

COOKING METHOD, APPARATUS AND DEVICE, AND COMPUTER-READABLE STORAGE MEDIUM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority of Chinese Patent Application No. 202010301014.2,
5 filed on April 16, 2020, filed with China National Intellectual Property Administration, and
entitled “COOKING METHOD, APPARATUS, DEVICE AND STORAGE MEDIUM”, the
entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to the technical field of intelligent control, and relates
10 to, but is not limited to, a cooking method, a cooking apparatus, a cooking device, and a
computer-readable storage medium.

BACKGROUND

[0003] As the quality of life improves, people's requirements for healthy diet increase.
Porridge is a kind of thick food made of rice, millet, corn or beans, which can not only relieve
15 hunger, but also have many advantages such as replenishing water, regulating the stomach and
preventing constipation. The common method of cooking porridge is to first cook it on a high
heat until it boils, and then switch to a low heat and cook until the porridge soup is thick. When
the porridge is cooked in the current rice cookers on the market, in order to avoid the porridge
overflowing due to high heat, it is possible to turn down the heat when it is almost boiled, so
20 that the time for cooking the porridge is usually more than 1.5 hours, which is a long time. With
the acceleration of the pace of life, people's pursuit of fast porridge cooking with rice cookers is
increasing day by day. At present, the rice cookers on the market cannot meet the needs of
fast-paced life.

SUMMARY

[0004] In view of this, embodiments of the present disclosure provide a cooking method, a
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cooking apparatus, a cooking device, and a computer-readable storage medium.

[0005] The embodiments of the present disclosure provide a cooking method, including:

[0006] in response to an operation instruction for starting a cooking device, controlling the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold;

[0007] controlling the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power;

[0008] controlling the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and

[0009] controlling the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power.

[0010] In some embodiments of the present disclosure, before controlling the cooking device to operate at the second power and/or at the third power, the method further includes:

[0011] controlling the cooking device to stop operating until the internal temperature of the cooking device drops to a second temperature threshold.

[0012] In some embodiments of the present disclosure, controlling the cooking device to operate at the second power includes:

[0013] acquiring a cooking amount of a cooking object in the cooking device when the internal temperature of the cooking device reaches a first temperature threshold;

[0014] querying a pre-stored relationship table of cooking amount and power according to the cooking amount, and determining that an adjustment ratio of the second power corresponding to the cooking amount is $P:Q$, both P and Q being positive numbers; and

[0015] controlling the cooking device to operate at the second power with the adjustment ratio of $P:Q$, wherein the cooking device operating at the second power with the adjustment ratio of $P:Q$ includes that the cooking device periodically operates at the second power for P seconds and stops operating for Q seconds.

[0016] In some embodiments of the present disclosure, controlling the cooking device to operate at the second power with the adjustment ratio of $P:Q$ includes:

[0017] collecting the internal temperature of the cooking device according to a collection period when the internal temperature of the cooking device reaches a third temperature threshold;

[0018] determining an internal temperature collected at a current moment as a first internal

temperature, and determining an internal temperature collected at a historical moment separated from the current moment by a second duration threshold as a second internal temperature;

[0019] determining the change slope of the internal temperature of the cooking device according to the first internal temperature, the second internal temperature and the second duration threshold; and

[0020] controlling the cooking device to stop operating at the second power when the change slope meets the preset slight boiling pre-judgment condition.

[0021] In some embodiments of the present disclosure, before controlling the cooking device to operate at the third power, the method further includes:

[0022] controlling the cooking device to operate at a fifth power until the internal temperature of the cooking device reaches a fourth temperature threshold, the fifth power being less than or equal to the second power, and greater than or equal to the third power.

[0023] In some embodiments of the present disclosure, controlling the cooking device to operate at the third power includes:

[0024] initializing a boiling count to 0 when the internal temperature of the cooking device reaches the fourth temperature threshold;

[0025] controlling the cooking device to operate at the third power with an adjustment ratio of M: N, wherein both M and N are positive numbers, and $M:N < P:Q$;

[0026] calculating a temperature rise value T of the internal temperature of the cooking device within the operating duration when an operating duration at the third power with the adjustment ratio of M: N is greater than or equal to a third duration threshold;

[0027] if the temperature rise value T is 0, increasing the boiling count by 1; and

[0028] when the boiling count is less than a count threshold, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N.

[0029] In some embodiments of the present disclosure, controlling the cooking device to operate at the third power further includes:

[0030] if the temperature rise value T is greater than a fifth temperature threshold, the boiling count is 0 and N is less than a fourth duration threshold, updating $N+a$ to N, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N, wherein a is a positive number;

[0031] if the temperature rise value T is greater than the fifth temperature threshold and the boiling count is not 0, setting the operating duration and the boiling count to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N;

[0032] if the temperature rise value T is equal to the fifth temperature threshold and the boiling count is 0, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of $M:N$; and

[0033] if the temperature rise value T is equal to the fifth temperature threshold, the boiling count is not 0, and N is greater than a fifth duration threshold, updating $N-b$ to N , setting the operating duration and the boiling count to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of $M:N$, wherein b is a positive number.

[0034] In some embodiments of the present disclosure, controlling the cooking device to operate at the third power further includes:

[0035] controlling the cooking device to stop operating at the third power, when the boiling count is not less than the count threshold, and the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold.

[0036] The embodiments of the present disclosure further provide a cooking apparatus, including:

[0037] a first control module, configured to, in response to an operation instruction for starting a cooking device, control the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold;

[0038] a second control module, configured to control the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power;

[0039] a third control module, configured to control the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and

[0040] a fourth control module, configured to control the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power.

[0041] The embodiments of the present disclosure further provide a cooking device, including:

[0042] a memory configured to store executable instructions; and

[0043] a processor, when configured to execute the executable instructions stored in the memory, the cooking method of any one of claims 1 to 8 is implemented.

[0044] The embodiments of the present disclosure further provide a computer-readable

storage medium, wherein the computer-readable storage medium stores executable instructions and is configured to implement the cooking method as described above when a processor is executed.

[0045] The present disclosure provides a cooking method, including: controlling the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold in response to an operation instruction for starting a cooking device; controlling the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power; controlling the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and controlling the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power. In this way, while preventing the object to be cooked from overflowing the cooking device, fast and fully automatic cooking is realized, which can improve the user's satisfaction when using the cooking device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0046] FIG. 1 is a schematic flowchart of a cooking method according to an embodiment of the present disclosure.

[0047] FIG. 2 is a schematic flowchart of the cooking method according to another embodiment of the present disclosure.

[0048] FIG. 3 is a schematic diagram of system composition of a cooking device according to an embodiment of the present disclosure.

[0049] FIG. 4A is a schematic flowchart of the cooking method according to yet another embodiment of the present disclosure.

[0050] FIG. 4B is a schematic flowchart of a heating process of the cooking method according to an embodiment of the present disclosure.

[0051] FIG. 4C is a schematic flowchart of the heating process of the cooking method according to another embodiment of the present disclosure.

[0052] FIG. 5 is a schematic structural diagram of a cooking apparatus according to an embodiment of the present disclosure.

[0053] FIG. 6 is a schematic structural diagram of the cooking device according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0054] In order to make the objective, the technical solution and the advantage of the present disclosure clearer, the present disclosure will be further described in detail below with reference to the accompanying drawings. The described embodiments should not be regarded as
5 a limitation to the present disclosure, and all other embodiments obtained by those of ordinary skill in the art without creative work fall within the scope of the present disclosure.

[0055] In the following description, the terms “first\second\third” are only used to distinguish similar objects, and do not represent a specific ordering of objects. It is understood that “first\second\third” can be interchanged in a specific order or sequence where permitted, to
10 enable the embodiments of the present disclosure described herein to be practiced in sequences other than those illustrated or described herein.

[0056] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the present disclosure belongs. The terms used herein are only for the purpose of describing the
15 embodiments of the present disclosure, and are not intended to limit the present disclosure.

