the digital tube of the heating zones displays "interlocking power", the dual-digit digital tube displays "Po", for example, "35, Po" representing the interlocking power segment 3500W); the relay 20 is engaged, and then the off state is enabled. The main board model A:2000W/1500Wconfiguration, b:2400W/2000W configuration, C:2600W/3000Wconfiguration, and d:3600W configuration.

[0053] As shown in FIG. 4, the power interlocking method may further include the step S400: when the maximum total power is zero, all heating zones are controlled to be in an off state. Hence, the problems that users do not disconnect power for long, multiple heating zones are in standby state and sometimes, surge and lightning strike and the like may impose external interferences, leading to automatically turning on or heating, can be solved, while the child lock function for preventing children from mistakenly turning it on can be achieved.

[0054] Specifically, the maximum total power has several options such as "0000", "AA00", "BB00", "CC00" and "DD00" and the like, where "DD00" is a default maximum power at the time of leaving factory, and "0000"corresponds to the maximum total power set to zero.

[0055] As shown in FIG. 5, the power interlocking method further includes the following steps.

[0056] At step S511, a temperature of the IGBT drive circuit 30 is obtained.

[0057] At step S512, when the temperature of the IGBT drive circuit 30 is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit 30 is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit 30 is greater than a preset temperature increase rate threshold, a power of the induction cooker is increased.

[0058] At step S513, when the temperature of the IGBT drive circuit 30 is greater than a preset third temperature threshold, the IGBT drive circuit 30 is turned off, and fault codes corresponding to the IGBT drive circuit 30 are output.

[0059] The third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

[0060] Specifically, in this embodiment, the first temperature threshold is 95 degrees Celsius, the second temperature threshold is 80 degrees Celsius, the third temperature threshold is 105 degrees Celsius, and the temperature increase rate threshold is 15 degrees Celsius per minute.

[0061] When it is detected that the temperature of the IGBT drive circuit 30 is greater than 80 degrees Celsius and the temperature increase rate of the IGBT drive circuit 30 is greater than 15 degrees Celsius per minute or the temperature of the IGBT drive circuit 30 is greater than 95 degrees Celsius, the power of the induction cooker is increased, for example, the level of the induction cooker is increased from the level P5 to the level P6. When it is detected that the temperature of the IGBT drive circuit 30 is greater than 105 degrees Celsius, the IGBT drive circuit 30 is turned off and the fault codes corresponding to the IGBT drive circuit 30 are output.

[0062] As shown in FIG. 6, at step S521, a step voltage value of the IGBT drive circuit 30 within a preset time interval is obtained.

[0063] At step S522, when the step voltage value is greater than a preset step voltage threshold, the power of the induction cooker is increased until the step voltage value is within a preset step voltage range.

[0064] Specifically, in this embodiment, the step voltage threshold is 100VDC and the time interval is 100ms.

[0065] The step voltage value of the IGBT drive circuit 30 within 100ms of the startup of the induction cooker is detected. When the step voltage value is greater than 100VDC, the power of the induction cooker is increased until the step voltage value is within the preset step voltage range.

[0066] With the above disposal, the large-power continuous, stable and reliable heating at the normal voltage of 220 to 250VAC can be achieved and each heating zone uses the corresponding same power for heating at the levels of P5 to P9 at the high voltage of 260 to 285VAC. In this way, the large-power interlocking function of 2.8 to 7.2KW of the IGBT soft switch can be maintained for the multiple heating zones within a broad voltage range of 85 to 285VAC.

[0067] In an embodiment of the present disclosure, the controller 10 includes an obtaining module and an adjusting module, where the obtaining module is configured to obtain a preset maximum power of each of the heating zones and a preset maximum total power of the multiple heating zones; the adjusting module is configured to adjust a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

[0068] Furthermore, the display device is connected with the controller 10 and the display device is configured to, when the induction cooker is powered on for the first time, display the maximum total power.

