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(54) **DOOR ASSEMBLY FOR A COOKING APPARATUS**

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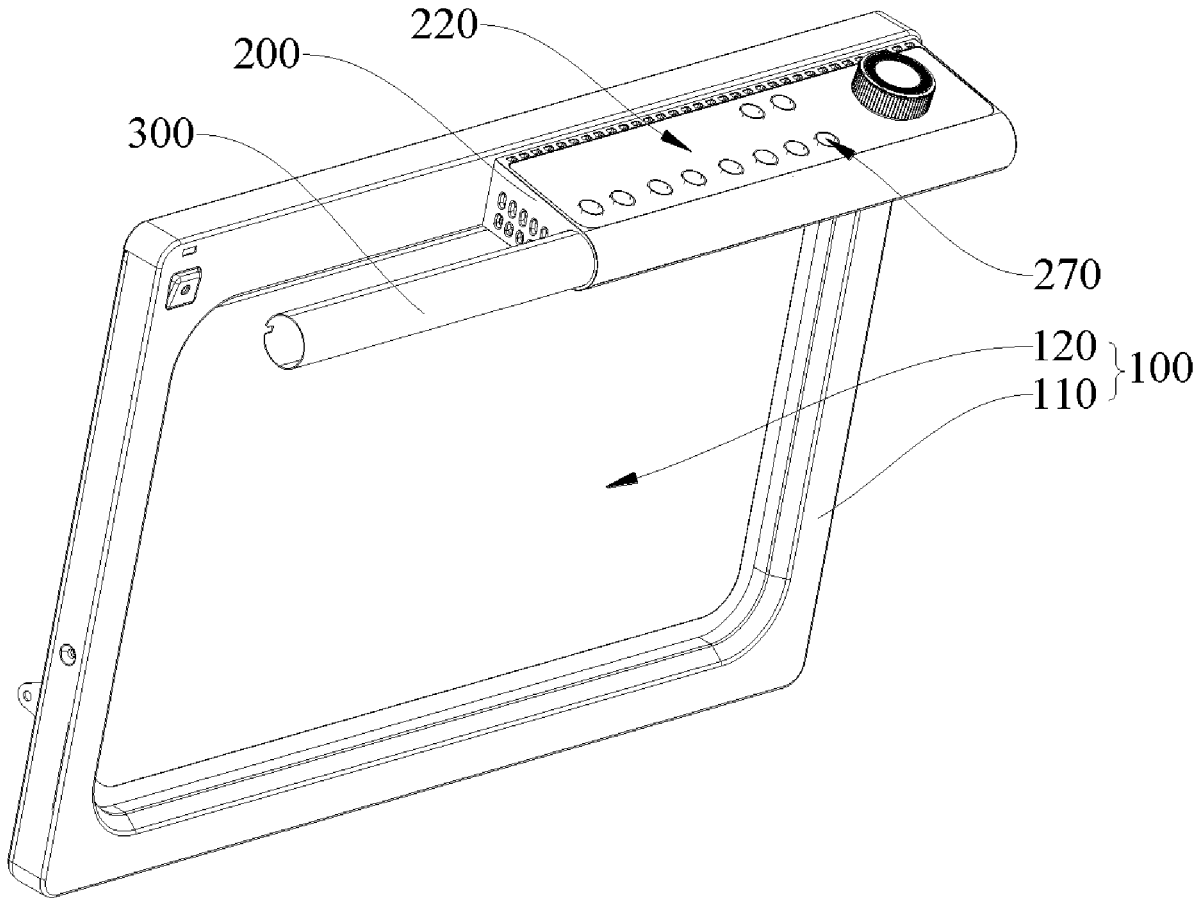
(57) **ABSTRACT**

The present application discloses a door assembly for a cooking apparatus, which belongs to the technical field of kitchen appliances. The door assembly comprises: a door body located in housing of the cooking apparatus and movable to allow access to a cooking chamber of the cooking apparatus; a controller fixed on one side of the door body away from said housing; a handle with two ends fixed in the controller and said door body such that the handle is used to open or close the door assembly. This arrangement has the following advantages: the controller does not occupy any space in the cooking chamber space, simplifies the cook apparatus structure, reduces the number of parts, and lowers the product cost. Additionally, the controller isolated from the temperature of the cooking chamber in the housing to prevent future damage.