[0057] The cooking method provided by the embodiment of the present disclosure will be described below with reference to the device provided by the embodiment of the present disclosure.

[0058] As shown in FIG. 1, FIG. 1 is a schematic flowchart of a cooking method according
20 to an embodiment of the present disclosure. The cooking method is applied to a cooking device. The cooking device may be an electric cooker, which will be described below with reference to the blocks shown in FIG. 1.

[0059] At block S101, in response to an operation instruction for starting a cooking device, the cooking device is controlled to operate at a first power until an internal temperature of the
25 cooking device reaches a first temperature threshold.

[0060] The operation instructions for starting the cooking device vary according to different control modes, and the control modes may include voice, touch, and keys. When the cooking device is controlled by voice, the operation instruction for starting the cooking device can be a voice instruction issued by the user that can express the semantics of “start cooking”. When the
30 cooking device is equipped with a display screen, the operation instruction for starting the cooking device may be a touch operation (e.g., click, press, slide, drag, etc.) instruction performed by the user on a certain position on the display screen. In some embodiments, the operation instruction for starting the cooking device may also be an operation instruction that the user clicks or presses a key provided on the cooking device. The cooking device may also

be controlled by remote control through the terminal, and the operation instruction for starting the cooking device may be a control instruction sent by the user when using the terminal.

[0061] When the user starts to cook, an operation instruction for starting the cooking device is sent to the cooking device, and the cooking device starts to operate at the first power in response to the operation instruction. At this time, a temperature sensor disposed inside the cooking device collects the internal temperature of the cooking device, and the cooking device operates at the first power until the internal temperature reaches the first temperature threshold.

[0062] The temperature sensor can be provided on the upper cover, bottom, side or other positions of the cooking device to collect the temperature at the corresponding position inside the cooking device. When collecting the temperature of the upper cover inside the cooking device, the collected temperature may be the temperature of the upper cover of the cooking device during the cooking process. When collecting the temperature of the bottom inside the cooking device, the collected temperature may be the temperature of the heating plate of the cooking device, or the bottom temperature of the carrier containing the cooking object in the cooking device. When collecting the temperature of the side inside the cooking device, the collected temperature may be the side temperature of the carrier containing the cooking object. In some embodiments, there may be a plurality of sensors inside the cooking device, and the plurality of sensors are provided at different positions on the upper cover and/or the bottom and/or side of the cooking device. By simultaneously collecting temperatures at different positions and determining the temperature of the cooking object according to the temperatures at multiple different positions, the accuracy of the temperature of the cooking object can be improved.

[0063] In some embodiments of the present disclosure, the temperature sensor can be provided on the upper cover of the cooking device. Since the temperature of the upper cover is mainly heated by the steam generated during the cooking process, using the sensor disposed on the upper cover to detect the temperature of the upper cover can more accurately determine the heating degree of the cooking object, to more accurately determine whether the cooking object is boiling, and preventing the cooking object from overflowing the cooking device.

[0064] The first power may be the full power of the cooking device, i.e., the maximum power, to heat the cooking object to the first temperature threshold as quickly as possible. The first temperature threshold is a preset temperature value, at which the cooking object in the cooking device has not boiled and will not overflow the cooking device. In some embodiments, the first temperature threshold may be 65 degrees Celsius (°C).

[0065] At block S102, the cooking device is controlled to operate at a second power until a

change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition.

[0066] When the internal temperature of the cooking device reaches the first temperature threshold, the temperature of the cooking object is already high. At this time, if the heating based on the full power is continued, the cooking object may overflow. When the internal temperature reaches the first temperature threshold, that is, when the cooking object reaches the first temperature threshold, the cooking device stops operating at the first power, and starts operating at the second power. The second power is less than or equal to the first power, and the average power of the cooking device operating at the second power is less than the average power of the cooking device operating at the first power.

[0067] In some embodiments, the second power is less than the full power, for example, the full power of the cooking device is 1000 watts (W), and when the cooking device operates at the second power, the power of the cooking device is 700W. In some embodiments, the second power is equal to full power, the cooking device is paused for a period of time each time the cooking device operates at the second power for a period of time. For example, the full power of the cooking device is 1000W, the cooking device operates at the second power of 1000W for 18 seconds (“s”), pauses for 14s, continues to operate at 1000W for 18s, pauses for 14s, and the cycle is repeated.

[0068] When the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, the operation at the second power is stopped. At this time, the cooking object in the cooking device has reached the slight boiling point, that is, the temperature of the cooking object is about to reach the boiling point.

[0069] At block S103, the cooking device is controlled to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold.

[0070] When the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, the temperature of the cooking object is about to reach the boiling point. At this time, if the heating based on the second power is continued, the cooking object may overflow. When the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, the cooking device is controlled to stop operating at the second power and start operating at the third power. The third power is less than or equal to the second power, and the average power of the cooking device operating at the third power is less than the average power of the cooking device operating at the second power.

[0071] In some embodiments, the third power is less than the second power. For example, when the cooking device operates at the third power, the power of the cooking device is 500W. In some embodiments, the third power is equal to full power, the cooking device is paused for a period of time each time the cooking device operates at the third power for a period of time. For example, the full power of the cooking device is 1000W, the cooking device operates at the third power of 1000W for 10s, pauses for 10s, continues to operate at 1000W for 10s, pauses for 10s, and the cycle is repeated.

[0072] Since the cooking objects in different altitude regions have different boiling temperatures, that is, different boiling points, it is not possible to determine whether the temperature of the cooking object has reached the boiling point only by using the internal temperature. In practical applications, when the cooking object in the cooking device boils, the temperature will not increase, and the internal temperature will remain unchanged when the heating continues. Based on this, the embodiments of the present disclosure determine whether the cooking object has reached the boiling temperature. When the duration that the internal temperature remains unchanged reaches the first duration threshold, the cooking device is controlled to stop operating at the third power, and the temperature of the cooking object in the cooking device has reached the boiling point.

[0073] At block S104, the cooking device is controlled to operate at a fourth power until a preset cooking duration is reached.

[0074] The temperature of the cooking object has reached the boiling point when the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold. At this time, if the heating based on the third power is continued, the cooking object may overflow. When the duration for which the internal temperature of the cooking device remains constant reaches the first duration threshold, the cooking device is controlled to stop operating at the third power and start operating at the fourth power. The fourth power is less than or equal to the third power, and the average power of the cooking device operating at the fourth power is less than the average power of the cooking device operating at the third power.

[0075] In some embodiments, the fourth power is less than the third power. For example, when the cooking device operates at the fourth power, the power of the cooking device is 200W. In some embodiments, the fourth power is equal to full power, the cooking device is paused for a period of time each time the cooking device operates at the fourth power for a period of time. For example, the full power of the cooking device is 1000W, the cooking device operates at the fourth power of 1000W for 5s, pauses for 10s, continues to operate at 1000W for 5s, pauses for

10s, and the cycle is repeated.

[0076] In some embodiments of the present disclosure, when the cooking object reaches the boiling point, the cooking device is controlled to continue to operate at the fourth power, and when the cooking time is reached, the cooking is automatically ended or turned to keep warm.

5 The cooking time is a preset value, for example, 45 minutes (“min”).

[0077] The embodiments of the present disclosure provide a cooking method, including: controlling the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold in response to an operation instruction for starting a cooking device; controlling the cooking device to operate at a second power until a
10 change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power; controlling the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and controlling the cooking device to
15 operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power. In this way, while preventing the object to be cooked from overflowing the cooking device, fast and fully automatic cooking is realized, which can improve the user’s satisfaction when using the cooking device.

[0078] Based on the embodiment shown in FIG. 1, the embodiments of the present disclosure further provide a cooking method. As shown in FIG. 2, FIG. 2 is a schematic
20 flowchart of the cooking method according to another embodiment of the present disclosure. The cooking method of the embodiments of the present disclosure includes the following blocks.