[0069] Furthermore, the controller is further configured to, when the maximum total power is zero, control all of the heating zones to be in an off state.

[0070] Furthermore, the adjusting module is further configured to, when a working voltage of the induction cooker is a first voltage value, control a first total power value of the induction cooker to be less than or equal to the maximum total power, and when the working voltage of the induction cooker is a second voltage value, control a second total power value of the induction cooker to be less than or equal to the first total power value of the induction cooker; wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

[0071] Furthermore, the controller further includes an IGBT drive circuit 30 regulating module which is connected with the IGBT drive circuit 30; the IGBT drive circuit 30 regulating module is configured to obtain a temperature of the IGBT drive circuit 30; when the temperature of the IGBT drive circuit 30 is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit 30 is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit 30 is greater than a preset temperature increase rate threshold, increase a power of the induction cooker; when the temperature of the IGBT drive circuit 30 is greater than a preset third temperature threshold, turn off the IGBT drive circuit 30, and output fault codes corresponding to the IGBT drive circuit 30; obtain a step voltage value of the IGBT drive circuit 30 within a preset time interval; when the step voltage value is greater than a preset step voltage threshold, increase the power of the induction cooker until the step voltage value is within a preset step voltage range; wherein the third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

[0072] Although the embodiments of the present disclosure have been shown and described, those skilled in the arts should understand that they can make various changes, modifications, replacements and variations to these embodiments without departing from the principle and tenet of the present disclosure, and the scope of protection of the present disclosure is defined by the claims and its equivalents.

[0073] The above are specific descriptions for preferred embodiments of the present disclosure, but the present disclosure is not limited to these embodiments. Those skilled in the arts can make various variations or replacements without departing from the spirit of the present disclosure, and these equivalent variations or replacements shall be incorporated in the scope of protection defined the claims of the present disclosure.

Claims

1. A power interlocking method, applied to an induction cooker with multiple heating zones, and comprising:

   obtaining a preset maximum power of each of the heating zones;
   obtaining a preset maximum total power of the multiple heating zones;
   adjusting a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

2. The power interlocking method of claim 1, wherein the induction cooker is provided with a display device and the method power interlocking method further comprises:
   when the induction cooker is powered on for the first time, displaying the maximum total power by the display device.

3. The power interlocking method of claim 1, further comprising:
   when the maximum total power is zero, controlling all of the heating zones to be in an off state.

4. The power interlocking method of claim 1, further comprising:

   when a working voltage of the induction cooker is a first voltage value, controlling a first total power value of the induction cooker to be less than or equal to the maximum total power;
   when the working voltage of the induction cooker is a second voltage value, controlling a second total power value of the induction cooker to be less than or equal to the first total power value of the induction cooker;
   wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

5. The power interlocking method of claim 1, wherein the induction cooker is provided with an Insulate-Gate Bipolar Transistor (IGBT) drive circuit; the power interlocking method further comprises:

   obtaining a temperature of the IGBT drive circuit; when the temperature of the IGBT drive circuit is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit is greater than a preset temperature increase rate threshold, increasing a power of the induction cooker; when the temperature of the IGBT drive circuit is greater than a preset third temperature threshold, turning off the IGBT drive circuit, and outputting fault codes corresponding to the IGBT drive circuit;
   obtaining a step voltage value of the IGBT drive circuit within a preset time interval; when the step voltage value is greater than a preset step voltage threshold, increasing the power of the induction cooker until the step voltage value is within a preset step voltage range;
   wherein the third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

6. An induction cooker, wherein the induction cooker is provided with multiple heating zones and a controller and the controller comprises an obtaining module and an adjusting module;

   the obtaining module is configured to obtain a preset maximum power of each of the heating zones and a preset maximum total power of the multiple heating zones;
   the adjusting module is configured to adjust a current power of a heating zone in working state to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.

