

# US Patent & Trademark Office

## Patent Public Search | Text View

United States Patent Application Publication

20250258513

Kind Code

A1

Publication Date

August 14, 2025

Inventor(s)

LEE; Jonghoon et al.

### COOKING APPARATUS

#### Abstract

A cooking apparatus including a heating source; a housing comprising a control panel; a regulator body; a shaft moveable between a first shaft position, in which a rotation of the shaft with respect to the regulator body is restricted, or to a second shaft position, in which the rotation of the shaft with respect to the regulator body for operating the heating source is unrestricted; a knob moveable with the shaft; a locking device to be moveable relative to the knob, the locking device comprising a locker moveable between a locking position, in which the locker is positioned between the knob and the control panel to restrict the movement of the knob while the shaft is in the first shaft position or to an unlocking position, in which the locker is at least partially received in a locker accommodation space to allow movement of the knob.

**Inventors:** LEE; Jonghoon (Suwon-si, KR), JEONG; Sangjin (Suwon-si, KR), HWANG; Jihun (Suwon-si, KR)

**Applicant:** SAMSUNG ELECTRONICS CO., LTD. (Suwon-si, KR)

**Family ID:** 91195923

**Assignee:** SAMSUNG ELECTRONICS CO., LTD. (Suwon-si, KR)

**Appl. No.:** 19/193264

**Filed:** April 29, 2025

#### Foreign Application Priority Data

KR 10-2022-0156769

Nov. 21, 2022

KR 10-2023-0002454

Jan. 06, 2023

#### Related U.S. Application Data

parent WO continuation PCT/KR2023/016381 20231020 PENDING child US 19193264

## Publication Classification

**Int. Cl.:** **G05G1/08** (20060101); **F24C15/00** (20060101); **G05G5/00** (20060101)

**U.S. Cl.:**

**CPC** **G05G1/082** (20130101); **F24C15/00** (20130101); **G05G5/005** (20130101);  
**G05G2505/00** (20130101)

---

## Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION [0001] This application is a continuation application is a continuation application, under 35 U.S.C. § 111 (a), of international application No. PCT/KR2023/016381, filed Oct. 20, 2023, which claims priority under 35 U. S. C. § 119 to Korean Patent Application No. 10-2022-0156769, filed Nov. 21, 2022 and Korean Patent Application No. 10-2023-0002454, filed Jan. 6, 2023, the disclosures of which are incorporated herein by reference in their entirety.

### TECHNICAL FIELD

[0002] The present disclosure relates to a cooking apparatus. More particularly, the present disclosure relates to a cooking apparatus including a knob assembly.

### BACKGROUND ART

[0003] In general, a cooking apparatus is an appliance that cooks food by including a cooking chamber, a heating device configured to apply heat to the cooking chamber, and a circulation device configured to circulate the heat generated by the heating device within the cooking chamber. The cooking apparatus is a device that cooks food by sealing and heating the food, and may generally be classified into electric, gas, and electronic types depending on the heating source of the heating device. For example, an electric oven may use heat of a heater driven by electricity as a heating source, a gas oven may use heat of gas as a heating source, and a microwave oven may use frictional heat of water molecules caused by high frequency as a heating source.

[0004] The cooking apparatus may be provided with a control panel on either a front or upper surface of a main body. The control panel may be provided with a number of buttons, keypads, and/or knob assemblies configured to allow a user to set a desired cooking mode or set various conditions necessary for cooking.

[0005] A control device configured to control a heating device may be operated in a push and turn manner. A knob assembly provided to operate the control device may control the operation of the cooking apparatus by a two-step mechanism in which a control shaft of the control device is pressed and then turned.

[0006] Meanwhile, if a user operates the knob assembly unintentionally, it may cause fire and/or burns.

### DISCLOSURE

#### Technical Problem

[0007] The present disclosure is directed to providing a knob assembly capable of preventing malfunction, and a cooking apparatus including the same.

[0008] Further, the present disclosure is directed to providing a knob assembly capable of preventing malfunction in a pushing operation, and a cooking apparatus including the same.

[0009] Further, the present disclosure is directed to providing a cooking apparatus including a regulator device configured not to operate unless an additional action of pressing a button is performed.

[0010] Further, the present disclosure is directed to providing a cooking apparatus including a movable locker configured to restrict movement of a knob assembly based on a button being pressed.

[0011] Further, the present disclosure is directed to providing a cooking apparatus capable of guiding movement of a button to allow a position of a locker to change by precise movement of the button.

[0012] Further, the present disclosure is directed to providing a cooking apparatus capable of preventing a locker from scratching a control panel while the locker restricts movement of a knob assembly

[0013] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the disclosure.

#### Technical Solution

[0014] One aspect of the present disclosure provides a cooking apparatus including: a heating source; a housing including a control panel; a regulator body configured to operate the heating source and be disposed adjacent to the control panel; a shaft to be coupled to the regulator body to move between a first shaft position, in which a rotation of the shaft with respect to the regulator body is restricted, and a second shaft position, in which the rotation of the shaft with respect to the regulator body for operating the heating source is unrestricted; and a knob coupled to the shaft so as to move along with the shaft. The cooking apparatus includes a locking device including a locker moveable relative to the knob whereby locker is configured to move between a locking position, in which the locker is positioned between the knob and the control panel to restrict a movement of the knob while the shaft is at the first shaft position, and an unlocking position, in which the locker is at least partially received in a locker receiving space to allow the movement of the knob.

[0015] The cooking apparatus may further include a button configured to move between a first button position that restricts movement of the locker from the locking position to the unlocking position, and a second button position that allows the movement of the locker from the locking position to the unlocking position. The locker receiving space may be disposed on the button.

[0016] The locker may extend along a direction facing the control panel.

[0017] The button may include a locker contact surface adjacent to an opening of the locker receiving space. The locker may be disposed at the locking position in which the locker comes into contact with the locker contact surface while the button is at the first button position, and the locker may be movable to the unlocking position in which the locker is received in the locker receiving space while the button is at the second button position.

[0018] The cooking apparatus may further include a button holder received in the knob and including a locking device mounting space. The button may be received in the locking device mounting space, the button may be disposed adjacent to one surface of the button holder while the button is at the first button position and the button may move closer to the other surface facing the one surface of the button holder while the button moves from the first button position to the second button position.

[0019] The button holder may include a guide hook portion disposed adjacent to the button and protruding toward the control panel to guide movement of the button.

[0020] The cooking apparatus may include a button elastic member disposed between the knob and the button holder to allow the button to be pressed from the second button position to the first button position.

[0021] The button elastic member may include a first button elastic member and a second button elastic member different from the first button elastic member to allow the button to move linearly.

[0022] The regulator body may further include a case including a stopper groove. The shaft may include a shaft body at least partially inserted into the case, and a stopper protruding from the shaft body to be received in the stopper groove while the shaft is at the first shaft position, the stopper

detached from the stopper groove while the shaft is at the second shaft position.

[0023] A distance by which the locker moves from the locking position to the unlocking position may be greater than or equal to a distance by which the shaft moves from the first shaft position to the second shaft position.

[0024] A direction, along which the button moves from the first button position to the second button position, may intersect a direction, along which the locker moves from the locking position to the unlocking position.

[0025] The cooking apparatus may further include a locker supporter mounted on the control panel and provided to come into contact with the locker to prevent the control panel from being scratched by the locker.

[0026] The locker may be disposed adjacent to the shaft to prevent vibration of the knob.

[0027] The cooking apparatus may further include a weight disposed on an opening of the knob, the weight including a locker hole through which the locker penetrates to allow the locker to be exposed to an outside of the weight.

[0028] The weight may include a button movement limiter protruding to an opposite direction facing the control panel to be in contact with the button in response to the button being at the second button position, so as to guide movement of the button to the second button position.

[0029] Another aspect of the present disclosure provides a cooking apparatus including: a housing including a control panel; a regulator device including a regulator body and a shaft provided to penetrate the control panel, the shaft configured to move to a first shaft position, in which rotation with respect to the regulator body is restricted, and a second shaft position, which allows rotation with respect to the regulator body; and a knob assembly coupled to the shaft to move along with the shaft. The knob assembly includes a locking device including a locker configured to move to a locking position, in which the locker is positioned between the knob and the control panel to restrict the movement of the knob while the shaft is at the first shaft position, and an unlocking position, in which the locker is at least partially received in a locker receiving space to allow the movement of the knob. The knob assembly further includes a button disposed in the locker receiving space, and configured to move to a first button position that restricts movement of the locker from the locking position to the unlocking position, and a second button position that allows the movement of the locker from the locking position to the unlocking position.

[0030] The locker may extend from the button to a direction facing the control panel.

[0031] The button may include a locker contact surface adjacent to an opening of the locker receiving space. The locker may be disposed at the locking position in which the locker comes into contact with the locker contact surface while the button is at the first button position, and the locker may be movable to the unlocking position in which the locker is received in the locker receiving space while the button is at the second button position.

[0032] The cooking apparatus may further include a button holder received in the knob and including a locking device mounting space. The button may be received in the locking device mounting space, the button may be disposed adjacent to one surface of the button holder while the button is at the first button position, and the button may move closer to the other surface facing the one surface of the button holder while the button moves from the first button position to the second button position.

[0033] Another aspect of the present disclosure provides a cooking apparatus including a control panel; a regulator body disposed to face one side of the control panel; a shaft at least partially inserted into the regulator body; and a knob assembly disposed on the other side of the control panel and coupled to the shaft. The knob assembly includes a locking device including a locker configured to move to a locking position that restricts movement of the knob, and an unlocking position, in which the locker is at least partially received in a locker receiving space to allow the movement of the knob.

Advantageous Effects

[0034] A cooking apparatus may include a regulator device operated by a push and turn method, and a knob assembly coupled thereto. Further, the knob assembly may include a locker for preventing pushing of the knob assembly and thus malfunction may be prevented.

[0035] Further, a cooking apparatus may include a locker protruding from a knob assembly toward a control panel, and thus as the locker is contacted, malfunction in a pushing operation may be prevented.

[0036] Further, as for a cooking apparatus, based on a button being pressed, a locker may be moved to an inside of a knob assembly so as to allow a pushing operation of the knob assembly.

Accordingly, a regulator device may not operate unless an additional operation of pressing a button is performed.

[0037] Further, as for a cooking apparatus, based on a button being pressed, a locker receiving space provided to receive at least a portion of a locker may be aligned with the locker, and thus the locker configured to restrict movement of a knob assembly may be movable.

[0038] Further, as for a cooking apparatus, a locker receiving space may be positioned in a button, and movement of the button may be guided by a guide hook portion. Accordingly, the movement of the button may be guided to allow a position of the locker to change according to the movement of the button.

[0039] Further, a cooking apparatus may include a locker supporter provided to be in contact with a locker, and thus it is possible to prevent the locker from scratching a control panel.

---

## Description

### DESCRIPTION OF DRAWINGS

[0040] FIG. 1 is a perspective view of a cooking apparatus according to one embodiment of the present disclosure.

[0041] FIG. 2 is a front view of the cooking apparatus illustrated in FIG. 1 according to an embodiment of the present disclosure.

[0042] FIG. 3 is a cross-sectional view taken along line II-II' of the cooking apparatus illustrated in FIG. 1 according to an embodiment of the present disclosure.

[0043] FIG. 4 is an enlarged view illustrating a portion of the cooking apparatus illustrated in FIG. 1 where a knob assembly is arranged according to an embodiment of the present disclosure.

[0044] FIG. 5 is a perspective view illustrating a regulator device illustrated in FIG. 4 according to an embodiment of the present disclosure.

[0045] FIG. 6 is an exploded perspective view of the regulator device illustrated in FIG. 5 according to an embodiment of the present disclosure.

[0046] FIG. 7 is a cross-sectional view taken along line VII-VII' of the regulator device illustrated in FIG. 5 according to an embodiment of the present disclosure.

[0047] FIG. 8 is a rear perspective view illustrating a shaft inserted into an outer cover of the regulator device illustrated in FIG. 6 according to an embodiment of the present disclosure.

[0048] FIG. 9 is a perspective view of the knob assembly illustrated in FIG. 4 according to an embodiment of the present disclosure.