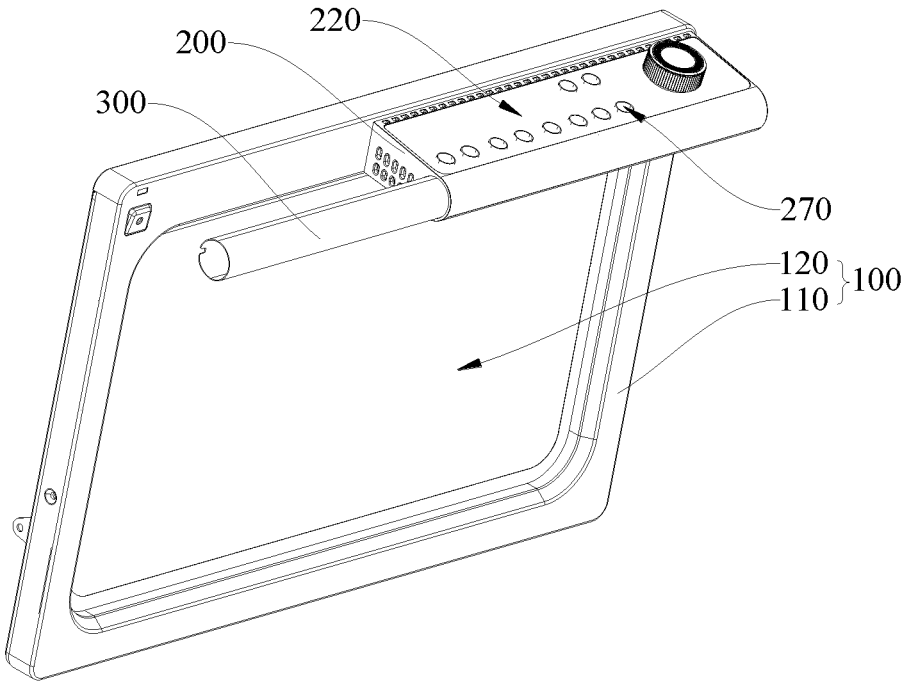


Figure 1

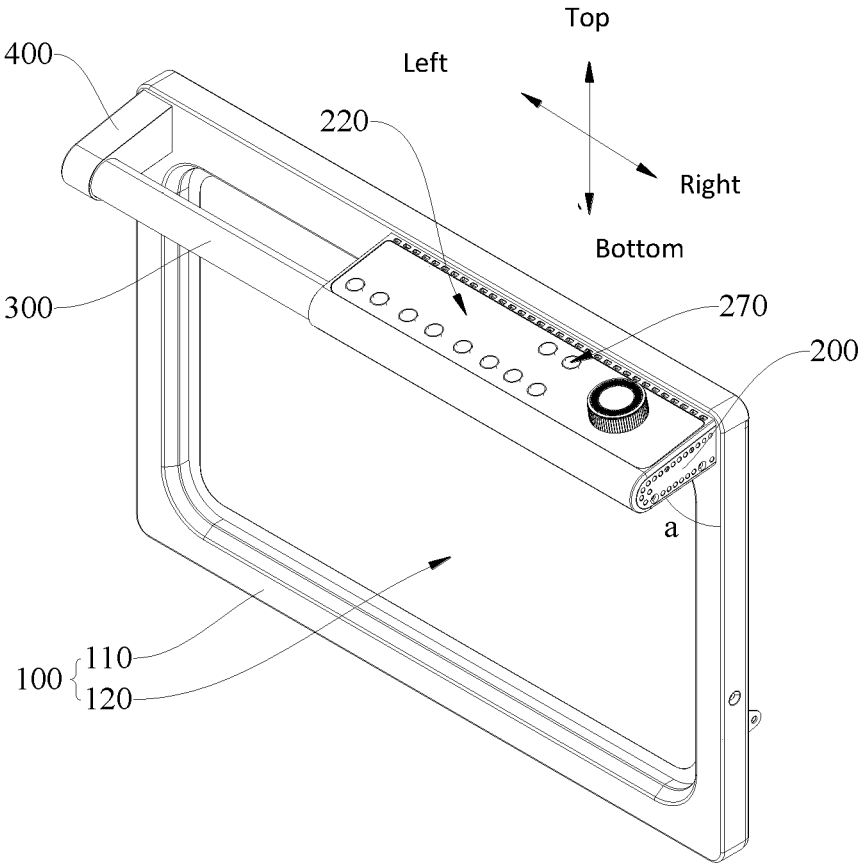


Figure 2

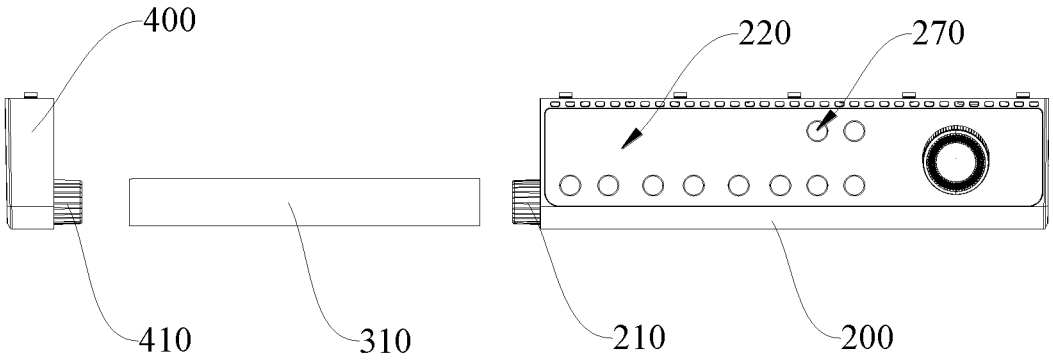


Figure 3

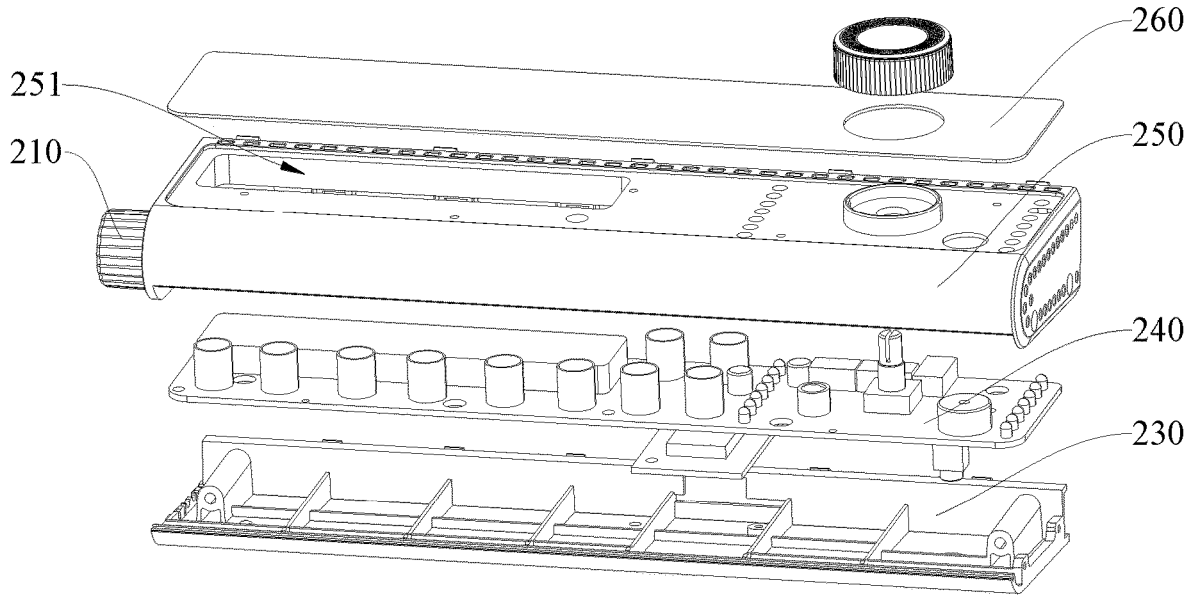


Figure 4

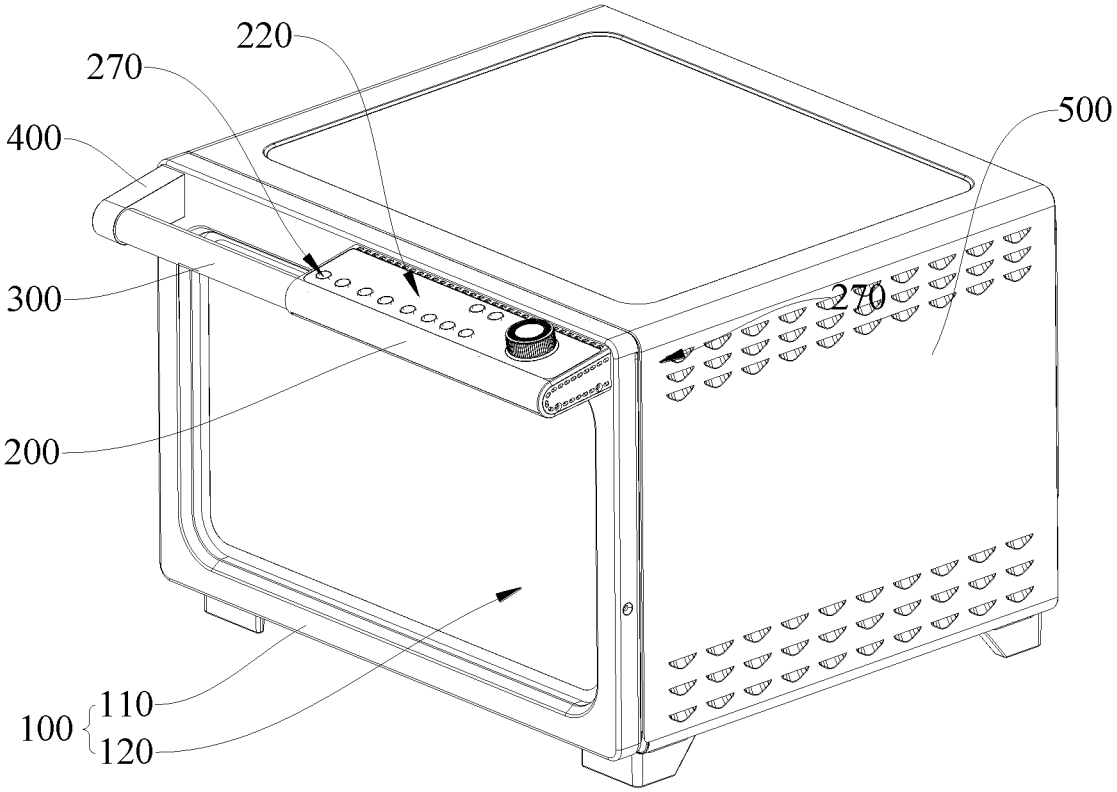


Figure 5

DOOR ASSEMBLY FOR A COOKING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to and benefit of the earlier Chinese Patent Application No. CN202320288337.1 filed on Feb. 2, 2023, the content of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present application belongs to the technical field of kitchen appliances, particularly door assemblies for a cooking apparatus.

BACKGROUND OF THE INVENTION

[0003] Cooking box apparatuses in the prior art typically a housing that isolates the cooking chamber from the outside, and the cooking components within the cooking chamber are controlled by a control panel or control buttons. The control panel or control buttons of the oven on the market are typically mounted on the oven housing. The control components are usually independent components, which take up a large amount of space, thereby reducing volume of the cooking chamber. Additionally, the control components require heat dissipation or significant insulation to protect the components from the relatively high temperature of the cooking chamber.

SUMMARY OF THE INVENTION

[0004] The purpose of the present application is to address at least one of the technical problems present in the prior art. To this end, the present application proposes a door assembly for a cooking apparatus, such as a cooking box apparatus. A controller for the cooking apparatus does not occupy the cooking chamber space and simplifies the product structure. At the same time, the controller is not easily affected by temperature of the oven chamber in the housing and results in a safter overall product.

