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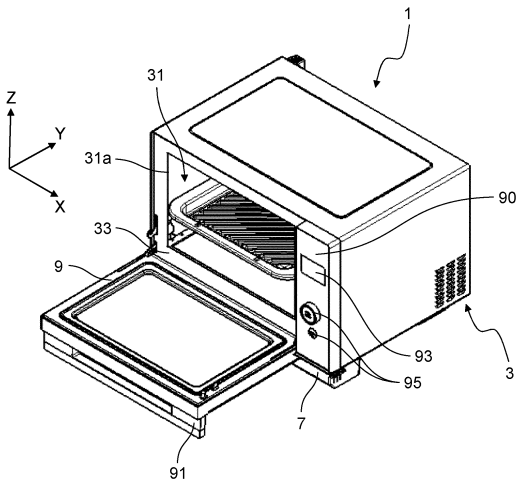
(54) HEATING COOKER

(57) A heating cooker according to the present disclosure includes a main body, a door, and a water receiving plate. The main body includes a heating chamber with an opening, and a front frame provided around a periphery of the opening of the heating chamber. The door is attached to the main body and covers the opening of the heating chamber. The water receiving plate is disposed below the heating chamber and behind the front frame, and receives water from a front corner of a bottom surface of the heating chamber. The water receiving plate includes a first water draining hole for guiding the water from the front surface side toward the rear surface side of the water receiving plate, and a guiding part for guiding the water to the first water draining hole.

FIG. 2



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Description

Technical Field

[0001] The present disclosure relates to a heating cooker.

Background Art

[0002] Conventionally, heating cookers with various configurations have been known to deal with a problem that dew condensation water generated during heat-cooking of foods drops to the outside. For example, a conventional heating cooker includes a water receiving part for receiving water dropping from a gap between an opening and a door of a main body of the heating chamber, and a tray for receiving and storing water dropping from the water receiving part (see, for example, PTL1 and PTL 2).

Citation List

Patent Literature

[0003]

PTL 1: Japanese Patent Application Unexamined Publication No. 2009-287815
PTL 2: Japanese Patent Application Unexamined Publication No. 2019-148399

SUMMARY OF THE INVENTION

[0004] However, conventional heating cookers still have room for improvement in terms of efficiently collecting water generated in a heating chamber.

[0005] Accordingly, an object of the present disclosure is to provide a heating cooker capable of efficiently collecting water generated in a heating chamber.

[0006] A heating cooker of one aspect of the present disclosure includes a main body, a door, and a water receiving plate. The main body includes a heating chamber with an opening, and a front frame provided around a periphery of the opening of the heating chamber. The door is attached to the main body and covers the opening of the heating chamber. The water receiving plate is disposed below the heating chamber and behind the front frame, and receives water from a front corner of a bottom surface of the heating chamber. The water receiving plate includes a first water draining hole for guiding the water from a front surface side toward a rear surface side of the water receiving plate, and a guiding part for guiding the water to the first water draining hole.

[0007] The heating cooker according to the present disclosure can efficiently collect water generated in the heating chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]

FIG. 1 is a front perspective view of a heating cooker in accordance with an exemplary embodiment of the present disclosure.
FIG. 2 is a front perspective view of the heating cooker with a door opened in accordance with the exemplary embodiment.
FIG. 3 is a front view of the heating cooker with the door and an operation display panel removed in accordance with the exemplary embodiment.
FIG. 4A is a perspective view showing a front frame of a main body with the door removed.
FIG. 4B is an enlarged view of a part of FIG. 4A.
FIG. 5A is a partial front view of the heating cooker with the door removed in accordance with the exemplary embodiment.
FIG. 5B is a view showing the front frame in perspective in order to visualize a rear side of a front frame lower part in FIG. 5A.
FIG. 6A is a front view of a water receiving plate of the heating cooker in accordance with the exemplary embodiment.
FIG. 6B is a rear view of the water receiving plate of the heating cooker in accordance with the exemplary embodiment.
FIG. 7 is a perspective view showing a lower part of the main body of the heating cooker viewed downward obliquely from the rear side in accordance with the exemplary embodiment.
FIG. 8 is a perspective view showing the lower part of the main body of the heating cooker viewed upward from the front side in accordance with the exemplary embodiment.

DESCRIPTION OF EMBODIMENT

(Findings Underlying the Present Disclosure)

[0009] The inventors of the present application have intensively studied for efficiently collecting water inside a heating chamber, and, as a result, have obtained the following findings.

[0010] A conventional heating cooker includes a water receiving part below a joint part between a front frame around a periphery of an opening of a heating chamber and a rear surface of a door. A water receiving tray is disposed below the water receiving part. The water receiving part is fixed to a bottom surface of the front frame extending rearward from a lower edge of the front frame.

[0011] In a conventional heating cooker, a plurality of steel plates is stuck to each other to form a heating chamber and a front frame of the heating chamber. In this configuration, when a gap is formed in a front corner of a bottom surface of the heating chamber, water generated inside the heating chamber may leak down through

the gap. In the conventional heating cooker, in order to prevent the water from leaking, the gap in the front corner of the bottom surface of the heating chamber is sealed with a silicone putty from the rear side of the steel plates.

[0012] The inventors of the present application have found a configuration in which water generated inside the heating chamber can be efficiently collected from the gap instead of sealing the gap of the front corner of the bottom surface of the heating chamber. This configuration can reduce water flowing out from between the door and the front frame. As a result, when a user opens the door, an amount of water attached to the front frame can be reduced.

[0013] Based on the new findings, the inventors of the present application have reached the invention mentioned below.

[0014] A heating cooker according to a first aspect of the present disclosure includes a main body, a door, and a water receiving plate. The main body includes a heating chamber with an opening, and a front frame provided around a periphery of the opening of the heating chamber. The door is attached to the main body to cover the opening of the heating chamber. A water receiving part is disposed below the heating chamber and behind the front frame, and receives water from a front corner on a bottom surface of the heating chamber. The water receiving plate includes a first water draining hole for guiding the water from a front surface side to a rear surface side of the water receiving plate, and a guiding part for guiding the water to the first water draining hole.

[0015] According to the first aspect, water generated in the heating chamber can be efficiently collected. Therefore, when a user opens the door, the amount of water attached to the front surface of the front frame and the rear surface of the door can be reduced. This reduces the need for the user to clean the front surface of the front frame and the rear surface of the door.

[0016] A heating cooker of a second aspect of the present disclosure is provided with a through hole in the front corner, in accordance with the first aspect. The second aspect can increase the amount of water flowing down from the front corner, thereby reducing water flowing down through a gap between the door and the front frame.