7. The induction cooker of claim 6, wherein the induction cooker is provided with a display device; the display device is connected with the controller and the display device is configured to, when the induction cooker is powered on for the first time, display the maximum total power.

8. The induction cooker of claim 6, wherein the controller is further configured to, when the maximum total power is zero, control all of the heating zones to be in an off state.

9. The induction cooker of claim 6, wherein the adjusting module is further configured to, when a working voltage of the induction cooker is a first voltage value, control a first total power value of the induction cooker to be less than or equal to the maximum total power, and when the working voltage of the induction cooker is a second voltage value, control a second total power value of the induction cooker to be less than or equal to the first total power value of the induction cooker; wherein the second voltage value is greater than the first voltage value, the first total power value is a sum of the current powers of all heating zones at a target level in a case that the working voltage of the induction cooker is the first voltage value, and the second total power value is a sum of the current powers of all heating zones at the target level in a case that the working voltage of the induction cooker is the second voltage value.

10. The induction cooker of claim 6, wherein the induction cooker is provided with an Insulate-Gate Bipolar Transistor (IGBT) drive circuit; the controller further comprises an IGBT drive circuit regulating module which is connected with the IGBT drive circuit;
the IGBT drive circuit regulating module is configured to obtain a temperature of the IGBT drive circuit; when the temperature of the IGBT drive circuit is greater than a preset first temperature threshold, or the temperature of the IGBT drive circuit is greater than a preset second temperature threshold and a temperature increase rate of the IGBT drive circuit is greater than a preset temperature increase rate threshold, increase a power of the induction cooker; when the temperature of the IGBT drive circuit is greater than a preset third temperature threshold, turn off the IGBT drive circuit, and output fault codes corresponding to the IGBT drive circuit; obtain a step voltage value of the IGBT drive circuit within a preset time interval; when the step voltage value is greater than a preset step voltage threshold, increase the power of the induction cooker until the step voltage value is within a preset step voltage range; wherein the third temperature threshold is greater than the first temperature threshold, and the first temperature threshold is greater than the second temperature threshold.

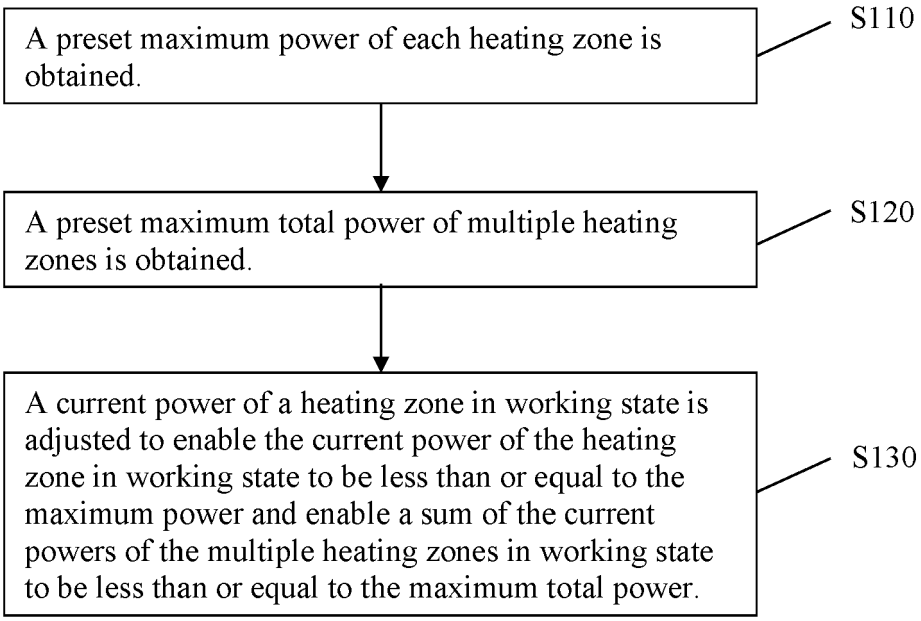
A preset maximum power of each heating zone is obtained.
S110
A preset maximum total power of multiple heating zones is obtained.
S120
A current power of a heating zone in working state is adjusted to enable the current power of the heating zone in working state to be less than or equal to the maximum power and enable a sum of the current powers of the multiple heating zones in working state to be less than or equal to the maximum total power.
S130