[0049] FIG. 10 is an exploded view of the knob assembly illustrated in FIG. 9 according to an embodiment of the present disclosure.

[0050] FIG. 11 is a cross-sectional perspective view illustrating a state in which the regulator device illustrated in FIG. 4 is mounted on a control panel according to an embodiment of the present disclosure.

[0051] FIG. 12 is a perspective view illustrating a state before a locker supporter is inserted into the control panel illustrated in FIG. 11 according to an embodiment of the present disclosure.

[0052] FIG. 13 is a perspective view illustrating a state after the locker supporter is inserted into

the control panel illustrated in FIG. 12 according to an embodiment of the present disclosure.

[0053] FIG. 14 is a cross-sectional view mainly illustrating the knob assembly and the regulator device of the cooking apparatus illustrated in FIG. 3 according to an embodiment of the present disclosure.

[0054] FIG. 15 is a cross-sectional view mainly illustrating the knob assembly illustrated in FIG. 14 according to an embodiment of the present disclosure.

[0055] FIG. 16 is a cross-sectional view illustrating a state in which a button is pressed in the knob assembly illustrated in FIG. 15 according to an embodiment of the present disclosure.

[0056] FIG. 17 is a perspective view illustrating a locker of the knob assembly illustrated in FIG. 15 and a configuration related thereto according to an embodiment of the present disclosure.

[0057] FIG. 18 is a front view illustrating the button inserted into a button holder illustrated in FIG. 17 according to an embodiment of the present disclosure.

[0058] FIG. 19 is an enlarged perspective view illustrating a state before the locker is inserted into a locker receiving space in the configuration related to the locker illustrated in FIG. 17 according to an embodiment of the present disclosure.

[0059] FIG. 20 is an enlarged perspective view illustrating a state after the locker is inserted into the locker receiving space in the configuration related to the locker illustrated in FIG. 18 according to an embodiment of the present disclosure.

[0060] FIG. 21 is a perspective view illustrating a state in which the button holder and a configuration related thereto illustrated in FIG. 17 is inserted into the knob according to an embodiment of the present disclosure.

[0061] FIG. 22 is a perspective view illustrating a weight illustrated in FIG. 10 according to an embodiment of the present disclosure.

[0062] FIG. 23 is a perspective view illustrating the button illustrated in FIG. 10 according to an embodiment of the present disclosure.

[0063] FIG. 24 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0064] FIG. 25 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0065] FIG. 26 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0066] FIG. 27 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0067] FIG. 28 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0068] FIG. 29 is a cross-sectional view illustrating a state in which a button of the knob assembly illustrated in FIG. 28 is pressed according to an embodiment of the present disclosure.

[0069] FIG. 30 is a perspective view illustrating the button, a locker and a shaft before the locker illustrated in FIG. 28 is accommodated in a locker insertion space according to an embodiment of the present disclosure.

[0070] FIG. 31 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

[0071] FIG. 32 is a cross-sectional view of a knob assembly and a configuration related thereto according to one embodiment of the present disclosure.

#### MODES OF THE INVENTION

[0072] The various embodiments and the terms used therein are not intended to limit the technology disclosed herein to specific forms, and the disclosure should be understood to include various modifications, equivalents, and/or alternatives to the corresponding embodiments.

[0073] In describing the drawings, similar reference numerals may be used to designate similar constituent elements.

[0074] A singular expression may include a plural expression unless otherwise indicated herein or clearly contradicted by context.

[0075] The expressions “A or B,” “at least one of A or/and B,” or “one or more of A or/and B,” “A, B or C,” “at least one of A, B or/and C,” or “one or more of A, B or/and C,” and the like used herein may include any and all combinations of one or more of the associated listed items.

[0076] The term of “and/or” includes a plurality of combinations of relevant items or any one item among a plurality of relevant items.

[0077] Herein, the expressions “a first”, “a second”, “the first”, “the second”, etc., may simply be used to distinguish an element from other elements, but is not limited to another aspect (importance or order) of elements.

[0078] When an element (e.g., a first element) is referred to as being “(functionally or communicatively) coupled,” or “connected” to another element (e.g., a second element), the first element may be connected to the second element, directly (e.g., wired), wirelessly, or through a third element.

[0079] In this disclosure, the terms “including”, “having”, and the like are used to specify features, numbers, steps, operations, elements, components, or combinations thereof, but do not preclude the presence or addition of one or more of the features, elements, steps, operations, elements, components, or combinations thereof.

[0080] When an element is said to be “connected”, “coupled”, “supported” or “contacted” with another element, this includes not only when elements are directly connected, coupled, supported or contacted, but also when elements are indirectly connected, coupled, supported or contacted through a third element.

[0081] Throughout the description, when an element is “on” another element, this includes not only when the element is in contact with the other element, but also when there is another element between the two elements.

[0082] In the following detailed description, the terms of “up and down direction”, “lower side”, “front and rear direction” and the like may be defined by the drawings, but the shape and the location of the element is not limited by the term

[0083] Particularly, as shown in FIG. 2, a direction in which a cooking chamber of a cooking apparatus 1 is opened is defined as the front, and the rear, left and right sides, and upper and lower sides are defined based on the front side.

[0084] Particularly, for the X, Y, and Z directions shown in FIG. 1, the +X direction is defined as the front side, the +Y direction is defined as the left side, and the +Z direction is defined as the upper side, and the directions are defined based on these.

[0085] Hereinafter exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0086] FIG. 1 is a perspective view of the cooking apparatus 1 according to one embodiment of the present disclosure. FIG. 2 is a front view of the cooking apparatus 1 illustrated in FIG. 1. FIG. 3 is a cross-sectional view taken along line II-III' of the cooking apparatus 1 illustrated in FIG. 1.

[0087] An inner housing 11 and an outer housing 12 may each have a substantially box shape with an open front surface.

[0088] The cooking apparatus 1 may include a cook top 30 disposed on an upper end of the cooking apparatus 1, and the cook top 30, on which a container containing food is disposed, may heat the container. The cooktop 30 may be provided with at least one heating portion 90a. A container containing food may be placed in the heating portion 90a and heated directly.

[0089] The cooking apparatus 1 may include a door 50 disposed on a front surface of a housing 10 to open and close the cooking chamber 20.

[0090] The outer housing 12 may include a front panel 13 forming the front surface of the housing 10, a side panel 14 forming a side surface of a main body, and a rear panel 15 forming a rear surface of the housing 10.

[0091] An opening may be provided in the front panel **13**, and a front surface of the cooking chamber **20** provided inside the housing **10** may be opened by the opening. The outer housing **12** may include a control panel **41** disposed in an upper portion of the front panel **13** and provided to cover an electric component chamber **40**. A display module **60** may be mounted on the control panel **41**.

[0092] The control panel **41** may be disposed on at least a portion of the housing **10**. According to one embodiment of the present disclosure, the control panel **41** may be disposed on a portion of the front surface of the housing **10**. However, the present disclosure is not limited thereto, and the control panel **41** may be disposed on the upper surface of the housing **10** or may form one surface of the housing **10**.

[0093] Alternatively, the housing **10** may include the control panel **41**.

[0094] The rear panel **15** may be provided with an inlet **15a** to allow air to be drawn into the electric component chamber **40**. The air drawn into the electric component chamber **40** through the inlet **15a** may flow inside the electric component chamber **40** and may cool electric components. However, the position of the inlet **15a** is not limited thereto, and may be disposed in any position that draws in outside air and guides the outside air to the electric component chamber **40**.

[0095] The cooking chamber **20** may be formed by an upper plate **21**, a bottom plate **22**, both side plates **23**, and a rear plate **24**. The cooking chamber **20** is a cooking space in which a front surface is open through an opening in the front panel **13** to allow food to be placed in and out.

[0096] A plurality of supports **25** may be provided on inner surfaces of the both side plates **23**. At least one detachable rack **26** on which food may be placed may be mounted on the plurality of supports **25**.

[0097] A rail (not shown) may be installed on the plurality of supports **25** to allow a rack **26** to slide. A user can take out or place food by moving the rack **26** through the rail (not shown).

[0098] A divider (not shown) provided to divide the cooking chamber **20** into a plurality of spaces may be removably mounted on the plurality of supports **25**. The cooking chamber **20** divided into the plurality of spaces by the divider may not have the same size, and each size may be different from each other.

[0099] Accordingly, a user can utilize the space of the cooking chamber **20**, which is divided into the plurality of spaces, in various ways according to the user intention. The divider may be formed of an insulating material and may insulate each cooking chamber **20**.

[0100] A heater **90b** configured to heat food may be provided in the cooking chamber **20**. The heater **90b** may be an electric heater including an electric resistor. However, the heater **90b** is not limited thereto and may be a gas heater configured to generate heat by burning gas. That is, the cooking apparatus **1** may include an electric oven and a gas oven.

[0101] The cooking apparatus **1** may include a heating source **90**. The heating source **90** may be configured to heat food.

[0102] The heating source **90** may include the above-mentioned heating portion **90a** and heater **90b**.

[0103] The rear plate **24** of the cooking chamber **20** may be provided with a circulation fan **28** configured to circulate air in the cooking chamber **20** to heat the food evenly, and a circulation motor **29** configured to drive the circulation fan **28**.

[0104] A fan cover **28a** may be provided on a front surface of the circulation fan **28** to cover the circulation fan **28**, and an outlet hole **28b** through which air flows may be formed in the fan cover **28a**.

[0105] The open front surface of the cooking chamber **20** may be opened and closed by the door **50**, and the door **50** may be coupled to the housing **10** by a hinge **51**, which is disposed in a lower portion of the housing **10**, so as to be rotatable with respect to the housing **10**.

[0106] A handle **52** may be provided in a front upper portion of the door **50** to be held by a user so as to allow the door **50** to open and close the cooking chamber **20**.



[0107] The display module **60** provided to display various operation information of the cooking apparatus **1** and to allow a user to input operation commands may be mounted on the control panel **41** provided on the front upper portion of the front panel **13**.

[0108] The display module **60** may include a liquid crystal display (LCD) device, and the liquid crystal display device may display electrical information about changes in liquid crystal transmittance according to the applied voltage as visual information. The liquid crystal display device may include a liquid crystal module configured to display an image, and a light source unit configured to emit light to the liquid crystal module. A light emitting diode (LED) may be used as the light source unit.

[0109] The display module **60** may include a cover panel **61** provided on a front surface of the liquid crystal display device. The cover panel **61** may simply be a protection panel to protect the liquid crystal display device, but may also be a touch panel configured to receive a user's touch command.

[0110] The control panel **41** may be provided with a knob assembly N configured to operate the cooking apparatus **1**. According to one embodiment of the present disclosure, four knob assemblies N may be provided. However, the present disclosure is not limited thereto. A detailed description of the knob assembly N is provided below.

[0111] An insulating material **20a** may be disposed between the electric component chamber **40** and the cooking chamber **20** to insulate the electric component chamber **40** and the cooking chamber **20** so as to prevent heat of the cooking chamber **20** from being transmitted to the electric component chamber **40**.

[0112] The insulating material **20a** may cover not only a space between the electric component chamber **40** and the cooking chamber **20** but also the entire outside of the cooking chamber **20** to prevent heat of the cooking chamber **20** from being transferred to the outside of the cooking apparatus **1**.

[0113] Because a temperature inside the electric component chamber **40** rises due to the heat of various electric components, the cooking apparatus **1** may be provided with a blowing device **70** configured to cool the electric component chamber **40** by circulating air around the electric component chamber **40**.

[0114] The blowing device **70** may include a blower fan **71** configured to move air, and a discharge flow path **72** provided to discharge the air drawn by the blower fan **71** to the front side of the cooking apparatus **1**.

[0115] The blower fan **71** may draw air in an axial direction and then discharge the drawn air in a radial direction. That is, the blower fan **71** according to the present disclosure may be a centrifugal fan. Alternatively, the blower fan **71** may include an axial fan.

[0116] The outside air may be drawn into the electric component chamber **40** through the inlet **15a** formed in the rear panel **15**, and the air drawn into the electric component chamber **40** may cool the electric components while moving inside the electric component chamber **40**. The air may be discharged to the front side of the cooking apparatus **1** through an outlet **80** along the discharge flow path **72**.