[0005] In the first aspect, the present application provides a door assembly for cooking box apparatus, and the door assembly comprises: a door body located in housing of the cooking apparatus and is movable to allow access to a cooking chamber of the cooking apparatus; a controller affixed on one side of the door body away from the housing; and a handle with two ends affixed on the controller and the door body. The handle allows the door body to be opened or closed to allow access to the cooking chamber of the cooking apparatus.

[0006] By arranging the controller of the door assembly on the outside side of the door body and as a base to affix the handle, the door assembly based on the present application does not occupy the cooking chamber space. As a result, the effective space of the cooking chamber is increased, the product structure of the cooking apparatus is simplified, the number of parts is reduced, and the product cost is lowered. Additionally, the controller is safer and less prone to damage because it is not easily affected by the temperature of the cooking chamber in the housing.

[0007] According to one example of the present application, the door assembly further comprises: a handle base, the handle base located in the door body, the first end of the handle is connected to the handle base, the second end of the handle is connected to the controller.

[0008] According to one example of the present application, the controller is provided with a first retainer protrusion, the handle base is provided with a second retainer protrusion, the handle comprises a hollow round tube, and two ends of the round tube are respectively nested at the first retainer protrusion and the second retainer protrusion.

[0009] According to one example of the present application, the controller is provided with an operating surface, and the operating surface faces upwards when the door assembly is closed.

[0010] According to one example of the present application, the bottom of the door body is rotationally connected with the housing, and the controller is arranged on the outer top of the door body.