[0017] In a heating cooker of a third aspect of the present disclosure, the water receiving plate includes a water receiving plate main body disposed behind the front frame, in accordance with the first and second aspects. The first water draining hole is provided in the water receiving plate main body. The guiding part is disposed to the front surface of the water receiving plate main body, and inclined downward from an end part of the water receiving plate main body to the first water draining hole.

[0018] The third aspect can guide water flowing out from the front corner of the bottom surface of the heating chamber to the first water draining hole.

[0019] In a heating cooker according to a fourth aspect of the present disclosure, the water receiving plate includes a water receiving part disposed below the first water draining hole and behind the water receiving plate, in accordance with any one of the first to third aspects. The water receiving part is integrally formed with the water receiving plate, and is a part of the water receiving plate protruding rearward.

[0020] According to the fourth aspect, the water receiving part can once receive the water flowing from the water receiving plate to a rear surface of the water receiving plate via the first water draining hole, and can further guide the water from the water receiving part to a different place.

[0021] In a heating cooker according to a fifth aspect of the present disclosure, a guiding part is formed of a member that is elastic and waterproof, in accordance with any one of the first to fourth aspects.

[0022] The fifth aspect can prevent the water flowing out from the front corner of the bottom surface of the heating chamber from leaking from between the front frame and the water receiving plate. As a result, the water flowing out from the front corner of the bottom surface of the heating chamber can be guided from the upper surface of the guiding part to the first water draining hole.

[0023] A heating cooker according to a sixth aspect of the present disclosure further includes a bottom plate including a water draining hole disposed below the heating chamber to receive water from the water receiving part, in accordance with the fifth aspect.

[0024] In the sixth aspect, the water receiving part can once receive the water flowing from the water receiving plate to the rear surface of the water receiving plate via the first water draining hole, and the water receiving part can further guide the water to the bottom plate. A second water draining hole provided in the bottom plate can further guide the water to the other place.

[0025] With the water receiving part integrally formed with the water receiving plate, a water receiving part as a different component is not required to be attached to the water receiving plate. This can reduce the manufacturing cost.

[0026] In a heating cooker according to a seventh aspect of the present disclosure, a bottom plate includes a groove formed below a tip end of the water receiving part, and the groove includes the second water draining hole, in accordance with the sixth aspect.

[0027] According to the seventh aspect, the water is temporarily stored in the groove of the bottom plate, and then the water can be guided from the second water draining hole to another place.

[0028] A heating cooker according to an eighth aspect of the present disclosure further includes a water receiving tray disposed below the bottom plate for receiving water from the second water draining hole, in accordance with the sixth or seventh aspect.

[0029] The seventh aspect finally can collect the water flowing out from the second water draining hole of the bottom plate to the water receiving tray. In a case of a

water receiving tray detachably attached to the main body, a user can easily discard the water stored in the water tray.

[0030] Hereinafter, heating cooker 1 according to an exemplary embodiment of the present disclosure is described in detail based on the drawings. The X, Y and Z axes shown in the following drawings show the lateral direction (left and right direction), the depth direction (forward and backward direction), and the height direction (vertical direction) of heating cooker 1, respectively.

[0031] In these drawings, the front surface and the rear surface of heating cooker 1 correspond to the front side and the rear side of heating cooker 1. That is, the front side of heating cooker 1 is in the Y-axis negative direction, and the rear side of heating cooker 1 is in the Y-axis positive direction.

[0032] In these drawings, left and right as viewed from the front of heating cooker 1 correspond to left and right of heating cooker 1, respectively. That is, the right side of heating cooker 1 is the X-axis positive direction, and the left side of heating cooker 1 is the X-axis negative direction.

[0033] FIG. 1 is a front perspective view of heating cooker 1. FIG. 2 is a front perspective view of heating cooker 1 with door 9 opened.

[0034] As shown in FIGs. 1 and 2, heating cooker 1 includes main body 3, water receiving tray 7 for accommodating water generated inside main body 3, and door 9 attached to main body 3.

[0035] Main body 3 includes heating chamber 31, front frame 33, and bottom plate 6 (see FIGs. 7 and 8). Heating chamber 31 is provided inside main body 3, and configured to accommodate heating targets such as food and beverage. Front frame 33 is provided to the front surface of main body 3. Bottom plate 6 is provided below heating chamber 31. Bottom plate 6 is described later.

[0036] A machine chamber (not shown) is provided in an interior space of main body 3 at the right side of heating chamber 31. The machine chamber includes a magnetron that generates microwaves, a drive power supply that supplies the magnetron with electric power, and a control unit that controls each element of heating cooker 1.

[0037] A radiation antenna (not shown) for radiating microwaves is disposed below heating chamber 31. A heating target accommodated in heating chamber 31 is dielectric-heated by microwaves radiated from the radiation antenna.

[0038] The machine chamber is also provided with a steam generating unit. A side wall near the machine chamber of heating chamber 31 is provided with a blowing outlet for supplying heating chamber 31 with steam generated by the steam generating unit. Opening 31a is provided on the front surface of heating chamber 31. Front frame 33 is provided around the periphery of opening 31a of heating chamber 31. Opening 31a and front frame 33 are openably covered with door 9.

[0039] Water receiving tray 7 may be disposed below front frame 33 (in the Z-axis negative direction) and may be detachably attached to main body 3. Water receiving tray 7 finally accommodates water flowing out between front frame 33 and door 9, and water flowing out from front corner hole 33a1 (see FIG. 4B) mentioned later.

[0040] Door 9 openably covers opening 31a of heating chamber 31. Door 9 is pivotably supported openably with respect to the horizontal rotation axis in a part of front frame 33 below opening 31a. When door 9 is opened by pulling handle 91 attached to door 9, opening 31a of heating chamber 31 is opened. When door 9 is closed so that door 9 becomes upright, opening 31a of heating chamber 31 is closed.

[0041] Main body 3 includes operation display panel 90 disposed at the right side of door 9. Operation display panel 90 includes display part 93 and operation parts 95. Display part 93 is, for example, a liquid crystal display for displaying a menu screen and the like. Operation part 95 includes a push button, a dial, and the like. A user can issue various cooking instructions to heating cooker 1 using operation part 95.

[0042] Each of two side walls 31b of heating chamber 31 (see FIGs. 4A and 4B) is provided with shelves for placing a grill dish and an iron dish at any of several heights. Usually, a heating target is placed and cooked on mount table 31d in heating chamber 31 (see FIGs. 4A and 4B), but depending on cooking methods, a heating target can be placed on a grill dish and an iron dish, and cooked.

[0043] FIG. 3 is a front view of heating cooker 1 with door 9 and operation display panel 90 removed. FIG. 4A is a perspective view of front frame 33 of main body 3 with door 9 and the like removed, and FIG. 4B is an enlarged view of a part of FIG. 4A.