[0117] The outlet **80** may include a space between the front panel **13** and the control panel **41**. However, the present disclosure is not limited thereto, and the outlet **80** may be provided in various positions and have various shapes as long as the air drawn through the inlet **15a** may be discharged to the outside of the main body **1**.

[0118] A portion of the air inside the cooking chamber **20** may be drawn into the discharge flow path **72** through a cooking chamber flow path **73** and discharged to the front surface of the cooking apparatus **1**.

[0119] A bypass hole **74** may be formed in the discharge flow path **72** to allow a portion of air, which flows from the discharge flow path **72** to the outlet **80**, to flow into the cooking chamber flow path **73**. The bypass hole **74** may be opened and closed by an opening and closing device **75**.

[0120] As the bypass hole **74** is opened or closed by the opening and closing device **75**, an amount of air, which moves from the discharge flow path **72** to the outlet **80** and flows in the cooking chamber flow path **73**, may be regulated. Accordingly, it is possible to regulate an amount of air discharged from the cooking chamber **20** to the cooking chamber flow path **73**.

[0121] The door **50** rotatably coupled to the front surface of the housing **10** to open and close the cooking chamber **20** may include a plurality of glasses. A space may be formed between the plurality of glasses, and as outside air is provided to flow into and circulate in the space, the door **50** may dissipate heat.

[0122] FIG. **4** is an enlarged view illustrating a portion of the cooking apparatus **1** illustrated in FIG. **1** where the knob assembly **N** is arranged.

[0123] The cooking apparatus **1** may include the knob assembly **N**. The knob assembly **N** may be configured to receive a user input to control the heating source **90** of the cooking apparatus **1**.

[0124] The cooking apparatus **1** may include the housing **10** including the control panel **41**.

[0125] The knob assembly **N** may be coupled to the control panel **41**.

[0126] The knob assembly **N** may include a knob **400** located on one side of the control panel **41**. The knob **400** may be provided to be held by a user and to allow the user to input a user input.

[0127] The knob **400** may be located on the front side of the control panel **41**. Accordingly, the knob **400** may be exposed to a user.

[0128] The knob **400** may be rotatable relative to the control panel **41**. The knob **400** may rotate with respect to an axis. A user can input a user input by rotating the knob **400**.

[0129] The knob **400** may have a portion having a substantially cylindrical shape. The cylindrical portion of the knob **400** may be accommodated in the control panel **41**. Accordingly, the knob **400** may be configured to be rotatable.

[0130] The knob **400** may include a portion extending in one direction and protruding forward to be easily held by a user. A user can rotate the knob **400** by holding a portion of the knob **400** that extends in one direction and protrudes forward.

[0131] The knob **400** may include a plastic material. However, the present disclosure is not limited thereto.

[0132] The knob **400** may be formed through an injection process. However, the present disclosure is not limited thereto.

[0133] The knob **400** may include a shaft mounting hole **400H**. The shaft mounting hole **400H** may be a hole into which a shaft **200** of a regulator device **R**, which will be described later, is inserted.

[0134] The shaft mounting hole **400H** may extend along a rotation axis of the knob **400**.

[0135] The knob **400** may be coupled to the shaft **300** so as to be movable together with the shaft **300**.

[0136] The knob assembly **N** may include the regulator device **R**. The regulator device **R** may be configured to generate a signal in response to a user input transmitted through the knob **400**.

[0137] The cooking apparatus **1** may include a locker supporter **900**.

[0138] The locker supporter **900** may be disposed between the knob assembly **N** and the control panel **41**.

[0139] The locker supporter **900** may prevent scratches from forming on the control panel **41**.

[0140] This will be described later along with related drawings.

[0141] The regulator device **R** may detect a user input to operate the heating source **90**.

[0142] The regulator device **R** may be coupled to the knob **400**. At least a portion of the regulator device **R** may be located behind the control panel **41**. Accordingly, the regulator device **R** may be prevented from being exposed to a user.

[0143] The regulator device **R** may include a case **100**. The case **100** may be a component that defines at least portion of an exterior of the regulator device **R**.

[0144] The case **100** may have a substantially rectangular parallelepiped shape.

[0145] The regulator device **R** may include a regulator body **R1**. The regulator body **R1** may be a

rest configuration of the regulator device R except the shaft **300** described later.

[0146] The regulator body **R1** may be fitted with at least a portion of the shaft **300**.

[0147] The regulator body **R1** may have a substantially rectangular parallelepiped shape. However, the present disclosure is not limited thereto.

[0148] The regulator body **R1** may transmit a signal to a processor (FIG. 5) by the flow of electricity. The processor may generate a signal to operate the heating source **90** by the signal generated by the regulator body **R1**.

[0149] The regulator body **R1** may be located adjacent to the control panel **41**. The regulator body **R1** may be positioned between the knob assembly **N** and the control panel **41**.

[0150] The regulator body **R1** may operate the heating source **90** and be positioned adjacent to the control panel **41**.

[0151] The regulator body **R1** may be positioned to face one side of the control panel **41**.

[0152] The knob assembly **N** may be located on the other side of the control panel **41** and coupled to the shaft **300**.

[0153] The regulator device **R** may include the shaft **200**. The shaft **200** may be rotatably inserted into the case **100**.

[0154] The shaft **200** may be coupled to the knob **400**. The shaft **200** may rotate along with the rotation of the knob **400**. The shaft **200** may be inserted into the shaft mounting hole **400H**.

Accordingly, a user can rotate the knob **400**, and the rotation of the knob **400** may be transmitted to the shaft **200**. As the shaft **200** rotates together, the regulator may generate a signal.

[0155] The shaft **200** may extend along the rotation axis of the knob **400**.

[0156] The shaft **200** may be positioned by penetrating the control panel **41**. A portion of the shaft **200** that is located in the front by penetrating the control panel **41** may be coupled to the knob **400**. A portion of the shaft **200** located behind the control panel **41** may be coupled to the case **100**.

[0157] The shaft **300** may be at a first shaft position in which rotation relative to the regulator body **R1** is limited. The shaft **300** may be coupled to the regulator body **R1** so as to be movable to a second shaft position in which the shaft **300** is rotatable with respect to the regulator body **R1** to operate the heating source **90**.

[0158] The shaft **200** may include a body of the shaft **200**. The body of the shaft **200** may be a component that defines at least portion of an exterior of the shaft **200**.

[0159] The body of the shaft **200** may include a knob mounting portion **211**. The knob mounting portion **211** may be a component coupled to the knob **400**.

[0160] The knob mounting portion **211** may be a component that is not rotationally symmetrical. The knob mounting portion **211** may be accommodated in the shaft mounting hole **400H**. The shaft mounting hole **400H** may have a shape corresponding to the knob mounting portion **211**.

Accordingly, the knob mounting portion **211** may rotate along with the rotation of the knob **400**.

[0161] The case **100** may include a regulator screw hole **101H**. The screw hole may be a hole into which a screw is mounted.

[0162] The control panel **41** may include a panel screw hole **41H**. The panel screw hole **41H** may be a hole provided at a position corresponding to the regulator screw hole **101H**.

[0163] A fastening member may couple the control panel **41** and the regulator device **R** by penetrating the panel screw hole **41H** and the regulator screw hole **101H**.

[0164] Hereinafter the regulator device **R** will be described in more detail.

[0165] FIG. 5 is a perspective view illustrating the regulator device **R** illustrated in FIG. 4. FIG. 6 is an exploded perspective view of the regulator device **R** illustrated in FIG. 5. FIG. 7 is a cross-sectional view taken along line VII-VII' of the regulator device **R** illustrated in FIG. 5. FIG. 8 is a rear perspective view illustrating the shaft **300** inserted into an outer cover **111** of the regulator device **R** illustrated in FIG. 6.

[0166] The regulator device **R** according to one embodiment of the present disclosure will be described with reference to FIGS. 5 to 8.

[0167] The cooking apparatus **1** may include a controller **1000**.

[0168] The controller **1000** may include a processor **1100** and a memory **1200**.

[0169] The processor **1100** may include a program (a plurality of instructions) for processing signals and providing control signals.

[0170] The memory **1200** may include a volatile memory such as Static Random Access Memory (S-RAM) and Dynamic Random Access Memory (D-RAM), and a non-volatile memory such as Read Only Memory (ROM), and Erasable Programmable Read Only Memory (EPROM).

[0171] The memory **1200** may be provided integrally with the processor **1100** or may be provided as a semiconductor device separate from the processor **1100**.

[0172] The processor **1100** may further include a processing core (e.g., a memory circuit and a control circuit) configured to process signals based on the program or data stored in the memory **1200** and configured to output a control signal.

[0173] When a first terminal (not shown) and a second terminal (not shown) are in contact, the regulator device R may generate a signal for the processor **1100** to receive.

[0174] The processor **1100** may control the heating source **90** to allow the heating source **90** to operate based on a user input detected by the regulator device R.

[0175] The processor **1100** may control the heating source **90** to operate the heating source **90** based on a signal generated in response to a user input from the regulator device R.

[0176] However, in order to allow the cam **200** to rotate through the rotation of the shaft **300**, the shaft **300** may need to be at the second shaft position.

[0177] This is because when the shaft **300** is at the first shaft position, a stopper **320** (FIG. 5) is received in a stopper groove **111H** (FIG. 5), thereby limiting rotation of the shaft **300**.

[0178] Accordingly, the regulator device R may be operated only when the shaft **300** is moved from the first shaft position to the second shaft position.

[0179] The cooking apparatus **1** may include the regulator device R.

[0180] The regulator device R may include the regulator body R1. The regulator body R1 may include the case **100**. The regulator body R1 may include the cam **200**. The regulator body R1 may include a terminal **201**.

[0181] The regulator device R may include the case **100**.

[0182] The case **100** may include a case body **120**. The case body **120** may be a component that defines at least a portion of an exterior of the case **100**.

[0183] When the case **100** has the shape of a rectangular parallelepiped, the case body **120** may be a component that defines five surfaces of the rectangular parallelepiped.

[0184] The case body **120** may have an operating space formed therein. The operating space may be a space surrounded by the five surfaces of the case body **120**. The operating space may include an opening.

[0185] The opening of the operating space may be positioned towards the front.

[0186] A configuration described later may be accommodated inside the case **100** through the opening of the operating space.

[0187] The case body **120** may be formed of plastic. However, the present disclosure is not limited thereto.

[0188] The case body **120** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0189] The case **100** may include a case cover **110**. The case cover **110** may be configured to close the opening of the operating space.

[0190] The case cover **110** may be positioned adjacent to the case body **120**. The case cover **110** may be configured to close the operating space defined by the case body **120**.

[0191] The case cover **110** may include an inner cover **113**.

[0192] When the case **100** has a rectangular parallelepiped shape, the inner cover **113** may define one surface in addition to the five surfaces defined by the case body **120**.

[0193] The inner cover **113** may be located in front of the case body **120**.

[0194] The inner cover **113** may have the shape of a flat plate with a predetermined thickness. However, the present disclosure is not limited thereto.

[0195] The inner cover **113** may be formed of plastic. However, the present disclosure is not limited thereto.

[0196] The inner cover **113** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0197] The case cover **110** may include the outer cover **111**. The outer cover **111** may be a component located outside the case **100** than the inner cover **113**.

[0198] The outer cover **111** may cover the inner cover **113**. The outer cover **111** may be provided to correspond to the inner cover **113**.

[0199] The outer cover **111** may be located in front of the inner cover **113**.

[0200] The outer cover **111** may have the shape of a flat plate with a predetermined thickness. However, the present disclosure is not limited thereto.

[0201] The outer cover **111** may be formed of a metal material. The outer cover **111** may have greater rigidity than the case body **120**. However, the present disclosure is not limited thereto.

[0202] The outer cover **111** may be formed through a press process. However, the present disclosure is not limited thereto.

[0203] The outer cover **111** may include a shaft hole **710H**. The shaft **300** may pass through the shaft hole **710H**.

[0204] The shaft hole **710H** may have a shape that allows the shaft **300** to pass therethrough. For example, when the shaft **300** has a circular cross-section, the shaft hole **710H** may also be provided to have a cylindrical shape.