[0079] At block S201, in response to an operation instruction for starting a cooking device,
25 the cooking device is controlled to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold.

[0080] In some embodiments of the present disclosure, blocks S201, S203, S205, and S206 correspond to blocks S101 to S104 in the embodiment shown in FIG. 1, respectively. The implementation process of blocks S201, S203, S205 and S206 refer to the above description.

30 **[0081]** At block S202, the cooking device is controlled to stop operating until the internal temperature of the cooking device drops to a second temperature threshold.

[0082] After the cooking device stops operating at the first power, residual heat is still present on the heating plate of the cooking device. In order to control the time point of preventing overflow more accurately and avoid the time point of overflow determined due to

the influence of residual heat on the heating plate, in the embodiment of the present disclosure, after the cooking device is controlled to stop heating based on the first power, the cooking device stops operating for a period of time, the heating plate conducts the residual heat on the heating plate to the carrier holding the cooking object through heat conduction, to continuously
5 heat the cooking object, consume the residual heat on the heating plate, and realize more accurate and reliable overflow prevention control.

[0083] In some embodiments, the length of time that the cooking device stops operating may be determined according to the internal temperature of the cooking device. In the embodiments of the present disclosure, the sensor inside the cooking device can be provided at
10 the bottom of the cooking device. Since the temperature at the bottom is closest to the temperature at the heating plate of the cooking device, the sensor at the bottom can more accurately determine whether the heating plate still has residual heat, to determine the length of time to stop operating.

[0084] A sensor for collecting the temperature of the heating plate is provided under the
15 heating plate of the cooking device. When the cooking device stops operating at the first power, the sensor collects the temperature at the bottom of the cooking device, that is, the temperature of the heating plate. Since the cooking device was in the operating state before, the temperature collected at this time is greater than the second temperature threshold and greater than the temperature of the cooking object, and the heating plate conducts the residual heat on the
20 heating plate through heat conduction, consuming the residual heat on the heating plate.

[0085] In the embodiments of the present disclosure, the residual heat at the bottom of the cooking device is consumed by heat conduction, and the temperature of the cooking object increases and the temperature of the heating plate decreases, to reduce the temperature at the bottom of the cooking device collected by the sensor. When the temperature at the bottom of the
25 cooking device drops to the second temperature threshold, the cooking device is controlled to start operating again.

[0086] In some embodiments, the block S202 can also be replaced by: controlling the cooking device to stop operating until a preset stopping duration is reached. The length of time that the cooking device stops operating can be determined according to the cooking volume of
30 the cooking object. When the cooking volume of the cooking object is large, the cooking object is easy to overflow, and it can stop operating for a long time (for example, 2min) to consume the residual heat on the heating plate. When the cooking volume of the cooking object is small, the cooking object is not easy to overflow, and can stop operating for a short period of time (for example, 1 min) to consume the residual heat on the heating plate.

[0087] In some embodiments, the block S202 can also be replaced by: controlling the cooking device to stop operating until the internal temperature of the cooking device no longer changes within a preset duration range. The length of time that the cooking device stops operating can be determined according to the internal temperature of the cooking device. When the residual heat at the bottom of the cooking device conducts heat conduction, the temperature of the cooking object increases, and the internal temperature of the cooking device increases. When the temperature collected by the internal temperature sensor does not change within the preset time period, it indicates that the temperature of the cooking object has a smaller temperature increase or the temperature does not increase within the preset time period. That is, the heat conduction speed is slow or the heat conduction is no longer carried out. At this time, there is less residual heat at the bottom of the cooking device, and the cooking device can be controlled to start operating again.

[0088] At block S203, the cooking device is controlled to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition.

[0089] The second power is less than or equal to the first power.

[0090] At block S204, the cooking device is controlled to stop operating until the internal temperature of the cooking device drops to a second temperature threshold.

[0091] In the embodiments of the present disclosure, the implementation process of block S204 is as described in the above-mentioned block S202, the implementation mode and function are the same. Both of them consume the residual heat on the heating plate, and continue to heat the cooking object through heat conduction, to achieve more accurate and reliable overflow control.

[0092] At block S205, the cooking device is controlled to operate at a third power until the duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold.

[0093] The third power is less than or equal to the second power.

[0094] At block S206, the cooking device is controlled to operate at a fourth power until a preset cooking duration is reached.

[0095] The fourth power is less than or equal to the third power.

[0096] The embodiments of the present disclosure provide a cooking method, including: in response to an operation instruction for starting a cooking device, controlling the cooking device to operate at a first power; when the internal temperature of the cooking device reaches the first temperature threshold, controlling the cooking device to stop operating; when the

internal temperature of the cooking device falls to the second temperature threshold, controlling the cooking device to operate at the second power; when the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, controlling the cooking device to stop operating; when the internal temperature of the cooking device drops to the second temperature threshold, controlling the cooking device to operate at the third power; when the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold, controlling the cooking device to operate at the fourth power until the preset cooking duration is reached. The cooking device is controlled to stop operating to consume the residual heat on the heating plate, and the residual heat conducts heat conduction to realize the continuous heating of the cooking object, which can improve the accuracy of the overflow prevention control.

[0097] In some embodiments, “controlling the cooking device to operate at the second power” in block S102 of the embodiment shown in FIG. 1 or block S203 of the embodiment shown in FIG. 2 can be implemented through the following blocks S1021 to S1023, which will be described below with reference to each block.

[0098] At block S1021, a cooking amount of a cooking object in the cooking device is acquired when the internal temperature of the cooking device reaches a first temperature threshold.

[0099] When the internal temperature of the cooking device reaches the first temperature threshold, the temperature of the cooking object is already high, and if the full-power heating is continued, the cooking object may overflow. When the internal temperature reaches the first temperature threshold, that is, when the cooking object reaches the first temperature threshold, the cooking amount of the cooking object in the cooking device is acquired. The adjustment ratio of the second power is determined according to the cooking amount.

[0100] In the embodiment of the present disclosure, the cooking volume refers to the volume of the cooking objects contained in the carrier for holding the cooking objects in the cooking device, including cooking ingredients and water. The cooking ingredients here can be grains such as rice, millet, corn, or beans, and the water can be tap water or mineral water. In some embodiments, the water can also be replaced by other liquids, such as milk, coconut milk, and the like.

[0101] At block S1022, a pre-stored relationship table of cooking amount and power is queried according to the cooking amount, to determine that an adjustment ratio of the second power corresponding to the cooking amount is $P:Q$.

[0102] Both P and Q are positive numbers.

[0103] Without considering that the cooking device is affected by other external factors, the more the cooking volume is, the greater the power that needs to be heated, and the less the cooking volume is, the smaller the power that needs to be heated. Therefore, a relationship table of cooking amount and power is established in advance and stored in the storage area of the cooking device. After obtaining the current cooking amount, it is determined that the adjustment ratio of the second power corresponding to the current cooking amount is P: Q by querying the relationship table of cooking amount and power. The adjustment ratio determined by different cooking amounts is different. When there is a large amount of cooking, the ratio of the adjustment ratio of the second power is larger, to speed up the cooking speed and improve the user's satisfaction with the cooking device.

[0104] At block S1023, the cooking device is controlled to operate at the second power with an adjustment ratio of P: Q.

[0105] The cooking device operating at the second power with the adjustment ratio of P: Q includes that the cooking device periodically operates at the second power for P seconds and stops operating for Q seconds.

[0106] According to the pre-stored relationship table of cooking amount and power, the adjustment ratio of the second power matching the cooking amount obtained in block S1021 is queried as P: Q, the cooking device is controlled to operate at the second power with the adjustment ratio of P: Q. That is, the cooking device is controlled to operate at the second power for P seconds, stop operating for Q seconds, operate at the second power for P seconds, and stop operating for Q seconds, and so on, until the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition.

[0107] The embodiments of the present disclosure provide a cooking method. According to the pre-stored relationship table of cooking amount and power, it is found that the adjustment ratio of the second power corresponding to the current cooking amount is P: Q. Based on different second powers, cooking objects with different cooking amounts can be worked, to realize fast and fully automatic cooking, and improve the user's satisfaction with the cooking device.