FIG.1

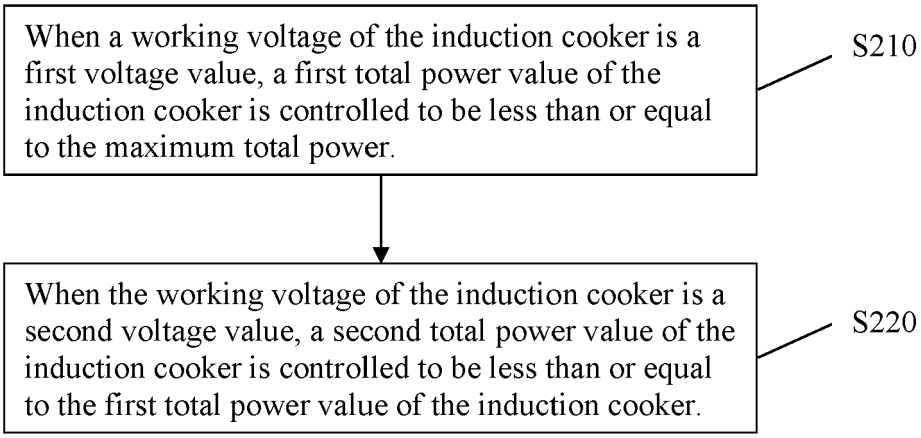
When a working voltage of the induction cooker is a first voltage value, a first total power value of the induction cooker is controlled to be less than or equal to the maximum total power.
S210
When the working voltage of the induction cooker is a second voltage value, a second total power value of the induction cooker is controlled to be less than or equal to the first total power value of the induction cooker.
S220