[0205] The shaft hole **710H** may have a shape corresponding to the cross-sectional shape of the shaft **300**. For example, the shaft hole **710H** may have the shape of a cylinder with a diameter similar to the cross-sectional shape of the shaft **300**. The similar diameter may mean that the shaft hole **710H** has a tolerance in the cross-sectional shape of the shaft **300** to allow the shaft **300** to move through the shaft hole **710H**.

[0206] The shaft hole **710H** may be located at the center of gravity of the case cover **110**. That is, when the case cover **110** has a substantially rectangular shape, the shaft hole **710H** may be located at a position corresponding to the center of the diagonal line.

[0207] The outer cover **111** may include the stopper groove **111H**. The case **100** may include the stopper groove **111H**. The stopper groove **111H** may be a groove into which the stopper **320** of the shaft **300**, which will be described later, is inserted.

[0208] The stopper groove **111H** may be located in the case cover **110**.

[0209] The case **100** may include the stopper groove **111H**.

[0210] The stopper groove **111H** may extend from the shaft hole **710H**. The stopper groove **111H** may extend radially from the shaft hole **710H**.

[0211] The stopper groove **111H** may have a shape corresponding to the stopper **320**. The stopper **320** may be accommodated in the stopper groove **111H**. When the stopper **320** is accommodated in the stopper groove **111H**, the stopper **320** may be accommodated in the stopper groove **111H** and thus movement thereof may be restricted. Accordingly, the rotation of the shaft **300** may be prevented. A more detailed description will be provided later in the description of the stopper **320**.

[0212] However, the present disclosure is not limited thereto, and the stopper **320** may be located on the case cover **110**. The stopper groove **111H** may be located on the shaft **300**. Hereinafter for convenience of description, it is assumed that the stopper **320** is a component of the shaft **300** and the stopper groove **111H** is located on the case cover **110**.

[0213] The regulator device **R** may include the shaft **300**. The shaft **300** may be configured to be rotatable with respect to the case **100**.

[0214] The shaft **300** may extend along the front and rear direction.

[0215] The shaft **300** may have a pillar shape with a substantially circular cross-section.

[0216] The shaft **300** may be positioned by penetrating the case cover **110**. The shaft **300** may be movable inside the case **100** along the direction in which the shaft **300** extends.

[0217] The shaft **300** may include a metal material. As a result, the shaft **300** may have rigidity that prevents the shaft **300** from breaking due to translational or rotational movement. However, the present disclosure is not limited thereto.

[0218] The shaft **300** may be formed through a casting process. However, the present disclosure is not limited thereto.

[0219] The shaft **300** may include a shaft body portion **310**. The shaft body portion **310** may be a component that defines at least a portion of the exterior of the shaft **300**.

[0220] At least a portion of the shaft body portion **310** may be inserted into the case **100**.

[0221] The shaft **300** may include the stopper **320**. The stopper **320** may be configured to prevent rotation of the shaft **300**.

[0222] The stopper **320** may protrude from the shaft body portion **310**. The stopper **320** may be accommodated in the stopper groove **111H**. While the stopper **320** is accommodated in the stopper groove **111H**, the stopper **320** may be in contact with the outer cover **111** to limit rotation of the shaft **300**.

[0223] The stopper **320** may have a shape corresponding to the stopper groove **111H**. The stopper **320** may have a shape similar to the stopper groove **111H**. That is, when the cross-section of the stopper **320** is quadrangle, the cross-section of the stopper groove **111H** may also have a quadrangle shape. Although the cross section of the stopper **320** and the cross section of the stopper groove **111H** correspond to each other, there may be a tolerance to allow the stopper **320** to pass through the stopper groove **111H**.

[0224] The stopper **320** may protrude from the shaft body portion **310** to be received in the stopper groove **111H** while the shaft **300** is at the first shaft position. The stopper **320** may be separated from the stopper groove **111H** while the shaft **300** is at the second shaft position.

[0225] The shaft **300** may include a shaft flange **330**. The shaft flange **330** may be configured to be in contact with the inner cover **113** or the outer cover **111** when the shaft **300** moves forward and backward.

[0226] The shaft flange **330** may protrude from the shaft body portion **310** in the radial direction. The shaft flange **330** may extend from the shaft body portion **310** in the circumferential direction.

[0227] The shaft flange **330** may have a substantially disk shape.

[0228] When the shaft **300** moves forward, the shaft flange **330** may be in contact with the outer cover **111**, thereby preventing the shaft **300** from moving forward.

[0229] The shaft flange **330** may include a groove stopper **331**. The groove stopper **331** may be configured to prevent rotation of the shaft **300** when the shaft **300** is at the first shaft position.

[0230] The groove stopper **331** may be located on the shaft flange **330**.

[0231] The groove stopper **331** may be provided to be concave from an outer diameter of the shaft flange **330** toward a rotation axis of the shaft **300**.

[0232] The groove stopper **331** may be configured to accommodate a groove stopper locking portion **112**.

[0233] The groove stopper locking portion **112** may be included in the outer cover **111**. The groove stopper locking portion **112** may protrude rearward. The groove stopper locking portion **112** may protrude toward the inner cover **113**.

[0234] The groove stopper locking portion **112** may have a shape corresponding to the groove stopper **331**.

[0235] The groove stopper locking portion **112** may be accommodated in the groove stopper **331** when the shaft **300** is at the first shaft position. Accordingly, when attempting to rotate the shaft **300** in a state in which the shaft **300** is at the first shaft position, the groove stopper locking portion **112** may be in contact with the shaft flange **330**, thereby limiting the rotation of the shaft **300**.

[0236] The groove stopper locking portion **112** may be separated from the groove stopper **331** when the shaft **300** is at the second shaft position. Accordingly, when the shaft **300** is rotated in a state in which the shaft **300** is at the second shaft position, there may be no a component that is in contact with the groove stopper locking portion **112** and thus the shaft **300** may rotate.

[0237] The shaft **300** may be prevented from moving backward by the case **100**.

[0238] When the shaft **300** moves rearward, the shaft flange **330** may be in contact with the inner cover **113** so as to prevent the shaft **300** from being separated rearward.

[0239] Accordingly, the shaft flange **330** may prevent the shaft **300** from being separated from the case **100**.

[0240] The shaft **300** may be positioned at the first shaft position. When the shaft **300** is positioned at the first shaft position, the stopper **320** may be accommodated in the stopper groove **111H**. That is, the stopper **320** may protrude from the shaft body portion **310** to be accommodated in the stopper groove **111H** as the shaft **300** is positioned at the first shaft position.

[0241] The shaft **300** may be at the second shaft position. When the shaft **300** is at the second shaft position, the stopper **320** may be spaced apart from the stopper groove **111H** by an operating distance.

[0242] While the shaft **300** is at the second shaft position, the cam **200** may rotate with the shaft **300**, thereby allowing the regulator device R to detect a user input. The cam **200** may be adjacent to the shaft **300** to allow the shaft **300** to be inserted therein.

[0243] The shaft **300** may include a rotation prevention portion **340**. When the rotation prevention portion **340** is accommodated in the cam **200**, the rotation prevention portion **340** may be configured to rotate together with the cam **200**.

[0244] The rotation prevention portion **340** may not be rotationally symmetrical with respect to the rotation axis. The rotation prevention portion **340** may not have a cylindrical shape. The rotation prevention portion **340** may have a shape that is cut along a plane including an extension direction of the cylinder.

[0245] The rotation prevention portion **340** may rotate together with the cam **200**, and thus the shaft **300** may rotate together with the cam **200**. Accordingly, the regulator device R may output a signal corresponding to a user input.

[0246] The regulator device R may include the cam **200**. The cam **200** may be configured to receive a rotational force from the shaft **300**.

[0247] The cam **200** may rotate together with the shaft **300**.

[0248] The cam **200** may be configured to be rotatable on the case body **120**. Accordingly, the cam **200** may be rotatable while being supported by the case body **120**.

[0249] The cam **200** may include a plastic material. However, the present disclosure is not limited thereto.

[0250] The cam **200** may be formed through an injection process. However, the present disclosure is not limited thereto.

[0251] The regulator device R may include the terminal **201**. The terminal **201** may be configured to allow electricity to flow.

[0252] The terminal **201** may include the first terminal and the second terminal.

[0253] While the first terminal is in contact with the second terminal according to the rotation of the cam **200**, the regulator device R may generate a signal based on a user input.

[0254] The regulator device R may include a shaft elastic member **301**. The shaft elastic member **301** may be configured to press the shaft **300** forward.

[0255] The shaft elastic member **301** may be positioned between the shaft **300** and the cam **200**.

[0256] The shaft elastic member **301** may be configured to press the shaft **300** to allow the stopper **320** to be positioned in the stopper groove **111H**. The shaft elastic member **301** may press the rotation prevention portion **340**. The shaft elastic member **301** may be in contact with the rotation prevention portion **340**. By being compressed by the shaft **300**, the shaft elastic member **301** may

press the shaft **300** in the direction opposite to the compression.

[0257] A user can generate a signal in the regulator device R by pressing and rotating the shaft **300**. When the user wishes to stop generating a signal from the regulator device R, the user can release the pressure on the shaft **300** to return the shaft **300** to its original position.

[0258] For example, the shaft elastic member **301** may include a compression spring.

[0259] FIG. **9** is a perspective view of the knob assembly N illustrated in FIG. **4**. FIG. **10** is an exploded view of the knob assembly N illustrated in FIG. **9**.

[0260] The knob assembly N according to one embodiment of the present disclosure will be described with reference to FIGS. **9** and **10**.

[0261] The knob assembly N may include the knob **400**. The knob **400** may be a component that defines the exterior of the knob assembly N.

[0262] The knob **400** may be provided to be held by a user.

[0263] A user can operate the cooking apparatus **1** by holding and pressing or rotating the knob **400**.

[0264] The knob **400** may include a space formed therein and provided to accommodate other components. The knob **400** may include an opening to accommodate other components therein.

[0265] The knob **400** may be positioned in front of other components to cover the other components accommodated therein.

[0266] The knob **400** may include a plastic material. However, the present disclosure is not limited thereto.

[0267] The knob **400** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0268] The knob **400** may include a knob body portion **410**.

[0269] The knob body portion **410** may have a substantially cylindrical shape.

[0270] The knob **400** may include a knob holding portion **420**.

[0271] The knob holding portion **420** may protrude from the knob body portion **410**.

[0272] The knob holding portion **420** may have a substantially rectangular parallelepiped shape.

[0273] The knob holding portion **420** may be formed not to exceed an outer circumference of the knob body portion **410**. That is, a long side of the knob holding portion **420** may have a length equal to or less than a diameter of the knob body portion **410**.

[0274] A button holder **800**, which will be described later, may be accommodated in a space defined by the knob holding portion **420**.

[0275] The knob holding portion **420** may include a button exposure hole **420H**.

[0276] At least a portion of a button **600** may be exposed to the outside of the knob **400** through the button exposure hole **420H**.

[0277] The knob assembly N may include a weight **700**. The weight **700** may be configured to cover the opening of the knob **400**.

[0278] The weight **700** may be positioned adjacent to the knob body portion **410**.

[0279] The weight **700** may have a shape corresponding to the knob body portion **410**. The weight **700** may have a substantially cylindrical shape.

[0280] The weight **700** may include a shaft mounting hole **710H**.

[0281] The shaft **300** may be accommodated in the shaft mounting hole **710H**.

[0282] The shaft mounting hole **710H** may not be circular. Accordingly, when the shaft **300** is accommodated in the shaft mounting hole **710H**, the shaft **300** may be rotated by the rotation of the weight **700**.

[0283] The weight **700** may be formed of metal. As a result, a user can feel the weight of the knob assembly N. However, the present disclosure is not limited thereto. The weight **700** may be formed by a casting process.

[0284] The knob assembly N may include the button holder **800**. The button holder **800** may be a component for accommodating the button **600**, which will be described later.



[0285] The button holder **800** may be accommodated in the knob holding portion **420**.

[0286] The button holder **800** may have a shape corresponding to the knob holding portion **420**. The button holder **800** may have a substantially rectangular parallelepiped shape in which one surface is open.

[0287] The button holder **800** may define a locking device seating space **810S** for accommodating the button **600** therein.

