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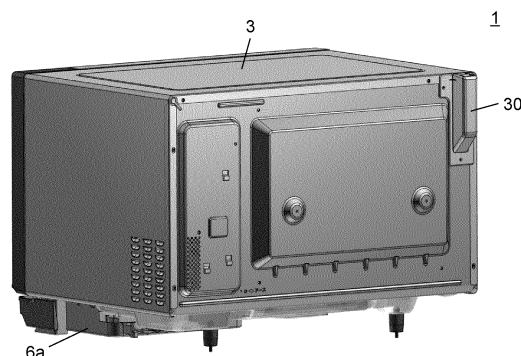
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(54) **COOKER**

(57) Cooker (1) is provided with casing (3), a heating chamber, an exhaust port, and separation unit (30). The heating chamber is provided inside casing (3). The exhaust port is provided in the heating chamber and discharges a gas inside the heating chamber. Separation unit (30) condenses and separates at least some of water vapor contained in the gas discharged through the exhaust port. Separation unit (30) is provided with a space, a water discharge part, and an exhaust part. The space

of the separation unit condenses water vapor that is contained in the gas discharged through the exhaust port. The water discharge part discharges the water, which is condensed in the space of the separation unit, into the casing. The exhaust part is provided in an upper part of separation unit (30) and discharges the remaining gas from which at least some of the water vapor has been separated to the outside of the casing.

FIG. 3



Description

TECHNICAL FIELD

[0001] The present disclosure relates to a cooker that heats a heating target such as food.

BACKGROUND ART

[0002] In a heating chamber of a cooker, indoor air also becomes high temperature. For that reason, there has been developed a technology of reducing temperature of an exhaust gas, thereby facilitating the installation and improving the safety (e.g., see Patent Literature 1).

[0003] The cooker described in Patent Literature 1 is provided with an exhaust path and an external exhaust duct. One end of the exhaust path is communicated with a downstream of a first exhaust port that is disposed in an upper part of the heating chamber, and the other end of the exhaust path is communicated with an upstream of a second exhaust port. The external exhaust duct is communicated with a downstream of the second exhaust port.

[0004] The external exhaust duct has an external exhaust port that is formed closer to the center thereof than the second exhaust port. A protrusion portion for changing a flow direction of an exhaust gas is provided between the second exhaust port of the external exhaust duct and the external exhaust port.

Citation List

Patent Literature

[0005] PTL1: Unexamined Japanese Patent Publication No. 2017-83100

SUMMARY OF THE INVENTION

[0006] The cooker disclosed in Patent Literature 1 is likely to cause dew condensation within an exhaust duct, when an exhaust gas contains a lot of water vapor. In this case, the condensed water is likely to leak out of the exhaust duct and drop on a stand on which the cooker is installed, or the like.

[0007] The present disclosure presents a technique for treating an exhaust gas from a cooker, more properly.

[0008] The cooker of the present disclosure is provided with a casing, a heating chamber, an exhaust port, and a separation unit. The heating chamber is provided inside the casing. The exhaust port is provided in the heating chamber and discharges a gas inside the heating chamber. The separation unit condenses and separates at least some of water vapor contained in the gas discharged through the exhaust port.

[0009] The separation unit is provided with a space, a water discharge part, and an exhaust part. In the space of the separation unit, the water vapor that is contained

in the gas discharged through the exhaust port is condensed. The water discharge part discharges the water, which is condensed in the space of the separation unit, into the casing. The exhaust part, which is provided in an upper part of the separation unit, discharges the remaining gas from which at least some of the water vapor has been separated to the outside of the casing.

[0010] The cooker of the present disclosure can treat an exhaust gas properly.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

FIG. 1 is a front perspective view of a cooker in accordance with an exemplary embodiment of the present disclosure in the state where a door is closed.

FIG. 2 is a front perspective view of the cooker in accordance with the exemplary embodiment in the state where the door is removed.

FIG. 3 is a rear perspective view of the cooker.

FIG. 4 is a front perspective view of the cooker in accordance with the exemplary embodiment in the state where a casing is removed.

FIG. 5 is a front perspective view of a separation unit of the cooker in accordance with the exemplary embodiment.

FIG. 6 is a view including (A) a plan view, (B) a front view, (C) a right-side view, and (D) a rear view of the separation unit of the cooker in accordance with the exemplary embodiment.