[0011] According to one example of the present application, the minimum included angle between the plane where the operating surface is located and the plane where the door body is located is a, where $a>60°$.

[0012] According to one example of the present application, the included angle, $a<90°$.

[0013] According to one example of the present application, the controller is provided with at least several heat dissipation structures.

[0014] According to one example of the present application, the controller comprises: a box body, the box body having openings; a fixing plate, the fixing plate located in the box body; a circuit board, the circuit board arranged on the fixing board, with openings exposing the circuit board; a screen-printed surface, the screen-printed surface affixed on the box body to cover the circuit board.

[0015] In the second aspect, the present application provides a cooking box apparatus, comprising a housing and a door assembly according to any of the examples described above, with the housing forming a cooking chamber; the door assembly is located in the housing, and the door assembly is suitable for opening or closing the cooking chamber.

[0016] The cooking box apparatus based on the present application, by arranging the controller on the outside side of the door, and as a base to bear the handle, does not occupy the cooking chamber space, increases effective space of the cooking chamber, simplifies the product structure, reduces the number of parts, and lowers the product cost. At the same time, the controller is not easily affected by the temperature of the cooking chamber in the housing, and the controller is safer.

[0017] Additional aspects and advantages of the present application will be given in part in the following description, which will become apparent from the following description, or learned through practice of the present application.