[0288] The button holder **800** may be accommodated in the knob **400**. The button holder **800** may include the locking device seating space **810S**. The button **600** may be accommodated in the locking device seating space **810S**.

[0289] The button **600** may be positioned adjacent to one surface of the button holder **800** while the button **600** is at a first button position. While the button **600** is moved from the first button position to a second button position, the button **600** may be moved to be closer to the other surface facing one surface of the button holder **800**.

[0290] The button holder **800** may include a plastic material. However, the present disclosure is not limited thereto.

[0291] The button holder **800** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0292] The knob assembly **N** may include a locking device **L**. The locking device **L** may be a device configured to lock the movement of the knob **400**.

[0293] The locking device **L** may be disposed between the knob **400** and the weight **700**.

[0294] The locking device **L** may be configured to restrict the movement of the knob **400**.

[0295] The locking device **L** may be provided on the knob **400**.

[0296] The locking device **L** may include the button **600**. The button **600** may be configured to be operated by a user.

[0297] The button **600** may be accommodated inside the button holder **800**.

[0298] The button **600** may be partially exposed to the outside of the button holder **800**. The button **600** may be partially exposed to the outside of the knob **400**. A user can move the button **600** by manipulating a portion of the button **600** exposed to the outside of the knob **400**.

[0299] A space may be defined between the button **600** and the button holder **800**. Accordingly, the button **600** may be movable relative to the button holder **800**.

[0300] The button **600** may be movable to the first button position that limits movement of the locker **500** from a locking position to an unlocking position. The locker **500** may be movable to the second button position that allows the locker **500** to be moved from the locking position to the unlocking position.

[0301] A locker receiving space **630S** may be located on the button **600**.

[0302] The button **600** may include a locker contact surface **630A** adjacent to an opening of the locker receiving space **630S**.

[0303] The locker **500** may be at the locking position in contact with the locker contact surface **630A** while the button **600** is at the first button position. The locker **500** may be at the unlocking position accommodated in the locker receiving space **630S** while the button **600** is at the second button position.

[0304] The locking device **L** may include a button elastic member **601**. The button elastic member **601** may be configured to apply an elastic force to the button **600**.

[0305] The button elastic member **601** may be disposed between the button **600** and the button holder **800**. The button elastic member **601** may be configured to press the button **600** and the button holder **800** between an inner surface of the button holder **800** and an outer surface of the button **600**. The button holder **800** may be supported by the knob holding portion **420**. Accordingly, the button elastic member **601** may press the button **600** to move the button **600**.

[0306] The button elastic member **601** may be disposed between the knob **400** and the button holder **800** to press the button **600** from the second button position to the first button position.

[0307] When the button **600** is pressed by a user, the button **600** may be moved from one side of the button holder **800** to the other side of the button holder **800** that is opposite to the one side and that is with the button elastic member **601** interposed therebetween. The button **600** moved to the other side may be pressed in a direction in which the button elastic member **601** is stretched as the button elastic member **601** is compressed. The button **600** may receive an elastic force from the button elastic member **601** to return to its original position.

[0308] A plurality of button elastic members **601** may be provided.

[0309] The plurality of button elastic members **601** may include a first button **600a** elastic member and a second button **600b** elastic member.

[0310] While the first button **600a** elastic member and the second button **600b** elastic member press the button **600** in two portions, the button **600** may move linearly.

[0311] The second button **600b** elastic member different from the first button **600a** elastic member may allow the button **600** to move linearly.

[0312] The button **600** may be spaced apart from the button holder **800** in a movable direction. The long side of the button **600** may be moved away from or close to a portion of the button holder **800**.

[0313] The button **600** may be positioned to allow a portion corresponding to a short side to be adjacent to the button holder **800**. As a result, the button **600** may be allowed to move in one direction.

[0314] The button **600** may include the locker receiving space **630S** provided to accommodate the locker **500**, which will be described later.

[0315] The button **600** may include a plastic material. However, the present disclosure is not limited thereto.

[0316] The button **600** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0317] The locking device L may include the locker **500**. The locker **500** may be configured to limit the movement of the knob **400**.

[0318] The locker **500** may be adjacent to the button **600**. The locker **500** may restrict the movement of the knob **400** by being in contact with the button **600**. When the locker **500** presses the button **600**, the button holder **800** in contact with the button **600** may be pressed, and the knob **400** in contact with the button holder **800** may be pressed. Accordingly, the movement of the knob **400** may be prevented.

[0319] The locker **500** may be positioned adjacent to the shaft **300** to prevent vibration of the knob **400**.

[0320] The locker **500** may be moved toward the locker receiving space **630S** defined by the button **600**. The locker **500** may be aligned with the locker receiving space **630S** according to the movement of the button **600**. When the locker **500** is aligned with the locker receiving space **630S**, the locker **500** may be moved to the locker receiving space **630S**. Accordingly, the knob **400** may be movable.

[0321] When the knob **400** is moved, the shaft **300** of the regulator device R coupled with the knob **400** may be moved, as described above. The shaft **300** may be moved from the first shaft position to the second shaft position according to the movement of the knob **400**. When the shaft **300** is moved to the second shaft position, the shaft **300** may be rotated by rotation of the knob **400**. By rotating the shaft **300**, the regulator device R may operate the heating source **90** of the cooking apparatus **1**.

[0322] That is, when the locker **500** is aligned with the locker receiving space **630S** by moving the button **600**, the heating source **90** may be operatable.

[0323] The locker **500** may extend in one direction.

[0324] The locker **500** may extend in a direction toward the control panel **41**.

[0325] The locker **500** may be at the locking position between the knob **400** and the control panel **41** to limit movement of the knob **400** while the shaft **300** is at the first shaft position. The locker **500** may be movable to the unlocking position in which at least a portion of the locker **500** is

accommodated in the locker receiving space **630S** to allow the knob **400** to move.

[0326] The locker **500** may include a metal material. Accordingly, the locker **500** may have high rigidity. However, the present disclosure is not limited thereto.

[0327] The locker **500** may be formed by a casting process. However, the present disclosure is not limited thereto.

[0328] The locking device **L** may include a locker elastic member **501**.

[0329] The locker elastic member **501** may be positioned between the locker **500** and the weight **700**. The locker elastic member **501** may be configured to press the locker **500** toward the button **600**.

[0330] The locker elastic member **501** may be a spring.

[0331] The knob assembly **N** may include a knob fastening member **F2**.

[0332] The knob fastening member **F2** may fasten the weight **700** and the knob **400**.

[0333] FIG. **11** is a cross-sectional perspective view illustrating a state in which the regulator device **R** illustrated in FIG. **4** is mounted on the control panel **41**. FIG. **12** is a perspective view illustrating a state before the locker supporter **900** is inserted into the control panel **41** illustrated in FIG. **11**. FIG. **13** is a perspective view illustrating a state after the locker supporter **900** is inserted into the control panel **41** illustrated in FIG. **12**.

[0334] A configuration coupled to the control panel **41** according to one embodiment of the present disclosure will be described with reference to FIGS. **11** to **13**.

[0335] The cooking apparatus **1** may include the control panel **41**. The control panel **41** may be a component configured to receive a user input or may be a combination of components configured to receive a user input.

[0336] The control panel **41** may have the shape of a flat plate or a shape formed by bending a flat plate.

[0337] The control panel **41** may define at least portion of the exterior of the cooking apparatus **1**.

[0338] The control panel **41** may be located in the front of the regulator body.

[0339] The control panel **41** may include a metal material. However, the present disclosure is not limited thereto.

[0340] The control panel **41** may be formed through a press process. However, the present disclosure is not limited thereto.

[0341] The control panel **41** may include a first control panel **41a** and a second control panel **41b** located behind the first control panel **41a**.

[0342] The first control panel **41a** may be spaced apart from the second control panel **41b**. The control panel **41** may have an insulating effect due to a space between the first control panel **41a** and the second control panel **41b**.

[0343] The cooking apparatus **1** may include a spacing member **91**. The spacing member **91** may be configured to form a space between the first control panel **41a** and the second control panel **41b**.

[0344] The spacing member **91** may be disposed between the first control panel **41a** and the second control panel **41b**. The spacing member **91** may support the first control panel **41a** and the second control panel **41b**.

[0345] The spacing member **91** may be positioned to correspond to the regulator device **R**.

[0346] Because the regulator device **R** is configured to generate electrical signals, the regulator device **R** may be vulnerable to heat. Accordingly, the spacing member **91** may be positioned adjacent to the regulator to prevent heat from being transferred to the regulator device **R**.

[0347] The spacing member **91** may be formed of plastic. However, the present disclosure is not limited thereto.

[0348] The spacing member **91** may be formed through an injection process. However, the present disclosure is not limited thereto.

[0349] The cooking apparatus **1** may include a regulator fastening member **F1**. The regulator fastening member **F1** may be configured to couple the control panel **41** and the regulator device **R**.

[0350] At least a portion of the regulator fastening member **F1** may be exposed to the outside of the control panel **41**.

[0351] The shaft **300** of the regulator device **R** may be positioned by penetrating the control panel **41**. At least a portion of the shaft **300** may be exposed to the outside of the control panel **41**.

[0352] The regulator fastening member **F1** may be positioned adjacent to the shaft **300**.

[0353] The regulator fastening member **F1** may be a screw or rivet.

[0354] The cooking apparatus **1** may include the locker supporter **900**. The locker supporter **900** may be configured to support the locker **500**.

[0355] The locker supporter **900** may be configured to surround a hole. The shaft **300** may be positioned by passing through the hole defined by the locker supporter **900**.

[0356] The locker supporter **900** may be positioned adjacent to the shaft **300**.

[0357] The locker supporter **900** may be positioned to correspond to the locker **500** (FIG. **14**).

[0358] As will be described later, the locker **500** may be pressed by the knob **400** or rotated according to the rotation of the knob **400**. When the knob **400** is rotated while the locker **500** is in contact with the locker supporter **900**, a trajectory of the locker **500** in contact with the locker supporter **900** may draw a circle. The locker supporter **900** may have a shape corresponding to a moving trajectory of the locker **500**. Accordingly, the locker **500** may come into contact with the locker supporter **900** according to the movement of the locker **500**.

[0359] As discussed above, the locker **500** may include a metal material. When the locker **500** is rotated and comes into contact with the control panel **41**, scratches may be formed on the control panel **41**. The control panel **41** is a component that defines at least portion of the exterior of the cooking apparatus **1**, and thus when scratches are formed on the control panel **41**, the aesthetics of the cooking apparatus **1** may be adversely affected. Furthermore, when the cooking apparatus **1** is used, water may be often used in the container containing the food, and thus water may splash on the control panel **41**. When water splashes on the control panel **41** in a state in which the control panel **41** is scratched, corrosion may occur due to reaction with water.

[0360] That is, the locker supporter **900** may be mounted on the control panel **41**. The locker supporter **900** may be in contact with the locker **500** to prevent scratches that is on the control panel **41** and caused by the locker **500**.

[0361] The locker supporter **900** may be removably coupled to the control panel **41**. As a result, even when a scratch is formed on the locker supporter **900**, the locker supporter **900** may be replaced with another locker supporter **900**.

[0362] The locker supporter **900** may include a plastic material. However, the present disclosure is not limited thereto.

[0363] The locker supporter **900** may be formed by injection molding. However, the present disclosure is not limited thereto.

[0364] The locker supporter **900** may include a supporter hook portion **910**. The supporter hook portion **910** may be inserted into the control panel **41** to couple the locker **500** to the control panel **41**.

[0365] The supporter hook portion **910** may protrude toward the inside of the regulator body. The supporter hook portion **910** may penetrate the control panel **41**.

[0366] A plurality of supporter hook portions **910** may be provided. The plurality of supporter hook portions **910** may be positioned symmetrically. As a result, the locker supporter **900** may be stably coupled to the control panel **41**.

[0367] The control panel **41** may include a hole into which the supporter hook portion **910** is inserted.

[0368] The locker supporter **900** may include a fastening member receiving space **900S**.

[0369] The regulator fastening member **F1** may be accommodated in the fastening member receiving space **900S**.