[0108] In some embodiments, "controlling the cooking device to operate at the second power with an adjustment ratio of P: Q" in block S1023 can be implemented through the following blocks S0231 to S0234, which will be described below with reference to each block.

[0109] At block S0231, the internal temperature of the cooking device is collected according to a collection period when the internal temperature of the cooking device reaches a third temperature threshold.

[0110] After the cooking device is controlled to operate at the second power with the adjustment ratio of P: Q, the internal temperature of the cooking device is monitored. When the internal temperature of the cooking device reaches the third temperature threshold, the internal temperature of the cooking device is collected according to the collection period, and the collected internal temperature is stored according to the collection sequence.

[0111] At block S0232, an internal temperature collected at a current moment is determined as a first internal temperature, and an internal temperature collected at a historical moment separated from the current moment by a second duration threshold is determined as a second internal temperature.

[0112] When the collection duration reaches the second duration threshold, the internal temperature collected at the current moment is determined as the first internal temperature, and the internal temperature collected at a historical moment separated from the current moment by the second duration threshold is determined as the second internal temperature. For example, the collection period is 1s, the second duration threshold is 25s, the internal temperature collected at the current moment is the first internal temperature, and the internal temperature collected 25s ago is the second internal temperature.

[0113] At block S0233, the change slope of the internal temperature of the cooking device is determined according to the first internal temperature, the second internal temperature and the second duration threshold.

[0114] The change slope k of the internal temperature of the cooking device is determined according to the first internal temperature c_1 , the second internal temperature c_2 and the second duration threshold t . The calculation formula is shown in (1):

$$k = \frac{c_1 - c_2}{t} \quad (1)$$

[0115] At block S0234, the cooking device is controlled to stop operating at the second power when the change slope meets the preset slight boiling pre-judgment condition.

[0116] When the change slope is less than or equal to the preset slope threshold, it is determined that the change slope meets the preset slight boiling pre-judgment condition, and the cooking device is controlled to stop operating at the second power.

[0117] The embodiments of the present disclosure provide a cooking method. Two internal temperatures are collected within the second duration threshold to determine the change slope of the internal temperature of the cooking device. Based on this, it is determined whether the temperature of the cooking object has reached a slight boil, to determine whether to stop operating on the second power, and realize automatic cooking.

[0118] In some embodiments, before block S103 shown in FIG. 1 or block S205 shown in FIG. 2, the cooking method may further include: block S03 “controlling the cooking device to operate at a fifth power until the internal temperature of the cooking device reaches a fourth temperature threshold, the fifth power being less than or equal to the second power, and greater than or equal to the third power”.

[0119] When the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, it is possible that the current temperature of the cooking object (that is, the internal temperature of the cooking device) is still far from the boiling point, that is, the current temperature of the cooking object has not reached the fourth temperature threshold. For faster cooking, the fifth power is used for heating. The fifth power is less than or equal to the second power and greater than or equal to the third power. During the process of operating on the fifth power, when the internal temperature of the cooking device reaches the fourth temperature threshold, the cooking device is controlled to stop operating at the fifth power.

[0120] When the change slope of the internal temperature of the cooking device meets the preset slight boiling pre-judgment condition, if the internal temperature of the cooking device has reached the fourth temperature threshold, there is no need to perform this block, and proceed to block S103 or block S205.

[0121] In some embodiments, “controlling the cooking device to operate on the third power” in block S103 shown in FIG. 1 or block S205 shown in FIG. 2 can be implemented through the following blocks.

[0122] At block S1031, a boiling count is initialized to 0 when the internal temperature of the cooking device reaches the fourth temperature threshold.

[0123] When the cooking device is controlled to operate at the third power, the adjustment ratio with which the cooking device operates at the third power is determined. When the internal temperature of the cooking device reaches the fourth temperature threshold, the boiling count is initialized to 0. The boiling count herein is a constant, which is used to count the number of times when the temperature rise value is 0 continuously during the heating process. Whenever the temperature rise value is not 0, the boiling count starts counting from 0 again.

[0124] At block S1032, the cooking device is controlled to operate at the third power with an adjustment ratio of M: N.

[0125] In the embodiments of the present disclosure, after initializing the boiling count, the cooking device is controlled to operate at the third power with the adjustment ratio of M: N. Both M and N are positive numbers, and $M:N < P:Q$. That is, the average power of the cooking

device when operating on the third power is less than the average power when operating on the second power. Initially, the cooking device is controlled to operate at the third power with an adjustment ratio of 3: 5, that is, heating at the third power for 3 seconds, stopping the heating for 5 seconds, heating at the third power for 3 seconds again, stopping the heating for 5 seconds, and the cycle is repeated.

[0126] At block S1033, when an operating duration at the third power with the adjustment ratio of M: N is greater than or equal to a third duration threshold, a temperature rise value T of the internal temperature of the cooking device within the operating duration is calculated.

[0127] The third duration threshold may be a preset value, such as 40s.

[0128] When the operating duration at the third power with the adjustment ratio of M: N is greater than or equal to the third duration threshold, through the collected internal temperature of the cooking device, the temperature rise value T of the internal temperature within the operating duration is calculated. The internal temperature collected when the third power starts to operate with the adjustment ratio of M: N is recorded as T₁, the internal temperature collected after operating for a long time is recorded as T₂, and the calculation formula of the temperature rise value T is shown in (2):

$$T=T_1-T_2 \quad (2)$$

[0129] At block S1034, if the temperature rise value T is 0, the boiling count is increased by 1.

[0130] The temperature rise value T is determined. If T is equal to 0, it means that the temperature of the cooking device has not changed during the current operating duration. At this time, the boiling count is increased by 1.

[0131] At block S1035, when the boiling count is less than a count threshold, the operating duration is reset to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0132] When the boiling count is less than the count threshold, the duration indicating that the temperature has not changed has not yet reached the first duration threshold, which is not enough to determine that the cooking object in the cooking device has reached the boiling point. At this time, the operating duration is reset to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0133] In some embodiments, after the block S1035, the method further includes the following blocks.

[0134] At block S1036, if the temperature rise value T is greater than a fifth temperature threshold, the boiling count is 0 and N is less than a fourth duration threshold, N+a is updated to

N, the operating duration is set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0135] a is a positive number. The fifth temperature threshold may be a constant, and the fifth temperature threshold is sufficient to ensure that the cooking object will not overflow when the temperature rises to the fifth temperature threshold within the operating duration. The fourth duration threshold is to prevent the operating power from being too small. When heating for 3s and stopping heating for 60s, the cooking object has not yet reached the boiling point when the cooking duration is reached. In this embodiment of the present disclosure, it is possible to set that a is equal to T, the fifth temperature threshold is 1°C, and the fourth duration threshold is 46s.

[0136] When the temperature rise value T is greater than the fifth temperature threshold, the boiling count is 0 and N is less than the fourth duration threshold, it indicates that the temperature of the cooking object rises too fast within the operating duration, there may be a risk of overflow, and the adjustment ratio of the operating power needs to be reduced. In the embodiments of the present disclosure, N+a is updated to N, the operating duration is set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N. The M: N at this time is no longer the initial value, and has been updated to the updated M: N. Since a is a positive number, the M: N after the update is smaller than the M:N before the update, to reduce the adjustment ratio of the operating power, and avoid the overflow of the cooking object.

[0137] In the embodiments of the present disclosure, M value can be unchanged, the heating is always heated for 3s, and the average heating power can be adjusted by adjusting the stop operating duration N.