BRIEF DESCRIPTION OF DRAWINGS

[0018] The above and/or additional aspects and advantages of the present application will become apparent and readily understood from description of examples in connection with the following drawings, wherein:

[0019] FIG. **1** is the first structural schematic diagram of the door assembly provided by examples of the present application.

[0020] FIG. **2** is the second structural schematic diagram of the door assembly provided by examples of the present application.

[0021] FIG. **3** is a breakdown schematic diagram of the handle provided by examples of the present application.

[0022] FIG. **4** is a breakdown schematic diagram of the controller provided by examples of the present application.

[0023] FIG. **5** is a structural schematic diagram of the cooking apparatus provided by examples of the present application.

DETAILED DESCRIPTION OF THE INVENTION

[0024] Examples of the present application are described in detail below, examples of which are shown in the attached drawings, wherein the same or similar numerals throughout represent the same or similar elements or elements having the same or similar functions. The examples described below with reference to the attached drawings are exemplary, and are for the purpose of interpreting the present application only, which should not be construed as limiting the present application.

[0025] Unless otherwise specified, the left and right directions in this application are horizontal, i.e., Y direction; the upper and lower directions are vertical, i.e., Z direction.

[0026] A door assembly for a cooking box apparatus according to examples of the present application is described below with reference to FIGS. **1-5**.

[0027] As shown in FIGS. **1** and **5**, one example of the present application provides a door assembly for a cooking apparatus.

[0028] In the present embodiment, the door assembly comprises a door body **100**, a controller **200**, and a handle **300**; a movable door body **100** located in the housing **500** of a cooking apparatus. The controller **200** is fixed on one side of the door body **100** away from the housing **500** and At least one ends of the handle **300** are affixed to the controller **200**. The handle **300** operates the door body **100** to open or close the cooking chamber of the cooking apparatus.

[0029] In some examples, the cooking apparatus may be an oven or microwave oven or a similar cooking appliance. The cooking apparatus may comprise a housing and cooking components, the housing **500** forms a cooking chamber, the cooking components are located inside the housing, the cooking components may heat a cooking chamber of the cooking apparatus. The housing **500** is provided with an opening connecting the cooking chamber at which the door body **100** is located and the door body **100** can seal such opening. Of course, the cooking apparatuses can be other types of appliances, which is not limited by this implementation.

[0030] In the present embodiment, the controller **200** comprises a housing and an integrated control system inside the housing connected to the cooking components for controlling the start, stop, or adjustment of operating parameters of the cooking components. The specific composition of the control system can be determined according to the type of cooking components. The cooking components can be heating tubes or microwave heating components, or similar means for heating the cooking chamber as known in the prior art.

[0031] In some examples, one side of the door body **100** may be rotationally connected with the housing **500** along which the door body **100**. The position of the door body **100** may be adjusted to suit the needs of the cooking apparatus. In general, the door body **100** can be repositioned relative to the housing **500** to switch between a closed state and the open state for the cooking chamber within the housing **500**. When the door body **100** is in the closed state, the door body **100** closes the opening on the housing, isolating the cooking chamber from the exterior and closing the housing **500**. When the door body **100** is in the open state, the door body **100** opens the opening on the housing, allowing access to the cooking chamber from the exterior, then the housing **500** is opened.

[0032] It is to be noted that the controller **200** can be secured on the opposite side of the side of the rotational connection with the housing **500**, thereby allowing for ease of operation in opening and/or closing the door body **100**. For example, the left side of the door body **100** is rotationally connected with the housing **500**, then the controller **200** is fixed to the right side of the door body **100**.

[0033] It can be understood that the handle **300** is fixed on the outer surface of the housing of the controller **200**, and the housing of the controller **200** is fixed on the door body **100**, so when the handle **300** is subjected to pulling force or pushing force, such pulling force or pushing force will be transferred to the door body **100**, thereby driving action of the door body **100**. For example, the door body **100** can be opened by applying outward pulling force to the handle **300** when the door body **100** is in the closed state; the door body **100** can be closed by applying inward pushing force to the handle **300** when the door body **100** is in the open state. Wherein, outward refers to a direction from inside to outside of the housing **500**, while inward refers to a direction from outside to inside of the housing **500**.

[0034] By arranging the controller **200** on the outside side of the door body **100**, and as a base to bear the handle **300**, the door assembly does not occupy the cooking chamber space, increases effective space of the cooking chamber, simplifies the product structure, reduces the number of parts, and lowers the product cost. At the same time, the controller **200** is not easily affected by the temperature of the cooking chamber in the housing **500**, and the controller **200** is safer.

[0035] As shown in FIG. **2**, in some examples of the present application, the door assembly may further comprise a handle base **400** located in the door body **100**; the first end of the handle **300** is connected with the handle base **400**, and the second end of the handle **300** is connected with the controller **200**.