FIG. 7 is a partially enlarged view of the separation unit of the cooker in accordance with the exemplary embodiment in the state where the separation unit is disposed on the casing.

DESCRIPTION OF EMBODIMENT(S)

[0012] Hereinafter, an exemplary embodiment will be described in detail, with reference to the drawings. However, description that is in more detail than necessary is occasionally omitted. For example, detailed description about already well-known matters and overlapped description about the substantially same configurations are occasionally omitted.

[0013] The accompanying drawings and the following description are provided for a person skilled in the art to fully understand the present disclosure, and do not intend to limit the subject matter described in the scope of claims.

(EXEMPLARY EMBODIMENT)

[1-1. STRUCTURE]

[0014] FIGS. 1 through 3 show appearance of cooker 1 in accordance with an exemplary embodiment of the

present disclosure. FIG. 1 is the front perspective view in the state where door 7 is closed. FIG. 2 is the front perspective view in the state where door 7 is removed. FIG. 3 is the rear perspective view.

[0015] As shown in FIGS. 1 through 3, cooker 1 is provided with casing 3, heating chamber 5, door 7, and operation panel 11. Heating chamber 5 is disposed in casing 3. Door 7 covers front opening 3b that is provided in front frame 3a serving as a front face of casing 3. Operation panel 11 is provided in the front face on a right side of heating chamber 5.

[0016] Heating chamber 5 has a microwave radiation port (not shown) for radiating a microwave, which is generated by a microwave oscillator (not shown) such as a magnetron, into heating chamber 5. A heating target (food) placed in heating chamber 5 is heated by the microwave radiated from the microwave radiation port.

[0017] Water supply tank 6a and drainage tank 6b are disposed under casing 3. Water supply tank 6a stores water for generating steam, which is to be sent to heating chamber 5. The water stored in water supply tank 6a is supplied to a steam generation unit (not shown) and changed into steam. The generated steam is supplied to heating chamber 5 through a steam pipe that connects the steam generation unit and heating chamber 5.

[0018] Door 7 has a rotation shaft that extends in a horizontal direction and is disposed in a lower part of the front face of casing 3. Door 7 is attached so as to cover front opening 3b of casing 3. By pulling handle 7a attached to an upper part of door 7, door 7 is rotated about the shaft, so that front opening 3b is opened. By holding handle 7a to move door 7 upward, door 7 is rotated up to a vertical state, so that front opening 3b is closed.

[0019] Operation panel 11 has a display unit and a control unit. The display unit is, for example, a liquid crystal display and displays a menu screen or the like. Operation panel 11 has a push button, a dial, or the like, for example, and is used for inputting instructions from a user to cooker 1.

[0020] As shown in FIG. 3, cooker 1 has separation unit 30 that is disposed on an external side and in an upper right part of a back face of casing 3. The separation unit 30 has a quadrangular prism shape whose central axis extends vertically as a whole. Separation unit 30 is a member that condenses and separates at least some of water vapor contained in a gas discharged through heating chamber 5. A structure of separation unit 30 will be described later in detail.

[0021] FIG. 4 is a front perspective view of cooker 1 in the state where casing 3 is removed. As shown in FIG. 4, exhaust port 40 is provided in a rear lower part of left side face 5a of heating chamber 5. Hot air inside heating chamber 5 is discharged through exhaust port 40.

[0022] The hot air, which is discharged through exhaust port 40, rises in a space between casing 3 and left side face 5a of heating chamber 5, and is supplied into separation unit 30 from inlet 41 disposed in an upper left part of back face 5b of casing 3. This air contains water

vapor and oil content generated from a heating target.

[0023] As mentioned above, separation unit 30 is disposed on an external side of casing 3. For that reason, the hot air, which is discharged through heating chamber 5, is rapidly cooled by external air surrounding separation unit 30, when passing through separation unit 30. Thus, the water vapor is condensed in separation unit 30. This condensed water contains oil content.

[0024] The water, which is condensed in separation unit 30, is returned into casing 3 through water receiving port 42 that is provided below inlet 41 in back face 5b of casing 3.

[0025] These components are disposed on a side different from that of machine room 13 in which electronic components, such as a magnetron and a control board (not shown), are accommodated.

[0026] A control unit is disposed in the control board. The control unit controls a magnetron, a display unit of operation panel 11, or the like, and receives instructions inputted through the control unit of operation panel 11.

[0027] This can prevent the water vapor from leaking into machine room 13 and affecting the electronic components.