[0138] At block S1037, if the temperature rise value T is greater than the fifth temperature threshold and the boiling count is not 0, the operating duration and the boiling count are set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0139] If the temperature rise value T is greater than the fifth temperature threshold and the boiling count is not 0, it indicates that the temperature rise value T of the cooking device is greater than the fifth temperature threshold after at least 2 operating durations. At this time, there is no need to adjust the adjustment ratio of the operating power, the operating duration and the boiling count are set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0140] At block S1038, if the temperature rise value T is equal to the fifth temperature

threshold and the boiling count is 0, the operating duration is set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0141] If the temperature rise value T is equal to the fifth temperature threshold and the boiling count is 0, it indicates that the temperature of the cooking device has just increased by the fifth temperature threshold within an operating duration. At this time, there is no need to adjust the adjustment ratio of the operating power, the operating duration and the boiling count are set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0142] At block S1039, if the temperature rise value T is equal to the fifth temperature threshold, the boiling count is not 0, and N is greater than a fifth duration threshold, N-b is updated to N, the operating duration and the boiling count are set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N.

[0143] b is a positive number. In order to avoid excessive operating power, such as heating for 3s and stopping the heating for 10s, the cooking object will overflow. Based on this, the fifth duration threshold is set to ensure that the cooking object will not overflow when the adjustment ratio of the operating power is increased. In this embodiment of the present disclosure, it is possible to set that b is equal to 1, and the fifth duration threshold is 13s.

[0144] If the temperature rise value T is equal to the fifth temperature threshold, the boiling count is not 0, and N is greater than the fifth duration threshold, it indicates that the temperature of the cooking device has increased by the fifth temperature threshold for at least two operating durations, the temperature of the cooking object rises too slowly within an operating duration, which prolongs the cooking time. At this time, the adjustment ratio of the operating power needs to be adjusted larger. In the embodiment of the present disclosure, N-b is updated to N, the operating duration and the boiling count are set to 0, and the cooking device is controlled to continue to operate at the third power with the adjustment ratio of M: N. The M: N at this time is no longer the initial value, and has been updated to the updated M: N. Since b is a positive number, the M: N after the update is greater than the M: N before the update, to increase the adjustment ratio of the operating power, and speed up the cooking speed.

[0145] In some embodiments, after the block S1039, the method further includes the following blocks.

[0146] At block S10310, the cooking device is controlled to stop operating at the third power, when the boiling count is not less than the count threshold, and the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold.

[0147] When the boiling count is not less than the count threshold, and the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold, it indicates that the cooking object has reached the boiling point, and the cooking device is controlled to stop operating at the third power. In the embodiment of the present disclosure, the first duration threshold may be an integer multiple of the second duration threshold, such as 3 times, that is, the first duration threshold is 120s.

[0148] In some embodiments, since the boiling points of the cooking objects in different altitude areas are different, when the boiling point is the plain boiling point (that is, the boiling point is greater than or equal to 97°C), the cooking device is controlled to continue heating at the fourth power with the adjustment ratio of M: (N+5). When the boiling point is the plateau boiling point (that is, the boiling point is less than 97°C), the cooking device is controlled to continue heating at the fourth power with the adjustment ratio of M: (N+4). M and N are respectively the M and N values determined based on the adjustment ratio of M: N when the cooking device stops when the internal temperature of the cooking device remains unchanged reaches the first duration threshold.

[0149] An exemplary application of the embodiments of the present disclosure in a practical application scenario will be described below.

[0150] FIG. 3 is a schematic structural diagram of a cooking device according to an embodiment of the present disclosure. As shown in FIG. 3, the cooking device described in this embodiment of the present disclosure includes an internal temperature detection system 31, an ambient temperature detection system 302, a heating system 304 and a control system 305. The internal temperature detection system 31 may include an upper cover temperature detection system 301 and a bottom temperature detection system 303. The control system 305 is respectively connected to the upper cover temperature detection system 301, the ambient temperature detection system 302, the bottom temperature detection system 303 and the heating system 304. The upper cover temperature detection system 301 is configured to detect the temperature of the upper cover of the cooking device. The ambient temperature detection system 302 is configured to detect the temperature of the environment where the cooking device is located. The bottom temperature detection system 303 is configured to detect the bottom temperature of the cooking device. The heating system 304 is configured to heat the cooking object. The control system 305 is configured to control the upper cover temperature detection system 301, the ambient temperature detection system 302, the bottom temperature detection system 303 and the heating system 304.

[0151] FIG. 4A is a schematic flowchart of the cooking method according to yet another

embodiment of the present disclosure. As shown in FIG. 4A, the cooking method includes the following blocks.

[0152] At block S401, heating stage 1: the cooking device is heated with high power (full power) until the internal temperature reaches the first temperature threshold.

5 **[0153]** The internal temperature can be detected by an internal temperature detection system, such as the upper cover temperature detection system. The upper cover temperature detection system may be a temperature sensor, and the first temperature threshold may be set to 65°C according to the test data.

10 **[0154]** At block S402, stop stage 1: stop heating the cooking device for the first preset duration.

[0155] The cooking amount of the cooking object is different, and the corresponding stop time is different, and the first preset duration for stopping the heating is set according to the cooking amount of the cooking object. The residual heat of the heating plate is consumed through the stop stage 1, which provides a basis for the judgment of the next heating stage described in block S403. When the heating plate consumes residual heat to heat the cooking object, the heating method is heat conduction. If the residual heat of the heating plate is not consumed in advance, the heating will be stopped when the overflow prevention temperature is reached. Since the heating plate still has residual heat, it will continue to heat the cooking object, which will cause the cooking object to overflow. Therefore, it is necessary to stop the work in advance to release the residual heat of the heating plate, to carry out more reliable overflow prevention control.

[0156] At block S403, heating stage 2: different cooking amounts are heated with different firepower, and the slight boiling is predicted in advance through the change of the slope of the internal temperature.

25 **[0157]** FIG. 4B is a schematic flowchart of a heating process of the cooking method according to an embodiment of the present disclosure, which is for realizing the heating process of the heating stage 2 in block S403, the heating stage 2 shown in FIG. 4B includes the following blocks.

30 **[0158]** At block S4031, the cooking device operates at the second power with the adjustment ratio of P: Q.

[0159] In the heating stage 2, the cooking device operates at the second power with the adjustment ratio of P: Q, that is, heating the cooking device at the second power for P seconds, stop heating the cooking device for Q seconds, then heating the cooking device at the second power for P seconds, stop heating the cooking device for Q seconds, and the cycle is repeated.

[0160] At block S4032, whether the internal temperature reaches the third temperature threshold is determined.

[0161] The cooking device operates at the second power with the adjustment ratio of P: Q, the internal temperature detection system detects the internal temperature. When it is detected that the internal temperature reaches the third temperature threshold (e.g., 80°C), it indicates that the temperature of the cooking object has reached the third temperature threshold. At this time, block S4033 is entered, and the slight boiling judgment is started. When it is detected that the internal temperature does not reach the third temperature threshold, return to block S4031 to continue to operate at the second power with the adjustment ratio of P: Q.

[0162] At block S4033, the internal temperature of the cooking device is collected according to the collection period and is saved in a preset space.

[0163] At block S4034, the maximum value and the minimum value of the collected temperature in the preset space are obtained.

[0164] The internal temperature of the cooking device is collected according to the preset collection period and is saved in a preset space. The maximum value and the minimum value of the collected internal temperature in the preset space are obtained. Since the cooking device is always working at this stage, it is impossible for the internal temperature to decrease. Therefore, the maximum value of the collected internal temperature is the internal temperature value collected at the current moment, and the minimum value of the collected internal temperature is the internal temperature value collected at the earliest moment in the preset space.

[0165] At block S4035, the difference T between the maximum value and the minimum value is calculated.

[0166] At block S4036, whether T meets the slight boiling condition is determined.

[0167] At block S4037, the cooking device is determined to have slightly boiled.

[0168] The temperature rise value c of the cooking device in the time period when the two temperatures are collected is calculated according to the maximum value and the minimum value of the internal temperature. According to c, it is determined whether the slight boiling condition is met. If c does not meet the slight boiling condition, it is possible to continue to collect the internal temperature, and enter block S4033. If c satisfies the slight boiling condition, it is possible to enter block S4037 to determine that the cooking device has slightly boiled.