[0044] As shown in FIG. 3, FIG. 4A, and FIG. 4B, heating chamber 31 includes side wall 31b, bottom surface 31c, and a top surface (not shown). Side wall 31b and bottom surface 31c are formed of a steel plate such as a galvanized steel plate. Mount table 31d on which a heating target is mounted is formed on bottom surface 31c.

[0045] As shown in FIG. 4A and FIG. 4B, front frame 33 of main body 3 is formed of one sheet of steel plate, and includes front frame lower part 33b, front frame side part 33c, and a front frame upper part (not shown).

[0046] In this exemplary embodiment, front frame lower part 33b and front frame side part 33c, and side wall 31b of heating chamber 31 and bottom surface 31c of heating chamber 31 are brought into contact with each other on two front corners 33a of the bottom surface of heating chamber 31. That is, front corner 33a corresponds to a joint part of steel plates of front frame lower part 33b, front frame side part 33c, side wall 3 1b, and bottom surface 31c. Front corner hole 33a1 is a through hole formed in front corner 33a.

[0047] When a heating target in heating chamber 31 is cooked by heating, steam is generated from the heating target and the steam generating unit. This steam fills heating chamber 31 and causes dew condensation on

side wall 31b and the top surface.

[0048] Water droplets generated by dew condensation reach the vicinity of front frame lower part 33b from side wall 31b, the top surface, and the rear surface of door 9 via bottom surface 31c. The water flows downward through a gap between door 9 and front frame lower part 33b and is collected in water receiving tray 7.

[0049] As shown by arrow P1 in FIG. 4A, water receiving tray 7 protrudes forward (in the Y-axis negative direction) from front frame 33 by at least a thickness of door 9. This configuration enables the water flowing down through the gap between door 9 and front frame lower part 33b to be collected in water receiving tray 7.

[0050] Furthermore, when front corner 33a includes a gap, the water that reaches the vicinity of front frame lower part 33b from side wall 31b, bottom surface 31c, or the top surface flows down also from front corner 33a. When the amount of the water flowing from front corner 33a is increased, the amount of the water flowing down through the gap between door 9 and front frame lower part 33b can be reduced.

[0051] Conventionally, a silicone putty is applied to front corner 33a from the inside of heating chamber 31 to seal front corner 33a so that a gap is not generated in front corner 33a. In heating cooker 1 according to this exemplary embodiment, front corner 33a is provided with front corner hole 33a1, and water that reaches the vicinity of front comer 33a is discharged from front corner hole 33a1.

[0052] FIG. 5A is a partial front view of heating cooker 1 with the door removed. FIG. 5B is a view showing front frame 33 in perspective in order to visualize a rear side of front frame lower part 33b in FIG. 5A. FIG. 6A and FIG. 6B are respectively a front view and a rear view of water receiving plate 5 of heating cooker 1.

[0053] As shown in FIG. 5B, water receiving plate 5 is a member disposed below heating chamber 31 and behind front frame lower part 33b, and configured to receive water flowing out from front corner hole 33a1.

[0054] As shown in FIG. 6A and FIG. 6B, water receiving plate 5 includes water receiving plate main body 5d and guiding part 5a. Water receiving plate main body 5d is disposed behind front frame lower part 33b. Guiding part 5a is disposed on the front surface of water receiving plate main body 5d, and has a bank shape protruding forward from water receiving plate main body 5d.

[0055] Guiding part 5a includes lowermost part 5a1 provided in the vicinity of the center in the left and right direction of water receiving plate 5, more precisely, disposed slightly near the left side from the center of water receiving plate 5. Guiding part 5a includes two inclined surfaces 5a2 each extending obliquely downward from the corresponding one of the two end parts of water receiving plate 5.

[0056] Water receiving plate main body 5d of water receiving part 5c includes water draining hole 5b provided in the vicinity of lowermost part 5a1 of guiding part 5a, more precisely, above lowermost part 5a1 of guiding part 5a. In this exemplary embodiment, water draining hole 5b corresponds to a first water draining hole.

[0057] Guiding part 5a is attached to the rear surface of front frame lower part 33b by screwing or welding so that the front end part of guiding part 5a is pressed against the rear surface of front frame lower part 33b. As a result, guiding part 5a seals the gap between water receiving plate 5 and front frame lower part 33b. Therefore, guiding part 5a is desirably formed of a member that is elastic and waterproof, for example, rubber.

[0058] With such a configuration, water flowing down from front corner hole 33a1 flows on the upper surface of inclined surface 5a2 toward lowermost part 5a1, and is guided toward the rear surface side from the front surface side of water receiving plate 5 via water draining hole 5b (see arrows P2 of FIG. 5B and FIG. 6A).

[0059] In this exemplary embodiment, each of two front corner holes 33a1 is disposed to corresponding one of left and right front corners 33a of heating chamber 31. However, one front corner hole 33a1 may be provided to any one of the left and right front corners 33a.

[0060] For example, in FIG. 6A, when front corner hole 33a1 is provided at only the right side of heating chamber 31, guiding part 5a is only required to include lowermost part 5a1, right-side inclined surface 5a2, and short left-side inclined surface 5a2. Short left-side inclined surface 5a2 is an inclined surface that is brought into contact with lowermost part 5a1, but is not brought into contact with the left front corner 33a of bottom surface 31c of heating chamber 31.

[0061] Furthermore, as shown in FIG. 6B, water receiving plate 5 includes water receiving part 5c below water draining hole 5b and in the lower part of water receiving plate main body 5d of water receiving plate 5. Water receiving part 5c is an approximately inverted triangle-shaped member formed by cutting and raising a part of water receiving plate main body 5d toward the rear side or obliquely rear side. In other words, water receiving part 5c is integrally formed with water receiving plate main body 5d, and is a part of water receiving plate main body 5d protruding rearward.

[0062] In this exemplary embodiment, cutting and raising a part of water receiving plate main body 5d means making two notches in the lower edge of water receiving plate main body 5d and bending a part of water receiving plate main body 5d sandwiched between the two notches. One notch may be made in the lower edge of water receiving plate main body 5d, and a part of water receiving plate main body 5d on either the left or right side of the notch may be bent.

[0063] Water receiving part 5c includes two side walls 5c1 formed by bending the edge upward. Since water receiving part 5c is formed in an inverted triangle shape, the two side walls 5c1 are the closest to each other at tip end 5c2 of water receiving part 5c.

[0064] With this shape, water receiving part 5c guides water flowing on the upper surface of water receiving part 5c toward tip end 5c2. The water flowing out from water

draining hole 5b is received by water receiving part 5c, then, collected in tip end 5c2 by two side walls 5c1, and flows down from tip end 5c2.