[0028] FIG. 5 is a front perspective view of separation unit 30. FIG. 6 includes (A) a plan view, (B) a front view, (C) a right-side view, and (D) a rear view of separation unit 30 of cooker 1.

[0029] As shown in FIGS. 5 and 6, separation unit 30 is provided with space 31, back face 31a, first side face 31b, second side face 31c, upper face 31d, water discharge part 32, and protrusion part 33. Space 31 is defined by back face 31a, first side face 31b, second side face 31c, and upper face 31d. Space 31 is a space for condensing at least some of the water vapor contained in the gas supplied from inlet 41.

[0030] Back face 31a has inclined part 31aa that is provided in a lower part thereof. Inclined part 31aa is inclined toward casing 3 so as to be closer to water discharge part 32 toward a lower part of space 31 from an upper part thereof. Back face 31a is connected to water discharge part 32 through inclined part 31aa. With this structure, the water condensed in space 31 can be discharged into casing 3, efficiently.

[0031] First side face 31b has first inclined part 31ba provided in a lower end thereof. Second side face 31c has second inclined part 31ca provided in a lower end thereof. First inclined part 31ba and second inclined part 31ca are inclined toward the center axis of separation unit 30 such that a gap between the two inclined parts becomes narrower toward the lower part of space 31 from the upper part thereof. First side face 31b and second side face 31c are connected to water discharge part 32 through first inclined part 31ba and second inclined part 31ca, respectively.

[0032] To discharge the water condensed in space 31 into casing 3, water discharge part 32 is provided in a lower end of inclined part 31aa of back face 31a. Exhaust part 34 is provided in upper face 31d of separation unit

30. Exhaust part 34 has opening 34a for exhausting the remaining gas from which at least some of water vapor has been separated to the outside of casing 3.

[0033] This makes it possible to reduce water vapor and oil content that are contained in the exhaust gas to be discharged to the outside of casing 3. As a result, dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like can be prevented.

[0034] Water discharge part 32 is connected to water receiving port 42 (see FIG. 4), which is provided in casing 3, to guide the discharge water to an inner side of water receiving port 42. Protrusion part 33 is a member that is provided below water discharge part 32 and protruded horizontally.

[0035] Protrusion part 33 is inserted into a through-hole (not shown) provided in back face 5b (see FIG. 4) of casing 3. Protrusion part 33 has a protrusion dimension more than or equal to a thickness of a plate constituting back face 5b of casing 3 so as to protrude to the inside of casing 3 through the through-hole. Protrusion part 33 can prevent the water, which contains oil content, from dropping in the outside of casing 3 from between water discharge part 32 and water receiving port 42. As a result, dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like can be prevented.

[0036] To guide an exhaust gas to a desired direction, exhaust part 34 further has two wind direction plates (first wind direction plate 34b and second wind direction plate 34c) disposed in opening 34a. First wind direction plate 34b is arranged so as to be inclined inward (toward a center side of an upper face of casing 3) at a predetermined angle from a front-rear direction of the upper face of casing 3. Thus, an exhaust gas can be prevented from flowing to a wall on a lateral side of cooker 1, a shelf board, or the like.

[0037] Second wind direction plate 34c has a predetermined elevation angle. The predetermined elevation angle is determined depending on a height of a space required above cooker 1. Thus, even if a shelf board or the like is placed at a position lower than the minimum height of the space required above cooker 1, for example, an exhaust gas can be prevented from reaching the shelf board. As a result, dirt on a wall, a shelf board, or the like above cooker 1 can be prevented.

[0038] To prevent condensation of water vapor on the upper face of casing 3, exhaust part 34 may be configured such that an exhaust gas flows upward at a predetermined angle or more from the upper face of casing 3.

[0039] FIG. 7 is a partially enlarged view of separation unit 30 of cooker 1 in the state where separation unit 30 is disposed on casing 3. As shown in FIG. 7, by inserting at least one part of protrusion part 33 into water receiving port 42 of casing 3, separation unit 30 is disposed on back face 5b of casing 3.

[0040] Protrusion part 33 has two inclined parts (first inclined part 33a and second inclined part 33b) each of

which extends upward and is provided at a corresponding one of both ends in a longitudinal direction thereof. First inclined part 33a is provided at a left end of protrusion part 33. Second inclined part 33b is provided at a right end of protrusion part 33.