[0169] In an embodiment, 25 data recording spaces are set, the collected internal temperature value is recorded every second. After recording 25 data recording spaces, the difference c between the last recorded internal temperature value and the first recorded internal temperature value in the data recording spaces is calculated. When c is less than the preset

temperature threshold (such as 5°C), or when the ratio of c to the recording time difference (that is, the difference between the time of the last recording and the time of the first recording in the data recording space) is greater than the preset slope, it indicates that the slight boiling condition has not yet been reached, at this time, the first recorded internal temperature value is deleted, to leave one data recording space, continue to collect and record the internal temperature value at the current moment, and calculate the difference c between the last recorded internal temperature value and the first recorded internal temperature value in the data recording space again. The above blocks are repeated until c meets the slight boiling condition, it is determined that the cooking device has reached the slight boiling, and the process goes to block S404.

[0170] At block S404, stop stage 2: stop heating the cooking device for a second preset duration.

[0171] When the internal temperature of the cooking device no longer rises within a certain period of time, the process enters block S405 to continue heating. For example, it is set that the next heating stage described in block S405 is entered 30 seconds after the internal temperature stops rising.

[0172] The purpose of block S404 is the same as that of block S402, that is, to consume the residual heat of the heating plate, and provide a basis for the judgment of the next heating stage described in block S405. In the embodiment of the present disclosure, the work is stopped in advance to release the residual heat of the heating plate, to perform relatively reliable overflow prevention control.

[0173] At block S405, boiling stage 1: through the local proportion integral differential (PID) algorithm, the boiling point and fire control strength at different altitude areas are identified.

[0174] FIG. 4C is a schematic flowchart of the heating process of the cooking method according to another embodiment of the present disclosure, which is for realizing the heating process of the boiling stage 1 in block S405, the boiling stage 1 shown in FIG. 4C includes the following blocks.

[0175] At block S40501, the cooking device operates at the third power with the adjustment ratio of M: N.

[0176] In the boiling stage 1, the cooking device operates at the third power with the adjustment ratio of M: N, that is, heating the cooking device at the third power for M seconds, stopping heating the cooking device for N seconds, heating the cooking device at the third power for M seconds again, stopping heating the cooking device for N seconds, and the cycle is

repeated.

[0177] At block S40502, whether the internal temperature reaches the fourth temperature threshold is determined.

[0178] The cooking device operates at the third power with the adjustment ratio of M: N,
5 the internal temperature detection system detects the internal temperature. When it is detected that the internal temperature reaches the fourth temperature threshold (e.g., 90°C), it indicates that the cooking object is about to boil, at this time, block S40503 is entered. When it is detected that the internal temperature does not reach the fourth temperature threshold, it indicates that the cooking object is still far from the boiling point, it is possible to return to
10 block S40501 to continue to operate at the third power with the adjustment ratio of M: N.

[0179] At block S40503, the boiling count is initialized to 0.

[0180] At block S40504, the heating duration is set to 0.

[0181] At block S40505, the cooking device is heated at the third power for M seconds, and stopped from being heated for N seconds.

15 **[0182]** At block S40506, whether the heating duration reaches the third duration threshold is determined.

[0183] The heating duration is calculated during the process of heating at the third power for M seconds and stopping heating for N seconds. When the heating duration reaches the third duration threshold (40s), block S40507 is entered. When the heating duration does not reach the
20 third duration threshold, it is possible to continue heating at the third power for M seconds, stop heating for N seconds, and return to block S40505.

[0184] At block S40507, the temperature rise value T of the internal temperature within the heating duration is calculated.

[0185] At block S40508, whether T is 0 is determined.

25 **[0186]** The temperature rise value T of the internal temperature within the heating duration is calculated. If the temperature rise value T is 0, that is, the internal temperature does not change within the heating duration, and the process proceeds to block S40509. If the temperature rise value T is not 0, that is, the internal temperature changes within the heating duration, and the process proceeds to block S40512 to determine the speed of the change to
30 determine whether the heating stop duration N needs to be increased or decreased.

[0187] At block S40509, the boiling count is increased by 1.

[0188] At block S40510, whether the boiling count is less than the count threshold is determined.

[0189] When the boiling count is less than the count threshold (such as 3), it indicates that

the duration for which the internal temperature is kept unchanged has not reached the first duration threshold (such as 120s). At this time, the process proceeds to block S40504 to start the heating process for the next heating time. When it is determined that the boiling count is not less than the count threshold, the process proceeds to block S40511.

5 **[0190]** At block S40511, when the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold, the cooking device is controlled to stop operating at the third power.

[0191] After the execution of block S40511 is completed, it is determined that the heating of the boiling stage 2 can be performed, and the process proceeds to block S406.

10 **[0192]** At block S40512, whether T is 1 is determined.

[0193] When the temperature rise value T is 1, it indicates that the internal temperature has risen by 1°C within the current heating duration, and the process proceeds to block S40513. When the temperature rise value T is not 1, that is, when the temperature rise value is greater than 1, the process proceeds to block S40515.

15 **[0194]** At block S40513, whether the boiling count is 0 is determined.

[0195] If the temperature rise value T is 1 and the boiling count is 0, it indicates that the internal temperature has risen by 1°C within a heating duration, and there is no need to adjust the adjustment ratio of the third power, and the process proceeds to block S40503 to continue heating.

20 **[0196]** If the temperature rise value T is 1 and the boiling count is not 0, it indicates that the internal temperature has risen by 1°C within at least two heating durations, and the average heating power is small. In order to speed up the cooking speed, the adjustment ratio of the third power needs to be increased, that is, on the premise of not changing the heating duration, the heating stop duration is shortened, and the process proceeds to block S40514.

25 **[0197]** At block S40514, N-b is updated to N.

[0198] b is a positive number, and N-b is updated to N, which shortens the heating stop duration, and can effectively improve the cooking speed. Then the process proceeds to block S40503 to continue heating.

[0199] At block S40515, whether the boiling count is 0 is determined.

30 **[0200]** If the internal temperature rise is greater than 1°C, and the boiling count is 0, it indicates that the internal temperature rise value is greater than 1°C within a heating duration, and the average heating power is large. In order to avoid the overflow of the cooking object, the adjustment ratio of the third power needs to be reduced, that is, the heating stop duration is extended without changing the heating duration, and the process proceeds to block S40516.

[0201] If the internal temperature rise is greater than 1°C, and the boiling count is not 0, it indicates that the internal temperature rise value is greater than 1°C within at least two heating durations, and there is no need to adjust the adjustment ratio of the third power, and the process proceeds to block S40503 to continue heating.

5 **[0202]** At block S40516, N+a is updated to N.

[0203] a is a positive number, and N+a is updated to N, which prolongs the heating stop duration, and can effectively prevent the cooking object from overflowing. Then the process proceeds to block S40503 to continue heating.

10 **[0204]** At block S406, boiling stage 2: slight boiling is controlled according to the boiling point and the fire control strength.

[0205] After entering the boiling stage 2, when the boiling point is the plain boiling point (that is, the boiling point is greater than or equal to 97°C), the cooking device is controlled to continue heating at the fourth power with the adjustment ratio of M: (N+5). When the boiling point is the plateau boiling point (that is, the boiling point is less than 97°C), the cooking device
15 is controlled to continue heating at the fourth power with the adjustment ratio of M: (N+4) until the cooking is over.

[0206] M and N are respectively the M and N values determined based on the adjustment ratio of M: N when the cooking device stops when the internal temperature of the cooking device remains unchanged reaches the first duration threshold. The condition for the end of
20 cooking may be that the cooking duration is reached or an operation instruction to end the cooking is received.