[0065] In other words, water receiving plate 5 functions as a gutter for guiding the water flowing out from front corner hole 33a1 to bottom plate 6 (described later) of main body 3 via guiding part 5a, water draining hole 5b, and water receiving part 5c.

[0066] FIG. 7 is a perspective view showing front frame 33 and bottom plate 6 of main body 3 of heating cooker 1 viewed downward obliquely from the rear side. As shown in FIG. 7, bottom plate 6 of main body 3 includes groove 6a provided below tip end 5c2 of water receiving part 5c for receiving water flowing out from tip end 5c2 of water receiving part 5c. The water received by groove 6a is discharged from water draining hole 6b provided in groove 6a (see arrow P3 in FIG. 7). In this exemplary embodiment, water draining hole 6b corresponds to a second water draining hole.

[0067] FIG. 8 is a perspective view showing the lower part of main body 3 of heating cooker 1 viewed upward from the front side. As shown in FIG. 8, water receiving tray 7 includes water storage part 7a provided below water draining hole 6b. The water generated in heating chamber 31 is finally collected in water storage part 7a via water draining hole 6b.

[0068] Note here that water storage part 7a may be configured to collect water flowing out through a gap between door 9 and front frame lower part 33b, in addition to the water discharged from water draining hole 6b. In addition to water receiving tray 7, other trays for collecting the water may be provided below heating chamber 31.

Industrial Applicability

[0069] According to the present disclosure, the water generated in heating chamber 31 can be collected efficiently. The present disclosure is applicable to microwave ovens with steam generators, and the like.

Reference Signs List

[0070]

1 heating cooker
3 main body
31 heating chamber
31a opening
31b side wall
31c bottom surface
31d mount table
33 front frame
33a front corner
33a1 front corner hole
33b front frame lower part
33c front frame side part
5 water receiving plate
5a guiding part
5a1 lowermost part
5a2 inclined surface
5b water draining hole (first water draining hole)
5c water receiving part
5c1 side wall
5c2 tip end
5d water receiving plate main body
6 bottom plate
6a groove
6b water draining hole (second water draining hole)
7 water receiving tray
7a water storage part
9 door
90 operation display panel
91 handle
93 display part
95 operation part

Claims

1. A heating cooker comprising:

   a main body including a heating chamber and a front frame, the heating chamber including an opening, the front frame being provided around a periphery of the opening of the heating chamber;
   a door attached to the main body and covering the opening; and
   a water receiving plate disposed below the heating chamber and behind the front frame, the water receiving plate being for receiving water from a front corner of a bottom surface of the heating chamber, wherein
   the water receiving plate includes a first water draining hole for guiding the water from a front surface side toward a rear surface side of the water receiving plate, and a guiding part for guiding the water to the first water draining hole.

2. The heating cooker according to claim 1, wherein the front corner includes a through hole.

3. The heating cooker according to claim 1 or 2, wherein

   the water receiving plate includes a water receiving plate main body disposed behind the front frame,
   the first water draining hole is provided in the water receiving plate main body, and
   the guiding part is disposed in the front surface of the water receiving plate main body, and inclined downward from an end part of the water receiving plate to the first water draining hole.

4. The heating cooker according to any one of claims 1 to 3, wherein

the water receiving plate includes a water receiving part disposed below the first water draining hole and behind the water receiving plate, and

the water receiving part is integrally formed with the water receiving plate, and is a part of the water receiving plate protruding rearward.

5. The heating cooker according to any one of claims 1 to 4, wherein the guiding part is formed of a member that is elastic and waterproof.

6. The heating cooker according to claim 5, further comprising a bottom plate disposed below the heating chamber, for receiving water from the water receiving part and including a second water draining hole.

7. The heating cooker according to claim 6, wherein the bottom plate includes a groove formed below a tip end of the water receiving part, and the groove includes the second water draining hole.

8. The heating cooker according to claim 6 or 7, further comprising a water receiving tray disposed below the bottom plate, for receiving water from the second water draining hole.