[0041] This makes it possible to prevent the water, which contains oil content, from dropping in the outside of casing 3 from between water discharge part 32 and water receiving port 42. As a result, dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like can be prevented.

[1-2. OPERATION]

[0042] Operation and function of cooker 1, which is configured as mentioned above, will be described in the following.

[0043] A user places a heating target in heating chamber 5 and closes the door 7, and subsequently operates operation panel 11 to set heating conditions such as cooking time and heating temperature. The control unit of cooker 1 controls a magnetron or the like to heat the heating target according to the heating conditions set above.

[0044] Exhaust port 40 is provided in a rear lower part of left side face 5a of heating chamber 5, and inlet 41 is provided in an upper left part of back face 5b of casing 3. The gas, which is heated in heating chamber 5, is supplied to separation unit 30 through exhaust port 40 and inlet 41.

[0045] Water receiving port 42 is provided below inlet 41 in back face 5b of casing 3. The water, which is condensed in separation unit 30, is returned into casing 3 from water receiving port 42. Exhaust part 34 is provided in upper face 31d of separation unit 30. The remaining gas from which at least some of water vapor has been separated in separation unit 30 is discharged to the outside from exhaust part 34.

[0046] According to the exemplary embodiment, water vapor and oil content, which are contained in the exhaust gas to be discharged to the outside of casing 3, can be reduced. This makes it possible to prevent dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like.

[0047] Especially, in the case where water vapor is used to heat a heating target, an exhaust gas contains a lot of water vapor. According to the exemplary embodiment, even in such a case, the water vapor and oil content, which are contained in the exhaust gas to be discharged to the outside of casing 3, can sufficiently be reduced. This makes it possible to prevent dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like.

[1-3. EFFECT]

[0048] The cooker in accordance with the exemplary embodiment is provided with a casing, a heating cham-

ber, an exhaust port, and a separation unit. The heating chamber is provided inside the casing. The exhaust port is provided in a heating chamber and discharges a gas inside the heating chamber. The separation unit condenses and separates at least some of water vapor contained in the gas discharged through the exhaust port.

[0049] The separation unit is provided with a space, a water discharge part, and an exhaust part. The space of the separation unit is a space for condensing water vapor that is contained in the gas discharged through the exhaust port. The water discharge part discharges the water, which is condensed in the space of the separation unit, into the casing. The exhaust part, which is provided in an upper part of the separation unit, discharges the remaining gas from which at least some of water vapor has been separated to the outside of the casing. This makes it possible to prevent dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like.

[0050] In the exemplary embodiment, the separation unit is provided on an external side of the back face of the casing. The water discharge part is connected to an opening formed in the casing. The water discharge part is provided with a protrusion part for receiving water so as not to drop the water, which contains oil content, from between the water discharge part and the opening. This makes it possible to prevent dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like.

[0051] In the present exemplary embodiment, the protrusion part has an inclined part that extends upward and is provided at an end in a longitudinal direction of the protrusion part. This makes it possible to prevent dirt on an external surface of cooker 1, a stand on which cooker 1 is placed, a surrounding wall thereof, or the like.

[0052] In the present exemplary embodiment, two side faces in the water discharge part, which constitute the above-mentioned space, are inclined such that a gap between the two side faces become narrower toward a lower part of the space from an upper part thereof. This makes it possible to discharge the condensed water efficiently.

[0053] In the present exemplary embodiment, the side faces and the back face, which constitute the space, have parts each of which is inclined so as to be closer to the water discharge part toward the lower part of the space from the upper part thereof. This makes it possible to discharge the condensed water efficiently.

[0054] In the present exemplary embodiment, the exhaust part is configured to send out an exhaust gas toward the center of the upper face of the casing. This makes it possible to prevent dirt on a wall, a shelf board, or the like above the cooker.

[0055] In the present exemplary embodiment, the exhaust part has an opening inclined downward at a predetermined angle. This makes it possible to prevent dirt on a wall, a shelf board, or the like above the cooker.

(MODIFICATION)

[0056] The above-mentioned exemplary embodiment is an example of the technique in accordance with the present disclosure, and the technique in accordance with the present disclosure is not limited to the above-mentioned exemplary embodiment. The technique in accordance with the present disclosure also includes modifications in which modification, substitution, addition, abbreviation, and the like are performed with respect to the above-mentioned exemplary embodiment.