[0207] The embodiments of the present disclosure provide a cooking method. When the heating starts, the heating is performed with full power, and when the internal temperature detection system reaches the first temperature threshold, the heating is stopped for the first
25 preset duration, and the residual heat on the heating plate is consumed. Then a smaller firepower is determined according to the cooking amount, the heating is performed with the small firepower, and the slight boiling is predicted in advance through the change of the internal temperature slope. When it is determined that the slight boiling is reached, the heating is stopped for the second preset duration, and the residual heat on the heating plate is consumed
30 again. Then, the boiling point and fire control strength at different altitude areas are identified through the local proportional integral derivative algorithm, and finally slight boiling control is carried out according to the boiling point and fire power control strength. In this way, while preventing the object to be cooked from overflowing the cooking device, fast and fully automatic cooking is realized, which can improve the user's satisfaction when using the

cooking device.

[0208] Based on the above embodiments, the present disclosure provides a cooking apparatus. The apparatus includes each unit included and each module included in each unit, which can be implemented by a processor in a computer device, and can also be implemented
5 by a specific logic circuit. In the process of implementation, the processor may be a central processing unit (CPU), a microprocessor unit (MPU), a digital signal processor (DSP) or a field programmable gate array (FPGA), or the like.

[0209] FIG. 5 is a schematic structural diagram of a cooking apparatus according to an embodiment of the present disclosure. As shown in FIG. 5, the cooking apparatus 500 can
10 include:

[0210] a first control module 501, configured to, in response to an operation instruction for starting a cooking device, control the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold;

[0211] a second control module 502, configured to control the cooking device to operate at
15 a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power;

[0212] a third control module 503, configured to control the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains
20 unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and

[0213] a fourth control module 504, configured to control the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power.

[0214] In some embodiments, the cooking apparatus 500 can further include:

[0215] a fifth control module, configured to control the cooking device to stop operating until the internal temperature of the cooking device drops to a second temperature threshold.

[0216] In some embodiments, the second control module 502 can include:

[0217] an acquisition unit, configured to acquire a cooking amount of a cooking object in
30 the cooking device when the internal temperature of the cooking device reaches a first temperature threshold;

[0218] a determination unit, configured to query a pre-stored relationship table of cooking amount and power according to the cooking amount, and determine that an adjustment ratio of the second power corresponding to the cooking amount is $P:Q$, both P and Q being positive

numbers; and

[0219] a first control unit, configured to control the cooking device to operate at the second power with the adjustment ratio of P: Q.

[0220] The cooking device operating at the second power with the adjustment ratio of P: Q includes that the cooking device periodically operates at the second power for P seconds and stops operating for Q seconds.

[0221] In some embodiments, the first control unit can include:

[0222] a collection sub-unit, configured to collect the internal temperature of the cooking device according to a collection period when the internal temperature of the cooking device reaches a third temperature threshold;

[0223] a first determination sub-unit, configured to determine an internal temperature collected at a current moment as a first internal temperature, and determine an internal temperature collected at a historical moment separated from the current moment by a second duration threshold as a second internal temperature;

[0224] a second determination sub-unit, configured to determine the change slope of the internal temperature of the cooking device according to the first internal temperature, the second internal temperature and the second duration threshold; and

[0225] a control sub-unit, configured to control the cooking device to stop operating at the second power when the change slope meets the preset slight boiling pre-judgment condition.

[0226] In some embodiments, the cooking apparatus 500 can further include:

[0227] a sixth control module, configured to control the cooking device to operate at a fifth power until the internal temperature of the cooking device reaches a fourth temperature threshold, the fifth power being less than or equal to the second power, and greater than or equal to the third power.

[0228] In some embodiments, the third control module 503 can include:

[0229] an initialization unit, configured to initialize a boiling count to 0 when the internal temperature of the cooking device reaches the fourth temperature threshold;

[0230] a second control unit, configured to control the cooking device to operate at the third power with an adjustment ratio of M: N, both M and N are positive numbers, and $M: N < P: Q$;

[0231] a first calculation unit, configured to calculate a temperature rise value T of the internal temperature of the cooking device within the operating duration when an operating duration at the third power with the adjustment ratio of M: N is greater than or equal to a third duration threshold;

[0232] a second calculation unit, configured to, if the temperature rise value T is 0, increase

the boiling count by 1; and

[0233] a third control unit, configured to, when the boiling count is less than a count threshold, set the operating duration to 0, and control the cooking device to continue to operate at the third power with the adjustment ratio of M: N.

5 **[0234]** In some embodiments, the third control module 503 can further include:

[0235] a fourth control unit, configured to, if the temperature rise value T is greater than a fifth temperature threshold, the boiling count is 0 and N is less than a fourth duration threshold, updating N+a to N, set the operating duration to 0, and control the cooking device to continue to operate at the third power with the adjustment ratio of M: N,

10 **[0236]** a is a positive number;

[0237] a fifth control unit, configured to, if the temperature rise value T is greater than the fifth temperature threshold and the boiling count is not 0, set the operating duration and the boiling count to 0, and control the cooking device to continue to operate at the third power with the adjustment ratio of M: N;

15 **[0238]** a sixth control unit, configured to, if the temperature rise value T is equal to the fifth temperature threshold and the boiling count is 0, set the operating duration to 0, and control the cooking device to continue to operate at the third power with the adjustment ratio of M: N;

[0239] a seventh control unit, configured to, if the temperature rise value T is equal to the fifth temperature threshold, the boiling count is not 0, and N is greater than a fifth duration threshold, updating N-b to N, set the operating duration and the boiling count to 0, and control the cooking device to continue to operate at the third power with the adjustment ratio of M: N,

20

[0240] b is a positive number.

[0241] In some embodiments, the third control module 503 can further include:

[0242] an eighth control unit, configured to control the cooking device to stop operating at the third power, when the boiling count is not less than the count threshold, and the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold.

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[0243] It should be pointed out herein that the descriptions of the above embodiments of the cooking apparatus are similar to the descriptions of the above methods, and have the same beneficial effects as the method embodiments. For technical details not disclosed in the embodiments of the cooking apparatus of the present disclosure, those skilled in the art should refer to the description of the method embodiments of the present disclosure.

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[0244] The embodiments of the present disclosure provide a cooking device, including a memory and a processor. The memory stores a computer program executable on the processor,

and when the program is executed by the processor, the blocks in the cooking methods provided in the above embodiments are implemented.

[0245] FIG. 6 is a schematic structural diagram of the cooking device according to an embodiment of the present disclosure. As shown in FIG. 6, the cooking device 600 includes at least a processor 601, a communication interface 602, and a computer-readable storage medium 603 configured to store executable instructions. The processor 601 controls the overall operation of the cooking device 600.

[0246] The communication interface 602 enables the path update device to communicate with other terminals or servers through a network.

[0247] The computer-readable storage medium 603 is configured to store instructions and applications executable by the processor 601, can also cache data to be processed or processed by each module in the processor 601 and the cooking device 600, which may be implemented by a flash memory or a random access memory (RAM).

[0248] Embodiments of the present disclosure provide a computer-readable storage medium on which a computer program is stored, and when the computer program is executed by a processor, the blocks in the cooking method provided in the foregoing embodiments are implemented.

[0249] It should be pointed out that the descriptions of the above computer-readable storage medium and device embodiments are similar to the descriptions of the above method embodiments, and have similar beneficial effects to the method embodiments. Technical details not disclosed in the computer-readable storage medium and device embodiments of the present disclosure refer to the description of the method embodiments of the present disclosure.

[0250] It should be noted that reference in the specification to “one or some embodiments” or “an embodiment” means that a particular feature, structure, or characteristic associated with the embodiment is included in at least one embodiment of the present disclosure. Thus, appearances of “in one/some embodiments” or “in an embodiment” in various places throughout this specification are not necessarily referring to the same embodiment. Furthermore, the particular features, structures or characteristics may be combined in any suitable manner in one or more embodiments. It should be understood that in various embodiments of the present disclosure, the value of the sequence numbers of the above processes does not mean the execution sequence, and the execution sequence of each process should be determined by its function and internal logic, and should not constitute any limitation on the implementation process of the embodiments of the present disclosure. The above-mentioned serial numbers of the embodiments of the present disclosure are only for description, and do not represent the

advantages or disadvantages of the embodiments.