FIG. 2

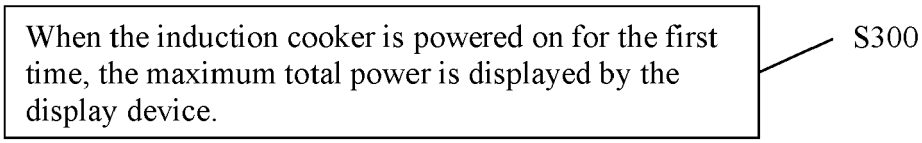

FIG. 3

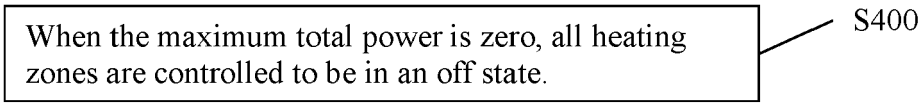

FIG. 4

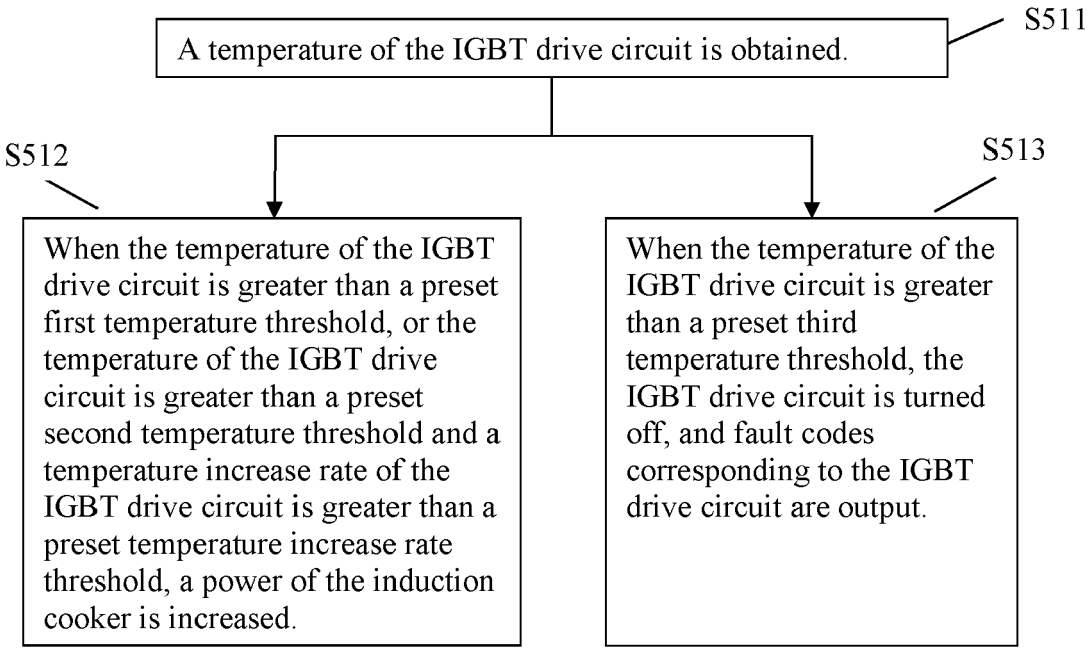

FIG. 5

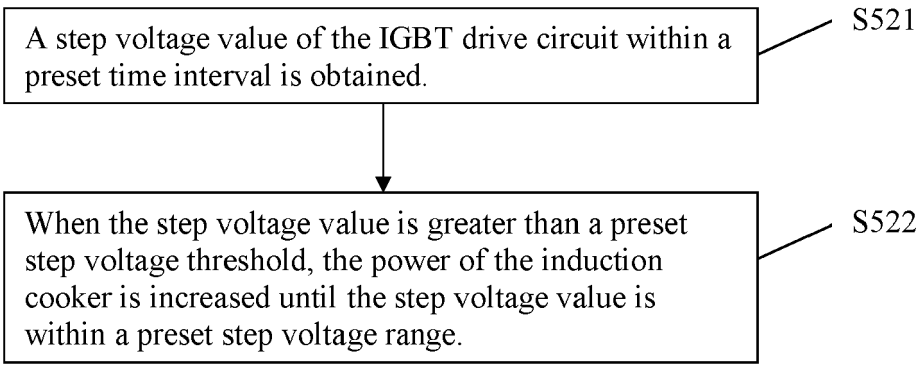
A step voltage value of the IGBT drive circuit within a preset time interval is obtained.
S521
When the step voltage value is greater than a preset step voltage threshold, the power of the induction cooker is increased until the step voltage value is within a preset step voltage range.
S522

FIG. 6

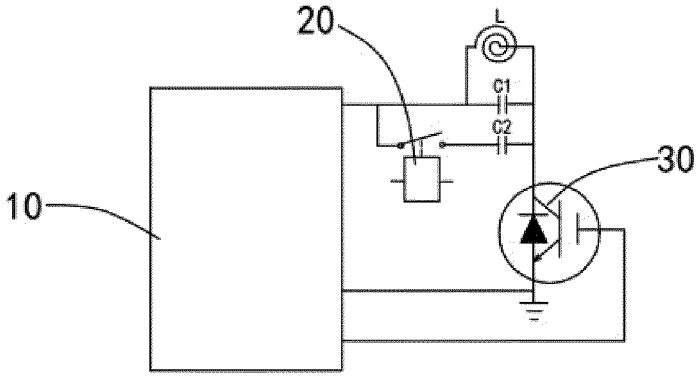
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FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 7314

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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
Munich	8 March 2024	de la Tassa Laforgue

CATEGORY OF CITED DOCUMENTS

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