[0057] Hereinafter, a modification of the above-mentioned exemplary embodiment will be described exemplarily.

[0058] The cooker in accordance with the present exemplary embodiment heats a heating target using a microwave, a heater, and water vapor. However, the technique in accordance with the present disclosure is applicable to any type of cooker.

[0059] In the present exemplary embodiment, machine room 13 is provided on a right side of heating chamber 5, and separation unit 30 is provided on a left side of casing 3. However, machine room 13 may be provided on a left side of heating chamber 5, and separation unit 30 may be provided on a right side of casing 3.

[0060] In the present exemplary embodiment, separation unit 30 is provided on the back face of casing 3. However, separation unit 30 may be provided inside casing 3.

INDUSTRIAL APPLICABILITY

[0061] The present disclosure is available for a cooker that heats a heating target such as food.

REFERENCE MARKS IN THE DRAWINGS

[0062]

1	cooker
3	casing
3a	front frame
3b	front opening
5	heating chamber
5a	left side face
5b	back face
6a	water supply tank
6b	drainage tank
7	door
7a	handle
11	operation panel
13	machine room
30	separation unit
31	space
31a	back face
31aa	inclined part
31b	first side face
3 1ba	first inclined part

31c second side face
 31ca second inclined part
 31d upper face
 32 water discharge part
 33 protrusion part
 33a first inclined part
 33b second inclined part
 34 exhaust part
 34a opening
 34b first wind direction plate
 34c second wind direction plate
 40 exhaust port
 41 inlet
 42 water receiving port

Claims

1. A cooker comprising:

a casing;
 a heating chamber that is provided inside the casing;
 an exhaust port that is provided in the heating chamber and discharges a gas inside the heating chamber; and
 a separation unit that condenses and separates at least some of water vapor contained in the gas discharged through the exhaust port, wherein
 the separation unit includes:

a space that is provided inside the separation unit, the space being a space in which the water vapor contained in the gas discharged through the exhaust port is condensed;
 a water discharge part that is provided in a lower part of the separation unit and discharges water into the casing, the water being condensed in the space; and
 an exhaust part that is provided in an upper part of the separation unit and discharges a remaining gas to an outside of the casing, the remaining gas being a gas from which at least some of the water vapor has been separated.

2. The cooker according to claim 1, wherein

the separation unit is disposed on an external surface of the casing,
 the water discharge part is connected to an opening provided in the casing, and
 the separation unit further includes a protrusion part that receives water so as not to drop the water from between the water discharge part and the opening.

3. The cooker according to claim 2, wherein the protrusion part has an inclined part that extends upward and is provided at an end in a longitudinal direction of the protrusion part.

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

the separation unit further has a back face, two side faces, and an upper face that define the space, and
 each of the two side faces has an inclined part that is provided in a corresponding one of lower parts of the two side faces and inclined such that a gap between the two side faces becomes narrower toward a lower part of the space from an upper part thereof.

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

the separation unit further has a back face, two side faces, and an upper face that define the space, and
 the back face has an inclined part that is provided in a lower part of the back face and inclined so as to be closer to the water discharge part toward a lower part of the space from an upper section thereof.

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

the separation unit further has a back face, two side faces, and an upper face that define the space, and
 the exhaust part is provided in the upper face and includes a wind direction plate that is arranged so as to be inclined inward at a predetermined angle from a front-rear direction of an upper face of the casing.

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

the separation unit further has a back face, two side faces, and an upper face that define the space, and
 the exhaust part is provided in the upper face and includes a wind direction plate that has a predetermined elevation angle.