FIG. 1

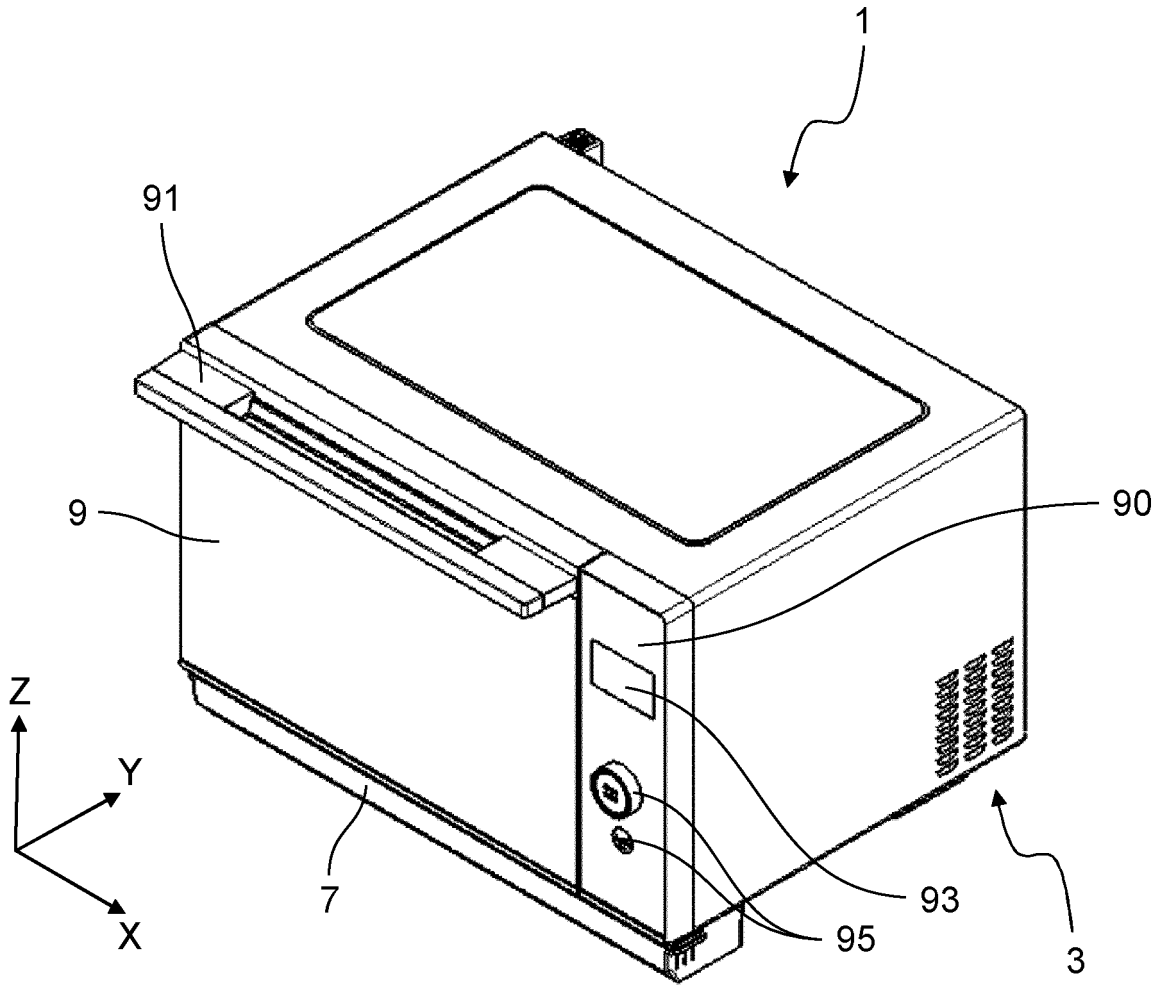


FIG. 2

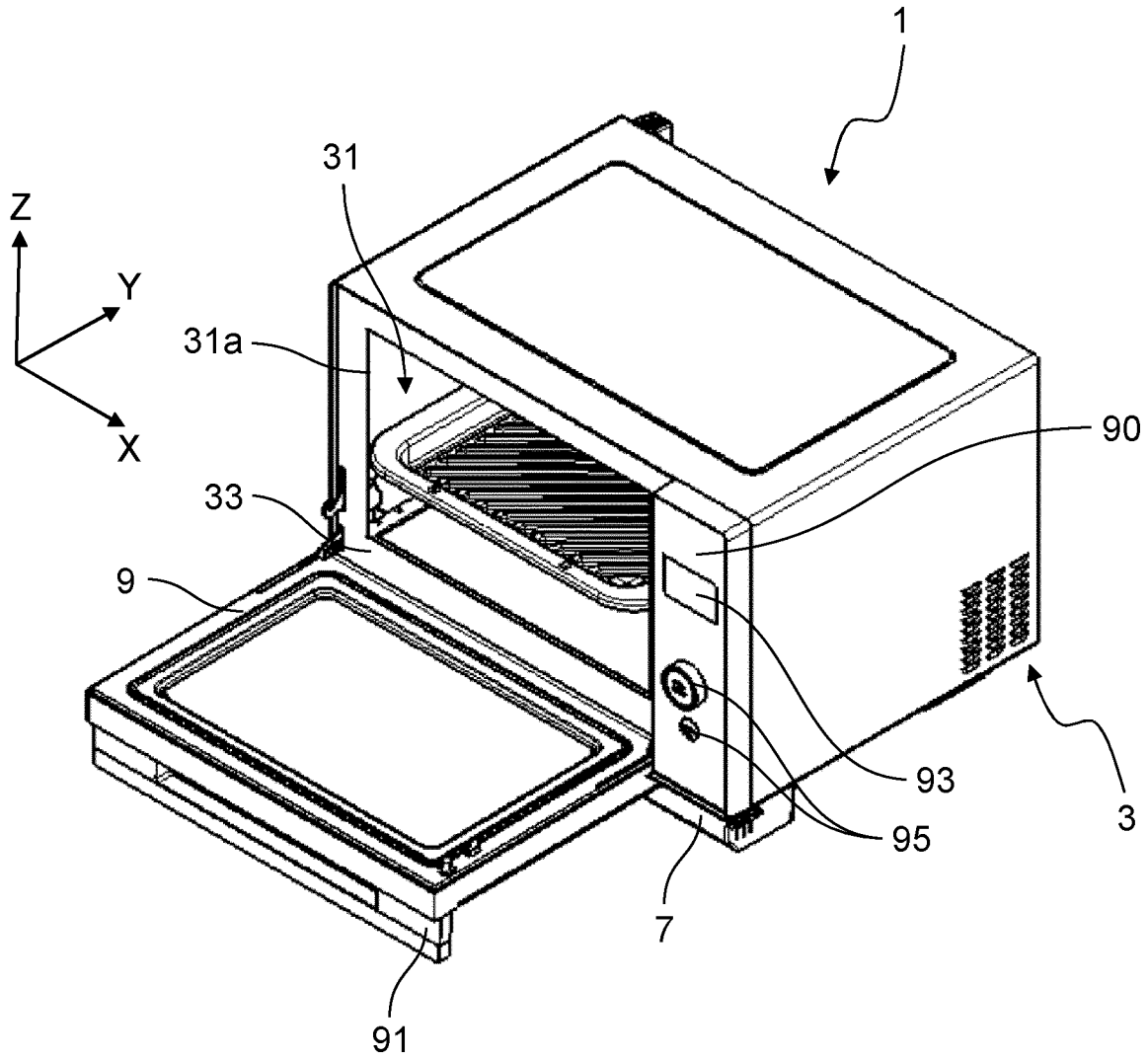


FIG. 3

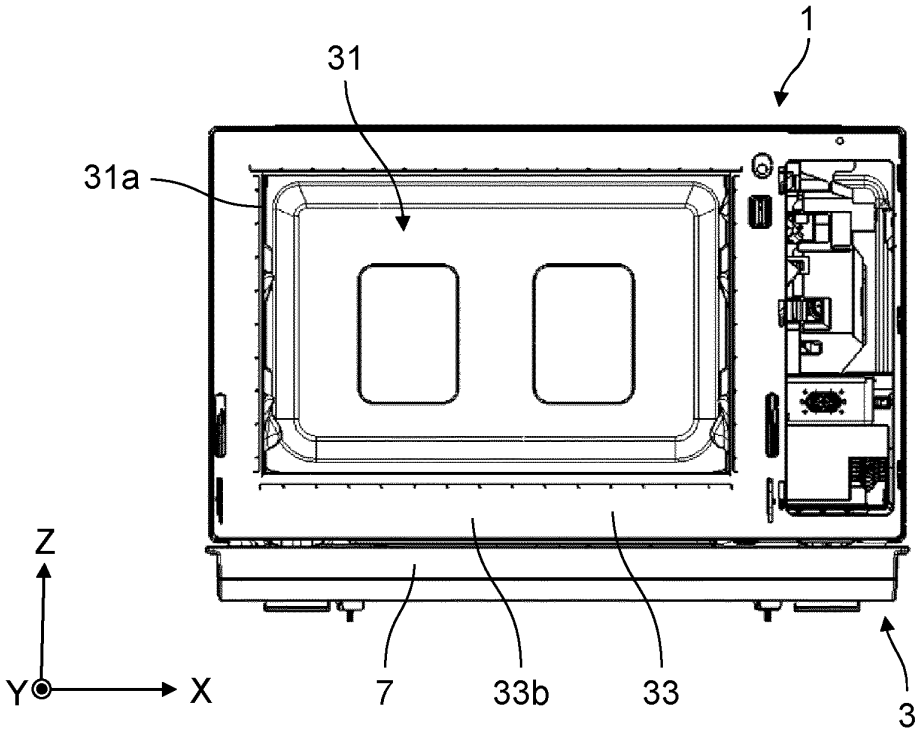


FIG. 4A

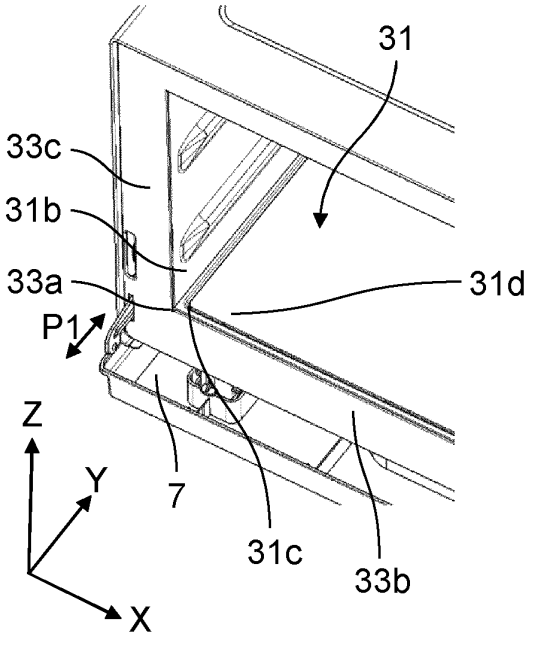


FIG. 4B

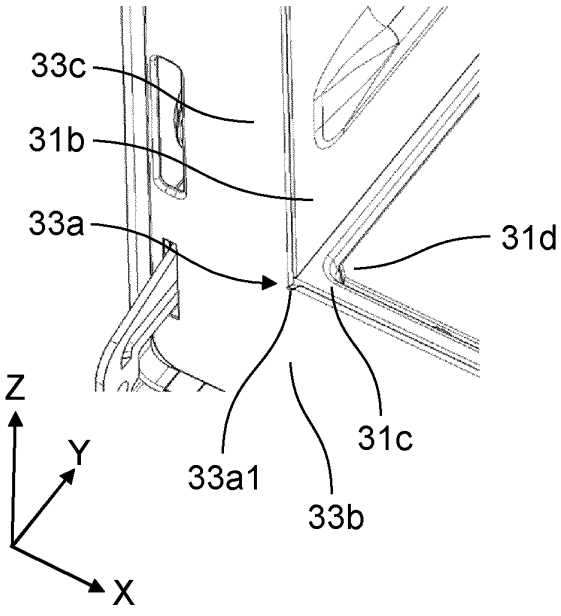


FIG. 5A

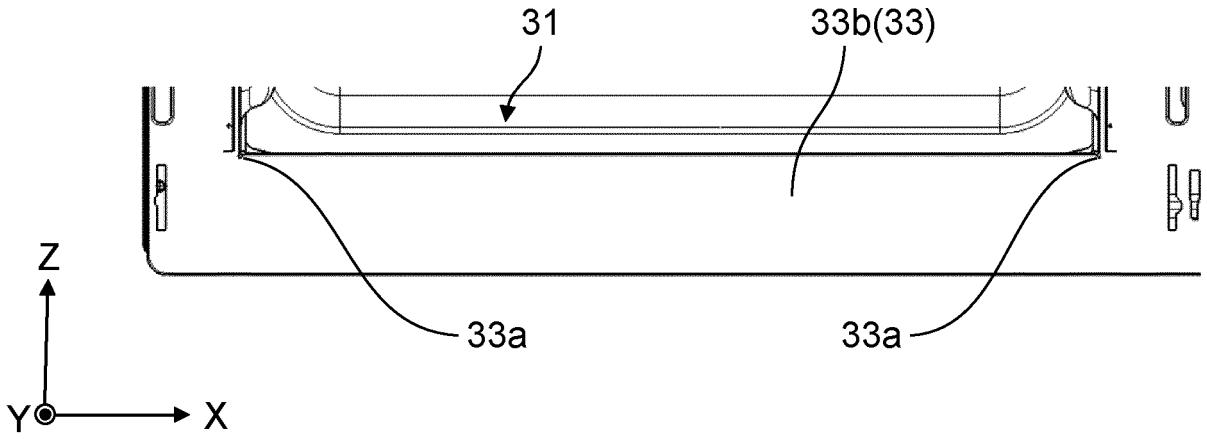


FIG. 5B

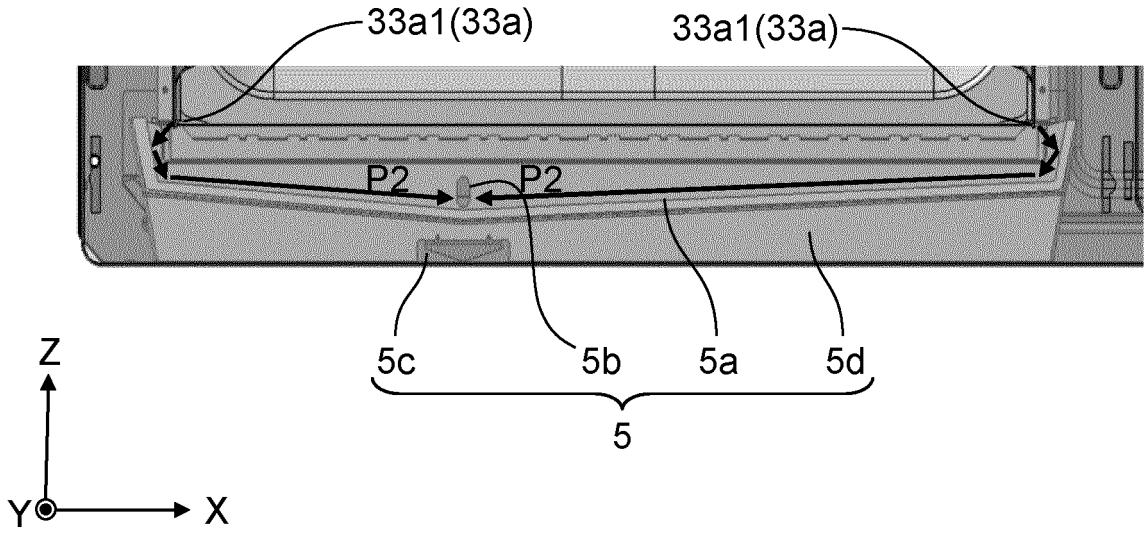


FIG. 6A

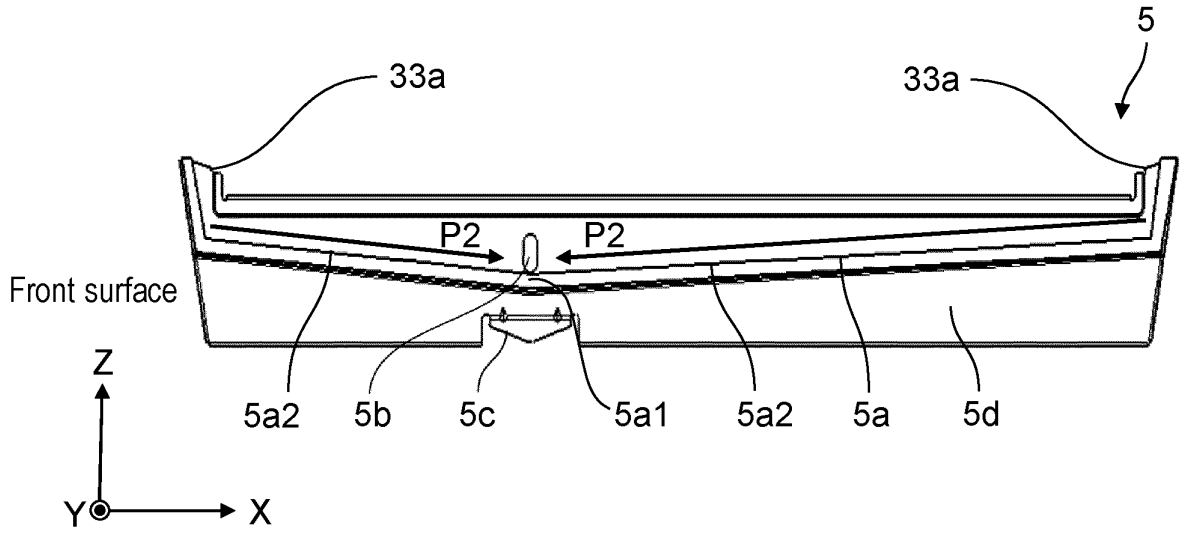

5
33a
33a
P2
P2
Front surface
Z
5a2
5b
5c
5a1
5a2
5a
5d
Y
X

FIG. 6B

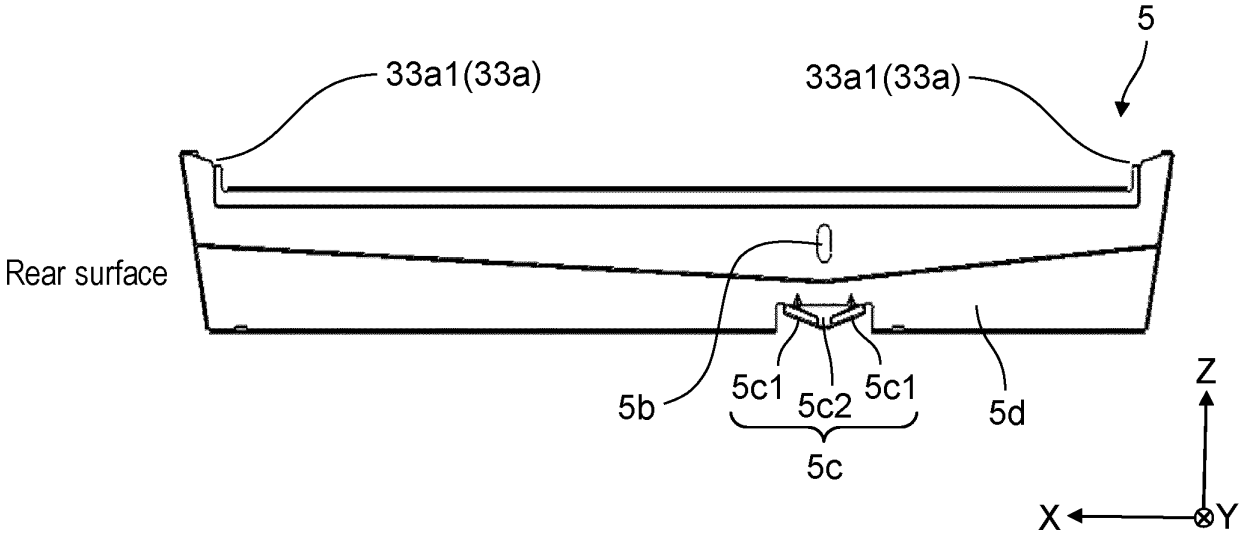

5
33a1(33a)
33a1(33a)
Rear surface