[0036] In some examples, the handle base **400** and the controller **200** can be bolted to the door body **100**, and the two are aligned in horizontal direction or vertical manner. Accordingly, the handle **300** is set between the handle base **400** and the controller **200**, which is arranged in the same horizontal direction or vertical manner. The handle **300** can be respectively fixed on two opposite sides of the handle base **400** and the controller **200**, and its fixation method can be threaded connection or flange connection, etc.

[0037] It can be understood that the handle base **400** and the controller **200** form a connection seat connected with the door body **100** at both ends of the handle **300**, and the force received by the handle **300** can be transferred to the door body **100** along the handle base **400** and the controller **200** on both sides, thereby causing the door body **100** to be more uniformly stressed and easy to operate.

[0038] As shown in FIG. **3**, in some examples of the present application, the controller **200** is set with the first retainer protrusion **210**, the handle base **400** is set with the second retainer protrusion **410**, the handle **300** comprises a hollow round tube **310**, and two ends of the round tube **310**

are respectively nested at the first retainer protrusion **210** and the second retainer protrusion **410**.

[0039] In the present embodiment, the first retainer protrusion **210** is set on the side of the controller **200** towards the handle base **400**, and the second retainer protrusion **410** is set on the side of the handle base **400** towards the controller **200**. The first retainer protrusion **210** and the second retainer protrusion **410** can be in cylindrical state, and their outer diameter must be able to be inserted into the round tube **310**.

[0040] In some examples, the round tube **310** can act as the body of the handle **300**, and two ends of the round tube **310** are in active connection with the first retainer protrusion **210** and the second retainer protrusion **410** to facilitate assembly. The first retainer protrusion **210** and the second retainer protrusion **410** are fitted with the round tube **310** via a friction fit or other method of attachment.

[0041] As an example, the assembly process can be: the first retainer protrusion **210** and the second retainer protrusion **410** are respectively inserted into two ends of the round tube **310**, to connect the round tube **310** with the controller **200** and the handle base **400**; then the controller **200** and the handle base **400** are secured on the door body **100**.

[0042] In some examples of the present application, the controller **200** is set with operating surface **220**, the operating face **220** is arranged upward so it can be seen by the user.

[0043] It should be noted that the operating surface **220** refers to the surface of one side provided with the interactive components on the housing of the controller **200**. The interactive components can include knobs, buttons, a touch screen, or a display screen, or the like as known in the art. The viewing angle of the user using the product is typically top down, thus the operating surface **220** is arranged upwards for easy viewing and operation by the user.

[0044] In some examples of the present application, the bottom of the door body **100** is rotationally connected with the housing **500**, and the controller **200** is set on the outer top of the door body **100**.

[0045] In this implementation, the controller **200** is located on top of the door body **100**, and the operating surface **220** on the controller **200** is arranged upwards, fitting the user's perspective, for easy operation.

[0046] In some examples, the bottom of the door body **100** can be set with a spool connecting the housing of the housing **500**. When the door body **100** is opening or closing, the door body **100** rotates around such spool.

[0047] In some examples of the present application, the minimum included angle between the plane where the operating surface is located and the plane where the door body is located is angle a, which is >60°.

[0048] Taking vertical placement of the door body as an example, the plane of the door body is the vertical plane, and the plane of the operating surface can be parallel to the direction where the controller is laid out. The minimum angle, a, is the angle between the controller and the door body when the operating surface is tilted downwardly in a direction away from the housing **500**. The minimum angle, a, is the angle between the controller and the door body supplemented along the vertical plane, when the operating surface is tilted upwardly in a direction away from the housing **500**. By arranging the angle, a>60°, the operating surface visually facilitates presentation of the panel to the user and eases control.

[0049] In some examples of the present application, the angle, a, is <90°.

[0050] In this implementation, the tilting operating plane arrangement is more convenient to view and operate. Further, the operating face can be tilted downwardly in a direction away from the housing **500**.

[0051] In some examples, the axis of the handle **300** is arranged horizontally, and the handle **300** is connected with sidewall of the controller **200**.

[0052] In some examples, the body of the handle **300** is the round tube **310**, the axis of the round tube **310** is arranged horizontally. When used by a user, the tube **310** can be gripped horizontally. The round tube **310** is arranged in the vertical plane of the door body **100**, and does not easily interfere with other sites of the housing **500**.

[0053] In some examples, the handle base **400** is also fixed to the top of the door body **100**, and is in horizontal alignment with the controller **200**. For example, the controller **200** is located on the right side, the handle base **400** can be located on the left side, the right side of the round tube **310** is nested at the first retainer protrusion **410** on the controller **200**, and the left side of the round tube **310** is nest at the second retainer protrusion **420** on the handle base **400**. Alternatively, the controller **200** is located on the left side, the handle base **400** can be located on the right side, the left side of the round tube **310** is nested at the first retainer protrusion **410** on the controller **200**, and the right side of the round tube **310** is nest at the second retainer protrusion **420** on the handle base **400**.