[0251] It should be noted that as used herein, the terms “including”, “comprising” or any other variant thereof are intended to encompass non-exclusive inclusion. A process, method, article or apparatus including a series of elements is thus made to include not only those
5 elements, but also other elements not expressly listed, or elements inherent to such process, method, article or apparatus. Without further limitation, an element qualified by the phrase “comprising a...” does not preclude the presence of additional identical elements in a process, method, article or apparatus that includes the element.

[0252] In the several embodiments provided in the present disclosure, it should be
10 understood that the disclosed apparatus and method may be implemented in other manners. The device embodiments described above are only illustrative. For example, the division of the units is only a logical function division. In actual implementation, there may be other division methods. For example, multiple units or components may be combined, or may be integrated into another system, or some features may be omitted, or not implemented. In addition, the
15 various components shown or discussed are coupled, or directly coupled, or communicatively connected to each other may be through some interfaces, indirect coupling or communication connection of devices or units, which may be electrical, mechanical or other forms.

[0253] The units described above as separate components may or may not be physically separated, and the components shown as units may or may not be physical units; may be
20 located in one place or distributed over multiple network elements; some or all of the units may be selected according to actual needs to achieve the purpose of the solution in this embodiment.

[0254] In addition, each functional unit in each embodiment of the present disclosure may all be integrated into one processing unit, or each unit may be separately used as a unit, or two or more units may be integrated into one unit. The above-mentioned integrated unit may be
25 implemented in the form of hardware, or may be implemented in the form of hardware plus software functional units.

[0255] Those of ordinary skill in the art can understand: all or part of the steps of implementing the above method embodiments may be completed by program instructions related to hardware. The aforementioned program can be stored in a computer-readable storage
30 medium, and when the program is executed, it executes the steps including the above method embodiments. The aforementioned storage medium includes: a U disk, a removable hard disk, a read only memory (ROM), a magnetic disk or an optical disk and other media that can store program codes.

[0256] Alternatively, if the above-mentioned integrated unit of the present disclosure is

implemented in the form of a software function module and sold or used as an independent product, it may also be stored in a computer-readable storage medium. Based on this understanding, the technical solutions of the embodiments of the present disclosure can be embodied in the form of software products in essence or the parts that make contributions to the prior art. The computer software product is stored in a storage medium, and includes several instructions for causing a product to perform all or part of the methods described in the various embodiments of the present disclosure. The aforementioned storage medium includes various media that can store program codes, such as a removable storage device, a ROM, a magnetic disk, or an optical disk.

[0257] The above is only the embodiment of the present disclosure, but the protection scope of the present disclosure is not limited to this. Any person skilled in the art can easily think of changes or substitutions within the technical scope disclosed in the present disclosure, which should be covered by the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure should be subject to the scope of the claims.

[0258] Industrial Applicability

[0259] The present disclosure provides a cooking method, including: controlling the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold in response to an operation instruction for starting a cooking device; controlling the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power; controlling the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and controlling the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power. In this way, while preventing the object to be cooked from overflowing the cooking device, fast and fully automatic cooking is realized, which can improve the user's satisfaction when using the cooking device.

CLAIMS

What is claimed is:

1. A cooking method, comprising:

in response to an operation instruction for starting a cooking device, controlling the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold;

controlling the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power;

controlling the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and

controlling the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power.

2. The method of claim 1, wherein before controlling the cooking device to operate at the second power and/or at the third power, the method further comprises:

controlling the cooking device to stop operating until the internal temperature of the cooking device drops to a second temperature threshold.

3. The method of claim 1, wherein controlling the cooking device to operate at the second power comprises:

acquiring a cooking amount of a cooking object in the cooking device when the internal temperature of the cooking device reaches a first temperature threshold;

querying a pre-stored relationship table of cooking amount and power according to the cooking amount, and determining that an adjustment ratio of the second power corresponding to the cooking amount is $P:Q$, both P and Q being positive numbers; and

controlling the cooking device to operate at the second power with the adjustment ratio of

P: Q, wherein the cooking device operating at the second power with the adjustment ratio of P: Q comprises that the cooking device periodically operates at the second power for P seconds and stops operating for Q seconds.

4. The method of claim 3, wherein controlling the cooking device to operate at the second power with the adjustment ratio of P: Q comprises:

collecting the internal temperature of the cooking device according to a collection period when the internal temperature of the cooking device reaches a third temperature threshold;

determining an internal temperature collected at a current moment as a first internal temperature, and determining an internal temperature collected at a historical moment separated from the current moment by a second duration threshold as a second internal temperature;

determining the change slope of the internal temperature of the cooking device according to the first internal temperature, the second internal temperature and the second duration threshold; and

controlling the cooking device to stop operating at the second power when the change slope meets the preset slight boiling pre-judgment condition.

5. The method of claim 1, wherein before controlling the cooking device to operate at the third power, the method further comprises:

controlling the cooking device to operate at a fifth power until the internal temperature of the cooking device reaches a fourth temperature threshold, the fifth power being less than or equal to the second power, and greater than or equal to the third power.

6. The method of claim 5, wherein controlling the cooking device to operate at the third power comprises:

initializing a boiling count to 0 when the internal temperature of the cooking device reaches the fourth temperature threshold;

controlling the cooking device to operate at the third power with an adjustment ratio of M: N, wherein both M and N are positive numbers, and $M: N < P: Q$;

calculating a temperature rise value T of the internal temperature of the cooking device

within the operating duration when an operating duration at the third power with the adjustment ratio of M: N is greater than or equal to a third duration threshold;

if the temperature rise value T is 0, increasing the boiling count by 1; and

when the boiling count is less than a count threshold, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N.

7. The method of claim 6, wherein controlling the cooking device to operate at the third power further comprises:

if the temperature rise value T is greater than a fifth temperature threshold, the boiling count is 0 and N is less than a fourth duration threshold, updating $N+a$ to N, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N, wherein a is a positive number;

if the temperature rise value T is greater than the fifth temperature threshold and the boiling count is not 0, setting the operating duration and the boiling count to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N;

if the temperature rise value T is equal to the fifth temperature threshold and the boiling count is 0, setting the operating duration to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N; and

if the temperature rise value T is equal to the fifth temperature threshold, the boiling count is not 0, and N is greater than a fifth duration threshold, updating $N-b$ to N, setting the operating duration and the boiling count to 0, and controlling the cooking device to continue to operate at the third power with the adjustment ratio of M: N, wherein b is a positive number.

8. The method of claim 6, wherein controlling the cooking device to operate at the third power further comprises:

controlling the cooking device to stop operating at the third power, when the boiling count is not less than the count threshold, and the duration for which the internal temperature of the cooking device remains unchanged reaches the first duration threshold.

9. A cooking apparatus, comprising:

a first control module, configured to, in response to an operation instruction for starting a cooking device, control the cooking device to operate at a first power until an internal temperature of the cooking device reaches a first temperature threshold;

a second control module, configured to control the cooking device to operate at a second power until a change slope of the internal temperature of the cooking device meets a preset slight boiling pre-judgment condition, the second power being less than or equal to the first power;

a third control module, configured to control the cooking device to operate at a third power until a duration for which the internal temperature of the cooking device remains unchanged reaches a first duration threshold, the third power being less than or equal to the second power; and

a fourth control module, configured to control the cooking device to operate at a fourth power until a preset cooking duration is reached, the fourth power being less than or equal to the third power.

10. A cooking device, comprising:

a memory configured to store executable instructions; and

a processor, when configured to execute the executable instructions stored in the memory, the cooking method of any one of claims 1 to 8 is implemented.

11. A computer-readable storage medium, wherein the computer-readable storage medium stores executable instructions and is configured to implement the cooking method of any one of claims 1 to 8 when a processor is executed.