5b
5c1
5c2
5c1
5c
5d
Z
X
Y

FIG. 7

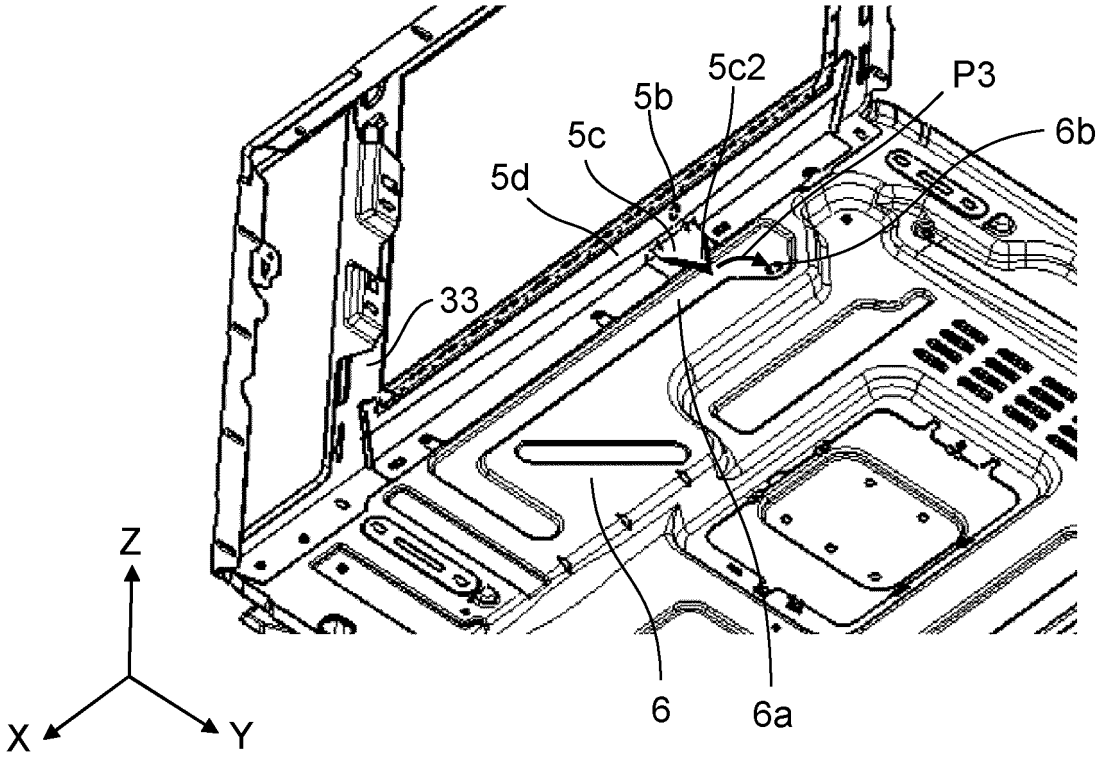
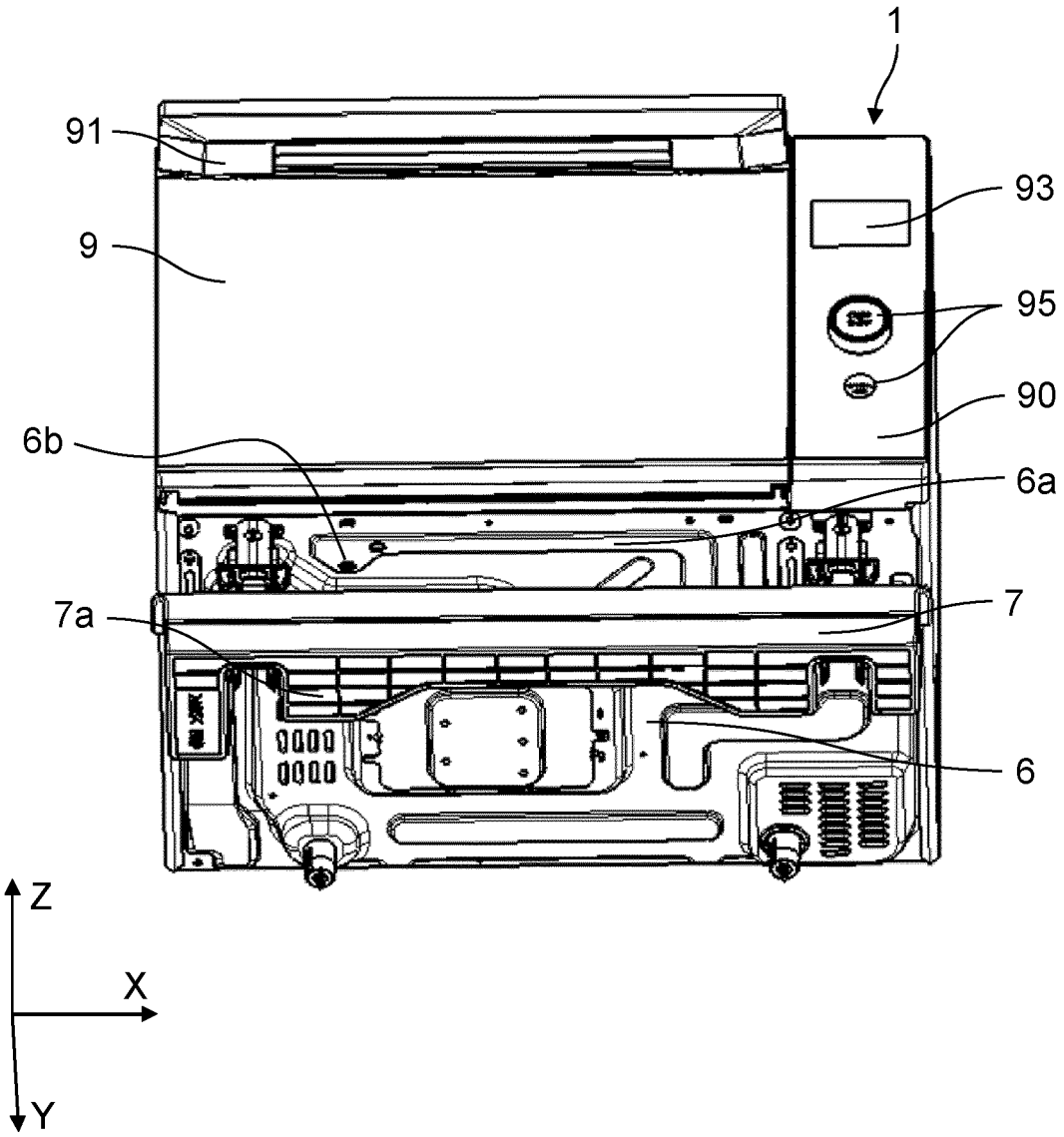


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2022/029734

A. CLASSIFICATION OF SUBJECT MATTER

F24C 7/02(2006.01)i; ***F24C 15/14***(2006.01)i
FI: F24C15/14 B; F24C7/02 551T

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24C15/14; F24C7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2007-003150 A (TOSHIBA CORP.) 11 January 2007 (2007-01-11) entire text, all drawings	1-8
A	JP 2019-148400 A (PANASONIC IP MANAGEMENT CORP.) 05 September 2019 (2019-09-05) entire text, all drawings	1-8
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 143693/1978 (Laid-open No. 059210/1980) (TOKYO SHIBAURA DENKI KK) 22 April 1980 (1980-04-22), entire text, all drawings	1-8
A	JP 2008-025896 A (SHARP CORP.) 07 February 2008 (2008-02-07) entire text, all drawings	1-8
A	US 5216216 A (SAMSUNG ELECTRONICS CO., LTD.) 01 June 1993 (1993-06-01) entire text, all drawings	1-8
A	CN 1884920 A (HAIER GROUP) 27 December 2006 (2006-12-27) entire text, all drawings	1-8

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2022	**04 October 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/029734

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2007-003150 A	11 January 2007	(Family: none)	
JP 2019-148400 A	05 September 2019	CN 110213850 A	
JP 55-059210 U1	22 April 1980	(Family: none)	
JP 2008-025896 A	07 February 2008	WO 2008/010386 A1	
US 5216216 A	01 June 1993	(Family: none)	
CN 1884920 A	27 December 2006	(Family: none)	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2009287815 A **[0003]**
- JP 2019148399 A **[0003]**