[0054] In some examples of the present application, the door body **100** can include the bezel **110** and glass, the bezel **110** is connected with the housing **500**, and the middle of the bezel **110** is set with the hollow region **120**; the glass is connected with the bezel **110** and is set in the hollow region **120**.

[0055] In some examples, the bezel **110** can be rectangular, the upper bezel of the bezel **110** may serve as the top of the door body **100**, and the controller **200** and/or the handle base **400** can be fixed on the upper bezel. The lower bezel of the bezel **110** can act as the bottom of the door body **100**, and the lower bezel can be in rotational connection with the housing of the housing **500**.

[0056] In some examples, the glass can be transparent glass. The surroundings of the transparent glass can be connected to the bezel **110** by adhesive. The transparent glass can facilitate the user view the interior of the housing **500**, improving usability.

[0057] In some examples of the present application, the controller **200** is set with at least several heat dissipation structures **270**.

[0058] In some examples, the heat dissipation structures **270** can be arranged on the operating surface, and the heat dissipation structures **270** are tunnels from interior to the exterior of the controller **200**, thereby providing heat dissipation and avoiding heat accumulation inside the controller **200**.

[0059] As shown in FIG. **4**, in some examples of the present application, the controller **200** can include the box seat **230**, the circuit board **240**, the box lid **250**, and the screen-printed surface **260**; the circuit board **240** is set on the box seat **230**; the box lid **250** is fit in with the box seat **230**, the box lid **250** is set with the opening **251**, and the opening

251 exposes the circuit board **240**; the screen-printed surface **260** is arranged on the box lid **250** to cover the circuit board **240**.

[0060] In the present implement, the housing of the controller **200** adopts the split design, dividing into the box seat **230** and the box lid **250**, which is conducive to mold release during mold injection and good control of appearance defects.

[0061] In some examples, the first retainer protrusion **210** can be set on the side of the box lid **250**, and the handle **300** is connected with the first retainer protrusion **210**. Alternatively, the handle **300** can also be bolted or the like to the side of the box lid **250**.

[0062] It is to be noted that the circuit board **240** is printed with control circuitry that can connect with cooking components within the housing **500** to control the start, stop, or adjustment of the operating parameters of the cooking components, the specific structure of the control circuitry corresponds to the type of cooking components, and corresponding control circuitry includes technology known in the art of control interfaces.

[0063] As an example, the assembly process of the controller **200** can be: the circuit board **240** is first secured to the box base **230**; the box lid **250** is then secured to the box base **230**; finally, the screen-printed surface **260** is stuck on the opening **251** of the box lid **250**. The above-mentioned method of securement can be bolted, and the controller **200** can also be bolted to the door body **100** after assembly is completed.

[0064] In some examples, the circuit board **240** is arranged with interactive components, such as knobs, buttons, etc. The screen-printed surface **260** is arranged with openings at sites corresponding to the interactive components to expose the interactive components for ease of operation.

[0065] In some examples of the present application, the controller can further comprise a box body, a fixing plate, a circuit board **240**, and a screen-printed surface **260**, the box body being provided with an opening **251**; the fixing plate is set on the box body; the circuit board **240** is set on the fixing plate, and the opening **251** exposes the circuit board; the screen-printed surface **260** is set on the box body to cover the circuit board **240**.

[0066] In the present implementation, the box body is designed integrally to serve as housing of the controller **200**. The integrated box body provides better sealing and stability. The fixing plate is primarily used to bear the circuit board **240** to facilitate securing the circuit board **240** inside the box body. Relevant structures of the circuit board **240** and the screen-printed surface **260** can refer to the above examples.

[0067] As an example, the assembly process of the controller **200** can be: The circuit board **240** is first fixed to the fixing plate; the fixing plate is then fixed to the box body; finally, the screen-printed surface **260** is stuck on the opening **251** of the box lid **250**. The above-mentioned method of securement can be bolted, and the controller **200** can also be bolted to the door body **100** after assembly is completed.

[0068] In the second aspect, the present application provides a cooking box apparatus, comprising a housing and a door assembly according to any of the examples described above, with the housing **500** forming a cooking chamber; the door assembly is located in the housing **500**, and the door assembly is suitable for opening or closing the cooking chamber. Specific structure of the door assembly can refer to the aforementioned examples, and it is not described again in this implementation.

[0069] The cooking box apparatus based on the present application, by arranging the controller **200** on the outside side of the door body **100**, and as a base to bear the handle **300**, does not occupy the cooking chamber space, increases effective space of the cooking chamber, simplifies the product structure, reduces the number of parts, and lowers the product cost; at the same time, the controller **200** is not easily affected by the temperature of the cooking chamber in the housing, and the controller **200** is safer.