[0370] As mentioned above, a portion of the regulator fastening member **F1** may be exposed to the

outside of the control panel **41**. When the trajectory, which is drawn as the locker **500** rotates, overlaps the position of the regulator fastening member **F1**, the locker supporter **900** may cover the front side of the regulator fastening member **F1** to support the locker **500** while locker **500** moves. For this, the regulator fastening member **F1** may be accommodated in the fastening member receiving space **900S**.

[0371] The fastening member receiving space **900S** may be concave toward the front.

[0372] In the case of a portion other than the portion in which the fastening member receiving space **900S** of the locker supporter **900** is located, a portion in contact with the control panel **41** and the fastening member receiving space **900S** is located, may come into contact with the regulator fastening member **F1**.

[0373] FIG. **14** is a cross-sectional view mainly illustrating the knob assembly **N** and the regulator device **R** of the cooking apparatus **1** illustrated in FIG. **3**. FIG. **15** is a cross-sectional view mainly illustrating the knob assembly **N** illustrated in FIG. **14**. FIG. **16** is a cross-sectional view illustrating a state in which the button **600** is pressed in the knob assembly **N** illustrated in FIG. **15**.

[0374] The movement of the knob assembly **N** according to one embodiment of the present disclosure will be briefly described with reference to FIGS. **14** to **16**.

[0375] The cooking apparatus **1** may include the regulator device **R**. The regulator device **R** may be in contact with the terminal **201** by rotation of the shaft **300**.

[0376] Particularly, the cam **200** may rotate due to the rotation of the shaft **300**, and the first terminal **201** (not shown) may move due to the rotation of the cam **200** to be in contact with the second terminal **201** (not shown). When the first terminal **201** and the second terminal **201** come into contact, electricity may flow. A signal may be transmitted to the heating source **90** by an electrical signal.

[0377] The cooking apparatus **1** may include the controller **1000**.

[0378] The controller **1000** may include the processor **1100** and the memory **1200**.

[0379] The processor **1100** may include a program (a plurality of instructions) for processing signals and providing control signals.

[0380] The memory **1200** may include a volatile memory **1200** such as Static Random Access Memory (S-RAM) and Dynamic Random Access Memory (D-RAM), and a non-volatile memory **1200** such as Read Only Memory (ROM), and Erasable Programmable Read Only Memory (EPROM).

[0381] The memory **1200** may be provided integrally with the processor **1100** or may be provided as a semiconductor device separate from the processor **1100**.

[0382] The processor **1100** may further include a processing core (e.g., a memory circuit and a control circuit) configured to process signals based on the program or data stored in the memory **1200** and configured to output a control signal.

[0383] When the first terminal **201** and the second terminal **201** are in contact, the regulator device **R** may generate a signal for the processor **1100** to receive.

[0384] The processor **1100** may control the heating source **90** to allow the heating source **90** to operate based on a user input detected by the regulator device **R**.

[0385] The processor **1100** may control the heating source **90** to operate the heating source **90** based on a signal generated in response to a user input from the regulator device **R**.

[0386] However, in order to allow the cam **200** to rotate through the rotation of the shaft **300**, the shaft **300** may need to be at the second shaft position.

[0387] This is because when the shaft **300** is at the first shaft position, the stopper **320** (FIG. **5**) is received in the stopper groove **111H** (FIG. **5**), thereby limiting rotation of the shaft **300**.

[0388] Accordingly, the regulator device **R** may be operated only when the shaft **300** is moved from the first shaft position to the second shaft position.

[0389] The knob assembly **N** may be coupled to the shaft **300**. The knob assembly **N** may be moved together with the shaft **300**. That is, as the knob assembly **N** moves, the shaft **300** may be

moved from the first shaft position to the second shaft position. The shaft **300** may rotate as the knob assembly **N** rotates. A user can control the movement of the shaft **300** by manipulating the knob assembly **N**. A user can control the regulator device **R** by manipulating the knob assembly **N**. A user can control the heating source **90** by manipulating the knob assembly **N**.

[0390] The control panel **41** may be located between the knob assembly **N** and the regulator body. The shaft **300** may be positioned by penetrating the control panel **41**.

[0391] The locker supporter **900** may be located on one side of the control panel **41** facing the knob assembly **N**.

[0392] The knob assembly **N** may include the knob **400** and the weight **700**. The knob **400** and the weight **700** may be coupled and moved together.

[0393] A space may be provided between the knob **400** and the weight **700**. At least a portion of the locker **500** may be located in the space provided between the knob **400** and the weight **700**.

[0394] The knob **400** may be in a first knob position in which the shaft **300** is at the first shaft position and a second knob position in which the shaft **300** is at the second shaft position.

[0395] The locker **500** may extend toward the locker supporter **900**.

[0396] The locker **500** may include a locker contact portion **510**.

[0397] The locker contact portion **510** may protrude to the outside of the weight **700**.

[0398] The locker contact portion **510** may be in contact with the locker supporter **900** when the knob **400** is at the first knob position. As a result, the movement of the knob assembly **N** toward the locker supporter **900** may be restricted. Accordingly, the locker contact portion **510** may restrict the movement of the shaft **300** from the first shaft position to the second shaft position.

[0399] The locker **500** may include a locker support portion **520**.

[0400] The locker support portion **520** may extend outwardly in the radial direction of the locker **500**. The locker support portion **520** may extend along the circumferential direction of the locker **500**. Accordingly, the locker elastic member **501** may be supported.

[0401] The locker support portion **520** may have a substantially disk shape.

[0402] The locker support portion **520** may be in contact with the weight **700** when the knob **400** is at the first knob position.

[0403] The locker **500** may include a locker extending portion **530**.

[0404] The locker extending portion **530** may protrude toward the button **600**.

[0405] The locker extending portion **530** may be in contact with the button **600** when the knob **400** is at the first knob position. Accordingly, the movement of the button **600** toward the locker **500** may be restricted. Therefore, the locker extending portion **530** may restrict the movement of the shaft **300** from the first shaft position to the second shaft position.

[0406] As shown in FIG. **15**, when the button **600** is at the first button position, the locker extending portion **530** may be in contact with the button **600**. That is, the locker **500** may be located in the locking position. In this case, the movement of the knob **400** from the first knob position to the second knob position may be restricted due to contact between the button **600** and the locker **500**. When knob **400** is at the first knob position, the shaft **300** may be at the first shaft position. When the button **600** is at the first button position, the shaft **300** may not be allowed to move from the first shaft position to the second shaft position.

[0407] As shown in FIG. **16**, when the button **600** is at the second button position, the locker receiving space **630S** located on the button **600** may be aligned with the locker extending portion **530**. In this case, the locker **500** may be moved forward. The locker **500** may be moved from the locking position to the unlocking position. As the locker **500** is movable, the knob **400** may be allowed to move from the first knob position to the second knob position. When the knob **400** is at the second knob position, the shaft **300** may be at the second shaft position. When the button **600** is at the second button position, the shaft **300** may be allowed to move from the first shaft position to the second shaft position.

[0408] At this time, when the locker **500** is moved from the locking position to the unlocking

position, it is required that the shaft **300** move by a distance that allows the stopper **320** of the shaft **300** to deviate from the stopper groove **111H**. Therefore, when the locker **500** is at the unlocking position, a distance by which the knob **400** is moved from the first knob position to the second knob position may be greater than or equal to a distance by which the shaft **300** is moved from the first shaft position to the second shaft position.

[0409] That is, the distance by which the locker **500** is moved from the locking position to the unlocking position may be greater than or equal to the distance by which the shaft **300** is moved from the first shaft position to the second shaft position.

[0410] When the locker **500** is in contact with the locker supporter **900** at the locking position, the knob **400** may be moved from the first knob position to the second knob position by the distance by which the locker **500** is moved from the locking position to the unlocking position. Therefore, in this case, the distance by which the locker **500** is moved from the locking position to the unlocking position may be greater than or equal to the distance by which the shaft **300** is moved from the first shaft position to the second shaft position.

[0411] When the shaft **300** is moved to the second shaft position, the shaft **300** may be rotated by rotation of the knob **400**. When the shaft **300** is rotated, the terminal **201** may be in contact by the rotation of the cam **200**, and thus a current may flow through the terminal **201**. When a current flows through the terminal **201**, the controller **1000** may detect the flow of the current and the controller **1000** may control the heating source **90** to operate.

[0412] When the button **600** is moved from the second button position to the first button position, an operation occurs in the reverse order of the previously described case.

[0413] When moving the button **600** from the first button position to the second button position, a user may need to press the button **600**. When a user does not press the button **600**, the button **600** may be pressed by the button elastic member **601** (FIG. **10**) and moved from the second button position to the first button position. In this case, when a user does not press the knob **400** rearward, the shaft **300** may be moved from the second shaft position to the first shaft position. This is because the shaft **300** is pressed by the shaft elastic member **301**.

[0414] While the button **600** is moved from the first button position to the second button position, the locker **500** and the locker receiving space **630S** may not be aligned. In this case, the locker **500** may be moved from the unlocking position to the locking position. This is because the locker elastic member **501** presses the locker **500** to move from the unlocking position to the locking position.

[0415] In the above, it has been described that the movement of the locker **500** is due to the position of the locker receiving space **630S** aligned with the locker **500** by the button **600**. Hereinafter a method in which the locker receiving space **630S** is aligned with the locker **500** will be described.

[0416] FIG. **17** is a perspective view illustrating the locker **500** of the knob assembly N illustrated in FIG. **15** and a configuration related thereto. FIG. **18** is a front view illustrating the button **600** inserted into the button holder **800** illustrated in FIG. **17**. FIG. **19** is an enlarged perspective view illustrating a state before the locker **500** is inserted into the locker receiving space **630S** in the configuration related to the locker **500** illustrated in FIG. **17**. FIG. **20** is an enlarged perspective view illustrating a state after the locker **500** is inserted into the locker receiving space **630S** in the configuration related to the locker **500** illustrated in FIG. **18**.

[0417] Movements of the button **600** and the locker **500** according to one embodiment of the present disclosure will be described with reference to FIGS. **17** to **19**.

[0418] The knob assembly N may include the button **600**.

[0419] The button **600** may include a button body **620**. The button body **620** may be a component that defines the exterior of the button **600**.

[0420] The button body **620** may be accommodated in the button holder **800**.

[0421] The button **600** may include a button holding portion **610**. The button holding portion **610**

may be exposed to the outside of the knob **400**.

[0422] The button holding portion **610** may protrude from the button body **620**. The button holding portion **610** may protrude toward the outside of the button holder **800**.

[0423] The button elastic member **601** may be located on one side of the button body **620** opposite to one side on which the button holding portion **610** protrudes. The button elastic member **601** may be positioned between the button body **620** and the button holder **800**. Accordingly, the button elastic member **601** may press the button body **620** to allow the button holding portion **610** to move outward from the knob **400**.

[0424] The button holder **800** may include an elastic member insertion protrusion **820** into which the button elastic member **601** is inserted.

[0425] The elastic member insertion protrusion **820** may protrude toward the button body **620**.

[0426] The button **600** may be slidably moved while being moved from the first button position to the second button position. A space may be located between the button body **620** and the button holder **800**. While the button body **620** is moved into the space, the button **600** may be moved from the first button position to the second button position.

[0427] The button holder **800** may include a guide hook portion **810**. The guide hook portion **810** may guide the slide movement of the button **600**.

[0428] The guide hook portion **810** may be positioned adjacent to the button **600** to guide the movement of the button **600**. The guide hook portion **810** may protrude toward the control panel **41**.

[0429] The guide hook portion **810** may include a hook shape at an end thereof. Accordingly, the button **600** may be prevented from being separated from the button holder **800**.

[0430] The guide hook portion **810** may extend along the locker **500**.

[0431] The guide hook portion **810** may extend along the direction in which the button **600** is moved from the first button position to the second button position. The button **600** may be slidably moved along the guide hook portion **810**.

[0432] The button elastic member **601** may include the first button **600a** elastic member and the second button **600b** elastic member. The first button **600a** elastic member and the second button **600b** elastic member may be configured to slide by dispersing a pressing force while moving the button **600** from the second button position to the first button position.

[0433] The button **600** may include an elastic member receiving portion **630**. The elastic member receiving portion **630** may be provided to accommodate the locker elastic member **501**.

[0434] The elastic member receiving portion **630** may protrude toward the locker support portion **520** (FIG. 15). The elastic member receiving portion **630** may include a space in which the elastic member is accommodated. The elastic member may be accommodated in the elastic member receiving portion **630** and a position of the elastic member may be fixed.

[0435] The locker contact surface **630A** may be provided inside the elastic member receiving portion **630**.

[0436] The locker extending portion **530** of the locker **500** may be in contact with the locker contact surface **630A** when the locker **500** is at the locking position. Accordingly, when the button **600** is at the first button position, the movement of the knob **400** from the first knob position to the second knob position may be restricted.

[0437] The locker elastic member **501** may be in contact with the locker contact surface **630A**. The locker elastic member **501** may be positioned between the locker contact surface **630A** and the locker support portion **520**.

[0438] The locker receiving space **630S** may be positioned adjacent to the locker contact surface **630A**. When the button **600** is moved from the first button position to the second button position, the locker receiving space **630S** may be moved toward the locker **500**.

[0439] When the button **600** is at the first button position, the locker receiving space **630S** may be located in a direction opposite to the direction in which the button **600** faces the second button



position with respect to the locker **500**.

[0440] When the button **600** is at the first button position, the locker receiving space **630S** may be positioned to be spaced apart from the position of the locker **500** by the distance by which the button **600** is moved from the first button position to the second button position.

[0441] Accordingly, when the button **600** is moved from the first button position to the second button position, the locker **500** may be aligned with the locker receiving space **630S**. Particularly, when the button **600** is at the second button position, the locker receiving space **630S** may be located in front of the locker extending portion **530** of the locker **500**. Therefore, while the knob **400** is moved from the first knob position to the second knob position, the locker extending portion **530** of the locker **500** may be moved to the locker receiving space **630S** and at same time, the movement of the knob **400** may be allowed. As the movement of the knob **400** is allowed, the shaft **300** may be movable from the first shaft position to the second shaft position.

[0442] A direction in which the button **600** is moved from the first button position to the second button position may intersect with a direction in which the locker **500** is moved from the locking position to the unlocking position. Accordingly, a user can easily press the button **600**, and at the same time, necessary movement of the locker **500** may be allowed.

[0443] FIG. **21** is a perspective view illustrating a state in which the button holder **800** and a configuration related thereto illustrated in FIG. **17** is inserted into the knob **400**.

[0444] A positional relationship between the button holder **800** and the knob **400** according to one embodiment of the present disclosure will be described with reference to FIG. **21**.

[0445] The knob **400** may include the knob body portion **410** and the knob holding portion **420** protruding from the knob body portion **410**.

[0446] The button holder **800** may be located inside the knob holding portion **420**. The button holder **800** may have a shape corresponding to the knob holding portion **420**.

[0447] The button holder **800** may be affected by the shape of the knob holding portion **420**. A movable distance of the button **600** from the first button position to the second button position may be affected by the shape of the button holder **800**. Particularly, the movable distance of the button **600** from the first button position to the second button position may be affected by a width of the button holder **800**. In other words, the movable distance of the button **600** may be determined by the knob holding portion **420**.

[0448] FIG. **22** is a perspective view illustrating the weight **700** illustrated in FIG. **10**.

[0449] The weight **700** according to one embodiment of the present disclosure will be described in detail with reference to FIG. **22**.

[0450] The knob assembly N may include the weight **700**.

[0451] The weight **700** may include a weight body **710**. The weight body **710** may define at least portion of the exterior of the weight **700**.

[0452] The weight **700** may include a weight protrusion **740**.

[0453] The weight protrusion **740** may protrude toward the button **600**.

[0454] The weight protrusion **740** may include a button movement limiter **741**.

[0455] The button movement limiter **741** may be in contact with the button body **620** (FIG. **23**) while the button **600** is at the second button position. As a result, it is possible to guide that the button **600** is at the second button position.

[0456] The button **600** may be required to be accurately positioned at the second button position. When the button **600** is at the second button position, the position of the locker receiving space **630S** may be required to be aligned to correspond to the locker **500**. This is because the locker receiving space **630S** needs to be positioned to correspond to the locker **500** in order that the locker **500** is moved from the locking position to the unlocking position.

[0457] For this, the button movement limiter **741** may restrict further movement by being in contact with the button body **620** when the button **600** is moved to the second button position.

[0458] That is, the button movement limiter **741** may protrude in an opposite direction facing the

control panel **41** to be in contact with the button **600** when the button **600** is at the second button position to guide movement of the button **600** to the second button position.

[0459] The weight **700** may include a fastening member hole **730H** into which the knob fastening member **F2** is insertable.

[0460] The weight **700** may include a locker hole **720H** through which the locker **500** passes. The locker hole **720H** may be positioned to correspond to the locker contact portion **510**.

[0461] The weight **700** may be positioned over the opening of knob **400**. The locker **500** may pass through the locker hole **720H** so as to be exposed to the outside of the weight **700**.

[0462] The weight **700** may include a flange receiving recess **721H** that is concave toward the opposite direction of the locker support portion **520** to accommodate the locker support portion **520** of the locker **500**. The flange receiving recess **721H** may be positioned to correspond to the locker support portion **520**. Accordingly, the locker support portion **520** may be positioned at an accurate position.

[0463] FIG. **23** is a perspective view illustrating the button **600** illustrated in FIG. **10**.

[0464] The button **600** according to one embodiment of the present disclosure will be described with reference to FIG. **23**.

[0465] The knob assembly **N** may include the button **600**.

[0466] The button **600** may include the button body **620**.

[0467] The button **600** may include the button holding portion **610**. The button holding portion **610** may protrude from the button body **620** toward the outside of the knob **400**.

[0468] The button **600** may include an elastic member receiving space **631S**. The elastic member receiving space **631S** may extend in a direction crossing the direction in which the button **600** is moved from the first button position to the second button position. The elastic member receiving space **631S** may extend in a direction perpendicular to the direction in which the button **600** is moved. Accordingly, the button **600** may be pressed in a direction different from the direction in which the locker **500** (FIG. **10**) receives elastic force by the locker elastic member **501** (FIG. **10**). When the direction in which the button **600** is moved from the first button position to the second button position is similar to the moving direction of the locker **500**, the knob assembly **N** may be pressed simultaneously with the operation of the button **600**. As a result, the regulator device **R** may operate due to the movement of the shaft **300**. In order to prevent this, it is appropriate that the moving direction of the button **600** is different from the moving direction of the shaft **300**.

[0469] The locker **500** may include the elastic member receiving portion **630**. The elastic member receiving portion **630** may extend from the button body **620** along the direction in which the locker **500** is moved from the locking position to the unlocking position. The elastic member receiving portion **630** may define the elastic member receiving space **631S**.

[0470] The button **600** may include the locker receiving space **630S**. The locker receiving space **630S** may extend along a direction parallel to the direction in which the elastic member receiving space **631S** extends. Accordingly, the locker elastic member **501** may apply an elastic force to the locker **500** in a direction parallel to the direction in which the locker **500** is moved.

[0471] The button **600** may include an elastic member recess. The elastic member recess may be a space in which the button elastic member **601** is accommodated. As a result, the button elastic member **601** may be stably positioned between the button **600** and the button holder **800**.

[0472] The elastic member recess may be located adjacent to the end of the button body **620**.

[0473] A plurality of elastic member recesses may be provided. The elastic member recess may include a first elastic member recess **620Ha** and a second elastic member recess **620Hb**.

[0474] The first elastic member recess **620Ha** and the second elastic member recess **620Hb** may be located at both ends of the button body **620** perpendicular to the moving direction of the button **600**.

[0475] The cooking apparatus **1** according to one embodiment of the present disclosure has been described in the above-description. Hereinafter a cooking apparatus **1** according to another

embodiment of the present disclosure will be described. Configurations that are the same as those shown in FIGS. **1** to **23** may be assigned the same reference numerals and descriptions thereof may be omitted.

[0476] FIG. **24** is a cross-sectional view of a knob assembly **N-1** and a configuration related thereto according to one embodiment of the present disclosure.

[0477] The regulator combination of the knob assembly **N-1** according to one embodiment of the present disclosure will be described with reference to FIG. **24**.

[0478] The knob assembly **N** may include a shaft rotation portion **400H-1**. The shaft rotation portion **400H-1** may define a space in which a shaft **300** is located.

[0479] The knob assembly **N-1** may be removably coupled to the shaft **300**. The knob assembly **N-1** may be separated from the shaft **300** to facilitate cleaning, and the knob assembly **N-1** may be coupled to the shaft **300** after cleaning.

[0480] A space defined by the shaft rotation portion **400H-1** may extend parallel to a direction in which a shaft mounting hole **710H-1** extends. The space defined by the shaft rotation portion **400H-1** may have a circular cross-section. The space defined by the shaft rotation portion **400H-1** may have a cylindrical shape.

[0481] The shaft **300** may be located inside the shaft rotation portion **400H-1**. When the shaft **300** is located inside the shaft rotation portion **400H-1** and the shaft **300** is not accommodated in the shaft mounting hole **710H-1**, the shaft **300** may not be rotated despite the rotation of the knob **400**. In this case, the shaft **300** may need to be moved further inside the knob assembly **N** to be accommodated in the shaft mounting hole **710H-1**.

[0482] The shaft rotation portion **400H-1** may not be provided in the knob assembly **N-1**. In a state in which the knob assembly **N-1** is not close enough to the shaft **300** and the knob **400** is pressed to move from the first knob position toward the second knob position, the shaft **300** may be moved to an end portion of the shaft mounting hole **710H-1**. That is, even when the knob **400** moves, the shaft **300** may not move from the first shaft position to the second shaft position. Because a user expects the movement of the shaft **300** to occur according to the movement of the knob **400**, the user can attempt to rotate the knob **400**. In this case, the stopper **320** of the shaft **300** may be caught in the stopper groove **111H**, thereby restricting rotation. In this case, the user may not obtain the desired operation.

[0483] To prevent this, a user can mount the knob assembly **N-1** to the shaft **300** after moving the locker **500** from the locking position to the unlocking position by moving the button **600** from the first button position to the second button position. In order for the shaft **300** to be positioned adjacent to the end portion of the shaft mounting hole **710H-1**, it is possible for the locker **500** to prevent the limitation in the movement of the knob assembly **N** by being in contact with the supporter.

[0484] However, because it is difficult for a user to know that the knob assembly **N-1** is deeply coupled to the shaft **300**, the shaft rotation portion **400H-1** may be provided. Accordingly, when the shaft **300** is not inserted sufficiently to the knob assembly **N-1**, the user can feel that the knob **400** is idling. Accordingly, the user can recognize that the knob assembly **N-1** is not sufficiently coupled to the shaft **300**. When there is idle rotation of the knob assembly **N-1**, the user can manipulate the knob assembly **N-1** to press the button **600** to couple the shaft **300** to the knob assembly **N-1**, more deeply.

[0485] In the embodiment referring to FIGS. **1** to **23**, the shaft rotation portion **400H-1** is not provided. Accordingly, a contact area between the shaft **300** and the knob assembly **N** is increased to allow the shaft **300** and the knob assembly **N** to be stably coupled. The present embodiment is different in that the shaft rotation portion **400H-1** is provided to allow a user to recognize that the knob assembly **N-1** is coupled to the shaft **300** at the accurate position.

[0486] FIG. **25** is a cross-sectional view of a knob assembly **N-2** and a configuration related thereto according to one embodiment of the present disclosure.

[0487] The knob assembly N-2 according to one embodiment of the present disclosure will be described with reference to FIG. 25.

[0488] A locker housing 699-2 may be provided in a control panel 41. The locker housing 699-2 may be provided to accommodate the following component.

[0489] The locker housing 699-2 may be disposed between the control panel 41 and the knob assembly N-2.

[0490] The locker housing 699-2 may include a space formed therein.

[0491] A shaft 300 may penetrate the locker housing 699-2 and be coupled to the knob assembly N-2.

[0492] A button 600-2, a button elastic member 601-2, a locker 500-2, and a locker elastic member 501-2 may be disposed inside the locker housing 699-2.

[0493] The locker 500-2 may include a locker contact portion 510 facing the shaft 300. The locker contact portion 510 may be in contact with the knob assembly N-2.