[0070] The terms "the first," "the second," and the like in the specification and claims of the present application are used to distinguish similar objects, and are not used to describe a particular order or sequential order. It should be understood that the data used in this manner can be interchanged where appropriate, so that the examples of the present application can be implemented in a sequence other than those illustrated or described herein, and that "the first", "the second", and the like distinguishing objects are generally of the same category and do not limit the number of objects, for example, the first object(s) may be one or several. Furthermore, the "and/or" in the specification and claims refers to at least one of the associated objects, and the character, "/", generally indicates the relationship between the contextual objects as "or".

[0071] In the descriptions of this application, it is to be understood that the orientation or location relationships indicated by the terms "center", "vertical", "horizontal", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", etc. are based on the orientation or location relationships shown in the drawings. They are merely for the purpose of describing this application and simplifying the descriptions and are not intended to indicate or imply that the apparatus or element referred to must have a particular orientation or be constructed and operated in a particular orientation, and thus cannot be construed as limitations to this application.

[0072] In the description of the present application, the first feature "on" or "under" the second feature, can comprise direct contact between the first and second features, or further comprise indirect contact between the first and second features but through additional features therebetween.

[0073] In the description of the present application, the first feature "on," "above," and "upper," the second feature, comprises the first feature directly above and obliquely above the second feature, or simply indicates that the level of the first feature is higher than that of the second feature.

[0074] In the description of this specification, the description by reference terms "one example", "some examples", "schematic examples", "examples", "specific examples", or "some examples", etc. means that specific features, structures, materials, or characteristics described in connection with such examples or implementations are included in at least one example or implementation of the present application. In the present specification, indicative representations of the above-described terms do not necessarily refer to the identical example for example. Moreover, the specific features, structures, materials, or characteristics described may be combined in a suitable manner in any one or more examples or examples.

[0075] Although examples of the present application have been shown and described, those of ordinary skill in the art can understand that: various changes, modifications, substitutions and transformations can be made to these examples without departing from the principles and purposes of the present application; the scope of this application is defined by the claims and their equivalents.

DRAWING REFERENCE SIGNS

[0076] door body **100**, bezel **110**, hollow region **120**;

[0077] controller **200**, first retainer protrusion **210**, operating surface **220**, box seat **230**, circuit board **240**, box lid **250**, opening **251**, screen-printed surface **260**, heat dissipation structure **270**;

[0078] handle **300**, round tube **310**;

[0079] handle base **400**, second retainer protrusion **410**;

[0080] housing **500**.

1. A door assembly for a cooking apparatus, the door assembly comprising:

a door body, said door body movable relative to a housing of said cooking apparatus with a cooking chamber;

a controller, said controller being fixed on a side of the door body away from said housing;

a handle, one end of said handle is fixed to said controller, wherein said handle moves said door body.

2. The door assembly according to claim **1** further comprising:

a handle base located on said door body; wherein one end of said handle is connected with said handle base.

3. The said door assembly according to claim **2**, wherein the ends of the said handle are connected said controller and said handle base.

4. The said door assembly according to claim **3**, wherein said handle is a round tube.

5. The said door assembly according to claim **3**, wherein the ends of the said handle are connected to a first retainer protrusion on said controller and the said a second retainer protrusion on said handle base.

6. The door assembly according to claim **1**, wherein said controller has an operating surface.

7. The door assembly according to claim **1**, wherein said controller is arranged on the outer top of the said door body.

8. The door assembly according to claim **7**, wherein said operating surface is arranged upward so it can be seen by the user.

9. The door assembly according to claim **8**, wherein the minimum angle between the plane of said operating surface and the plane of said door body is greater than 60°.

10. The said door assembly according to claim **9**, wherein said angle between the plane of said operating surface and the plane of said door body is less than 90°.

11. The door assembly according to claim **1**, wherein said controller is provided with at least several heat dissipation structures.

12. The door assembly according to claim **11**, wherein said at least several heat dissipation structures comprise of tunnels between the interior to the exterior of the controller surface.

13. The door assembly according to claim **2**, wherein the handle base is fixed to the top of the door body, and is in horizontal alignment with the controller.

14. The door assembly according to claim **2**, wherein the door body includes a bezel, the bezel is connected with the housing.

15. The door assembly according to claim **14**, wherein the bezel can be rectangular and the upper portion of the bezel **110** is the top of the door body.

16. The door assembly according to claim **15**, wherein the controller is fixed on the upper bezel.

17. The door assembly according to claim **15**, wherein the handle base is fixed on the upper bezel.

18. The door assembly according to claim **2**, wherein said controller further comprises:

a controller body, said controller body has openings;

a fixing plate, said fixing plate arranged on the said controller body;

a circuit board, said circuit board located on the said fixing board, said openings exposing said circuit board;

a silk-screen surface, the said silk-screen surface affixed to the said controller body to cover the said circuit board.

19. The door assembly according to claim **1**, wherein the door assembly has an open position to provide access to said cooking chamber.

20. The door assembly according to claim **1**, wherein the door assembly has a closed position to prevent access to said cooking chamber.

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