[0494] The locker elastic member 501-2 may press the locker 500-2 to allow the locker 500-2 to be pressed toward the knob assembly N-2.

[0495] The locker 500-2 may be in contact with the knob assembly N-2 at the locking position. The locker 500-2 may be in contact with a weight 700 at the locking position.

[0496] When the button 600-2 is moved from the first button position to the second button position, the locker 500-2 may be aligned with the locker receiving space 630S-2. The locker receiving space 630S-2 may be located within the locker housing 699-2.

[0497] The locker 500-2 may be positioned toward the control panel 41 while being moved from the locking position to the unlocking position.

[0498] While the button 600-2 is moved from the first button position to the second button position, the knob 400 may be movable from the first knob position to the second knob position. When the knob 400 is moved to the second knob position, the shaft 300 may be moved from the first shaft position to the second shaft position. When shaft 300 is at the second shaft position, the shaft 300 may rotate. When the shaft 300 rotates, the regulator device R may generate a signal to operate the heating source 90.

[0499] In the embodiment shown in FIGS. 1 to 23, the knob assembly N includes the locking device L. The locking device L may be disposed inside the knob 400. In the embodiment, a locking device L-2 may be located inside the locker housing 699-2 located adjacent to the control panel 41.

[0500] FIG. 26 is a cross-sectional view of a knob assembly N and a configuration related thereto according to one embodiment of the present disclosure.

[0501] The knob assembly N-3 according to one embodiment of the present disclosure will be described with reference to FIG. 26.

[0502] The knob assembly N-3 may include a first button 600a-3 and a second button 600b-3.

[0503] The first button 600a-3 and the second button 600b-3 may be positioned symmetrically with respect to the shaft 300.

[0504] The knob assembly N-3 may include a first locker 500a-3 and a second locker 500b-3.

[0505] The first locker 500a-3 and the second locker 500b-3 may be positioned symmetrically with respect to the shaft 300.

[0506] The first locker 500a-3 and the second locker 500b-3 may be in contact with a locker supporter 900.

[0507] The first locker 500a-3 and the second locker 500b-3 press the locker supporter 900 symmetrically with respect to the shaft 300. Accordingly, when a knob 400 is moved from the first knob position to the second knob position, the knob 400 may be pressed horizontally with respect to the shaft 300.

[0508] FIG. 27 is a cross-sectional view of a knob assembly N and a configuration related thereto according to one embodiment of the present disclosure.

[0509] A locker supporter 900-4 according to one embodiment of the present disclosure will be

described with reference to FIG. 27.

[0510] A control panel **41** may include the locker supporter **900-4**.

[0511] The locker supporter **900-4** may be provided to extend from a portion of the control panel **41**.

[0512] The locker supporter **900-4** may be formed together in a process of forming the control panel **41**. As a result, the process may be simplified by not including a separate locker supporter **900-4**.

[0513] FIG. **28** is a cross-sectional view of a knob assembly N-5 and a configuration related thereto according to one embodiment of the present disclosure. FIG. **29** is a cross-sectional view illustrating a state in which a button **600-5** of the knob assembly N-5 illustrated in FIG. **28** is pressed. FIG. **30** is a perspective view illustrating the button **600-5**, a locker **500-5** and a shaft **300-5** before the locker **500-5** shown in FIG. **28** is accommodated in a locker **500-5** insertion space.

[0514] The locker **500-5** according to one embodiment of the present disclosure will be described with reference to FIGS. **28** to **30**.

[0515] The locker **500-5** may extend along a direction in which the shaft **300-5** extends.

[0516] The locker **500-5** may be positioned by penetrating the shaft **300-5**. The locker **500-5** may be located inside the shaft **300-5**. The locker **500-5** may be exposed to the outside of the shaft **300-5** at an end of the shaft **300-5** facing the knob assembly N-5.

[0517] One end of the locker **500-5** may be exposed to the outside of the shaft **300-5**, and the other end of the locker **500-5** may be in contact with the inside of the shaft **300-5**.

[0518] The shaft **300-5** may include a hole for accommodating the locker **500-5**. The hole defined in the shaft **300-5** may extend in a longitudinal direction of the shaft **300-5**.

[0519] A weight **700-5** may include a hole through which the locker **500-5** passes to allow the locker **500-5** to be in contact with the button **600-5**. The locker **500-5** may be positioned to pass through the hole defined in the weight **700-5**.

[0520] The locker **500-5** may be in contact with the button **600-5** provided inside the knob **400**.

[0521] The locker **500-5** may be located in the locking position. However, when the button **600-5** is moved from the first button position to the second button position, the locker receiving space **630S** may be located adjacent to an end portion of the locker **500-5**.

[0522] When the knob **400** attempts to move from the first knob position to the second knob position in a state in which the button **600-5** is at the first button position, the end portion of the locker **500-5** may come into contact with the knob **400** and thus the movement of the knob **400** may be restricted.

[0523] When the knob **400** attempts to move from the first knob position to the second knob position in a state in which the button **600-5** is at the second button position, the end portion of the locker **500-5** may be accommodated in the locker receiving space **630S** and thus the movement of the knob **400** may be allowed.

[0524] When the knob **400** is moved to the second knob position, the shaft **300-5** may be moved to the second shaft position and thus the regulator device R may operate the heating source **90**.

[0525] In the embodiment, the locker elastic member **501** may not be required.

[0526] Therefore, in the button **600-5**, an elastic member receiving portion **630-5** protruding from the button body **620** toward the locker **500-5** may not define a separate elastic member receiving space **631S**.

[0527] When the button **600-5** is at the first button position, the elastic member receiving portion **630-5** may include a locker contact surface **630A-5** in contact with the locker **500-5**.

[0528] When the button **600-5** is at the second button position, the elastic member receiving portion **630-5** may include a locker receiving space **630S-5** configured to accommodate the locker **500-5**.

[0529] The locker receiving space **630S-5** may be positioned adjacent to the locker contact surface **630A-5**.

[0530] Hereinafter another embodiment of the shape of the locker **500** will be described.

[0531] FIG. **31** is a cross-sectional view of a knob assembly N-**6** and a configuration related thereto according to one embodiment of the present disclosure.

[0532] A locker **600-6** according to one embodiment of the present disclosure will be described with reference to FIG. **31**.

[0533] The locker **600-6** may extend along a direction in which a shaft **300-6** extends.

[0534] The locker **600-6** may be positioned by penetrating the shaft **300-6**. The locker **600-6** may be located inside a shaft **300-6**. The locker **600-6** may be exposed to the outside of the shaft **300-6** at an end portion of the shaft **300-6** facing the knob assembly N-**6**.

[0535] One end of the locker **600-6** may be exposed to the outside of the shaft **300-6**, and the other end of the locker **600-6** may be exposed to the outside of the shaft **300-6** and the case **100**.

[0536] The locker **600-6** may include a flange between the case **100** and the shaft **300-6**. The flange may prevent the locker **600-6** from being separated to the outside of the case **100**. The flange may prevent the movement of the locker **600-6** relative to the shaft **300-6**.

[0537] A shaft elastic member **301-6** may be positioned between the flange and the inside of the shaft **300-6**.

[0538] FIG. **32** is a cross-sectional view of a knob assembly N-**7** and a configuration related thereto according to one embodiment of the present disclosure.

[0539] A locker **600-7** according to one embodiment of the present disclosure will be described with reference to FIG. **32**.

[0540] The locker **600-7** may extend along a direction in which a shaft **300-7** extends.

[0541] The locker **600-7** may be positioned by penetrating the shaft **300-7**. The locker **600-7** may be located inside the shaft **300-7**. The locker **600-7** may be exposed to the outside of the shaft **300-7** at an end portion of the shaft **300-7** facing the knob assembly N-**7**.

[0542] One end of the locker **600-7** may be exposed to the outside of the shaft **300-7**, and the other end of the locker **600-7** may be located between the shaft **300-7** and the case **100**.

[0543] A flange may be defined at the other end of the locker **600-7**.

[0544] A shaft elastic member **301-7** may be positioned between the flange and the inside of the shaft **300-7**.

[0545] The flange may prevent the movement of the locker **600-7** relative to the shaft **300-7**.

[0546] Unless the context clearly indicates otherwise, the embodiments described above may be combined with other embodiments. Alternatively, it should be understood that combinations between embodiments are possible unless an embodiment is clearly limited in combination with another embodiment. Any combination of one embodiment with another embodiment are considered to be disclosed in the present disclosure.

[0547] While the present disclosure has been particularly described with reference to exemplary embodiments, it should be understood by those of skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the present disclosure.

## Claims

**1.** A cooking apparatus comprising: a heating source; a housing comprising a control panel; a regulator body configured to operate the heating source and be disposed adjacent to the control panel; a shaft to be coupled to the regulator body and while the shaft is coupled to the regulator body, the shaft being moveable between a first shaft position, in which a rotation of the shaft with respect to the regulator body is restricted, and a second shaft position, in which the rotation of the shaft with respect to the regulator body for operating the heating source is unrestricted; a knob to be coupled to the shaft so as to move along with the shaft while the knob is coupled to the shaft; and a locking device including a locker moveable relative to the knob, whereby locker is configured to move between a locking position, in which the locker is positioned between the knob

and the control panel to restrict a movement of the knob while the shaft is at the first shaft position, and an unlocking position, in which the locker is at least partially received in a locker receiving space to allow the movement of the knob.

**2.** The cooking apparatus of claim 1, further comprising: a button configured to move between a first button position that restricts a movement of the locker from the locking position to the unlocking position and a second button position that allows the movement of the locker from the locking position to the unlocking position, wherein the locker receiving space is disposed on the button.

**3.** The cooking apparatus of claim 2, wherein the locker extends along a direction facing the control panel.

**4.** The cooking apparatus of claim 2, wherein the button comprises a locker contact surface adjacent to an opening of the locker receiving space, wherein the locker is disposed at the locking position in which the locker comes into contact with the locker contact surface while the button is at the first button position, and the locker is movable to the unlocking position in which the locker is received in the locker receiving space while the button is at the second button position.

**5.** The cooking apparatus of claim 3, further comprising: a button holder received in the knob and comprising a locking device mounting space, wherein the button is received in the locking device mounting space, the button is disposed adjacent to one surface of the button holder while the button is at the first button position, and the button moves closer to another surface facing the one surface of the button holder while the button moves from the first button position to the second button position.

**6.** The cooking apparatus of claim 5, wherein the button holder comprises a guide hook portion disposed adjacent to the button and protruding toward the control panel to guide a movement of the button.

**7.** The cooking apparatus of claim 5, further comprising: a button elastic member disposed between the knob and the button holder to allow the button to be pressed from the second button position to the first button position.

**8.** The cooking apparatus of claim 7, wherein the button elastic member comprises: a first button elastic member; and a second button elastic member different from the first button elastic member to allow the button to move linearly.

**9.** The cooking apparatus of claim 8, wherein the regulator body further comprises a case comprising a stopper groove, wherein the shaft comprises: a shaft body at least partially inserted into the case; and a stopper protruding from the shaft body to be received in the stopper groove while the shaft is at the first shaft position, the stopper detached from the stopper groove while the shaft is at the second shaft position.

**10.** The cooking apparatus of claim 1, wherein a distance by which the locker moves from the locking position to the unlocking position is greater than or equal to a distance by which the shaft moves from the first shaft position to the second shaft position.

**11.** The cooking apparatus of claim 2, wherein a direction, along which the button moves from the first button position to the second button position, intersects a direction, along which the locker moves from the locking position to the unlocking position.

**12.** The cooking apparatus of claim 11, further comprising: a locker supporter mounted on the control panel and provided to come into contact with the locker to prevent the control panel from being scratched by the locker.

**13.** The cooking apparatus of claim 12, wherein the locker is disposed adjacent to the shaft to prevent vibration of the knob.

**14.** The cooking apparatus of claim 12, further comprising: a weight disposed on an opening of the knob, the weight comprising a locker hole through which the locker penetrates to allow the locker to be exposed to an outside of the weight.

**15.** The cooking apparatus of claim 14, wherein the weight comprises a button movement limiter

protruding to an opposite direction facing the control panel to be in contact with the button based on the button being at the second button position, so as to guide movement of the button to the second button position.

---