FIG. 1

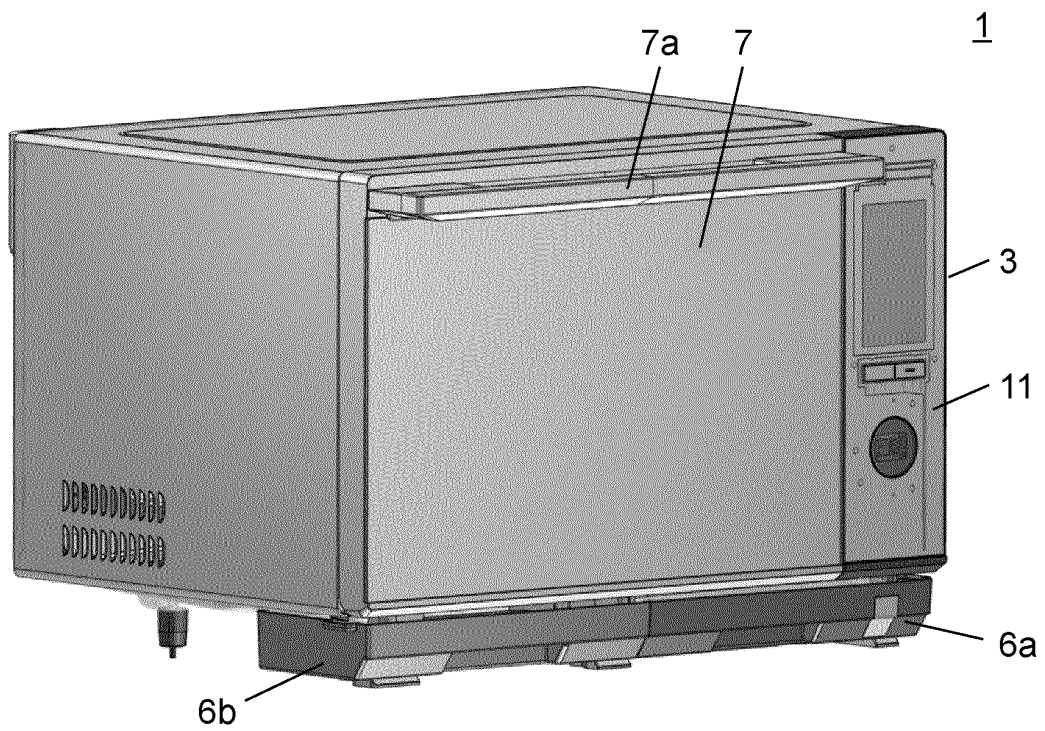


FIG. 2

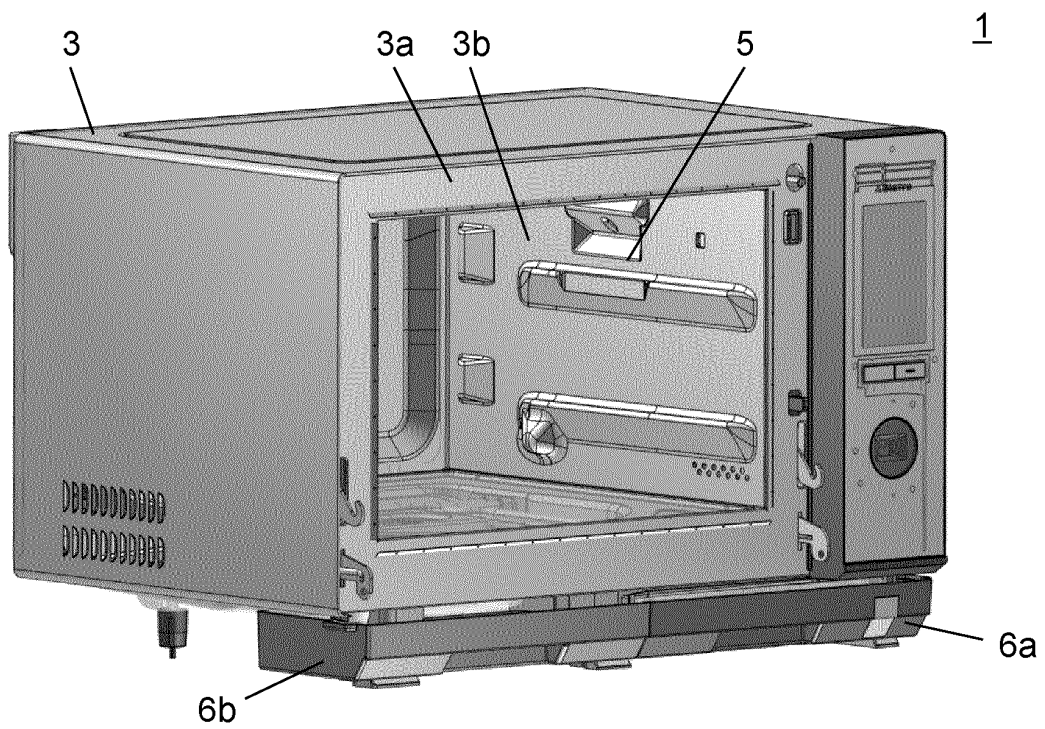


FIG. 3

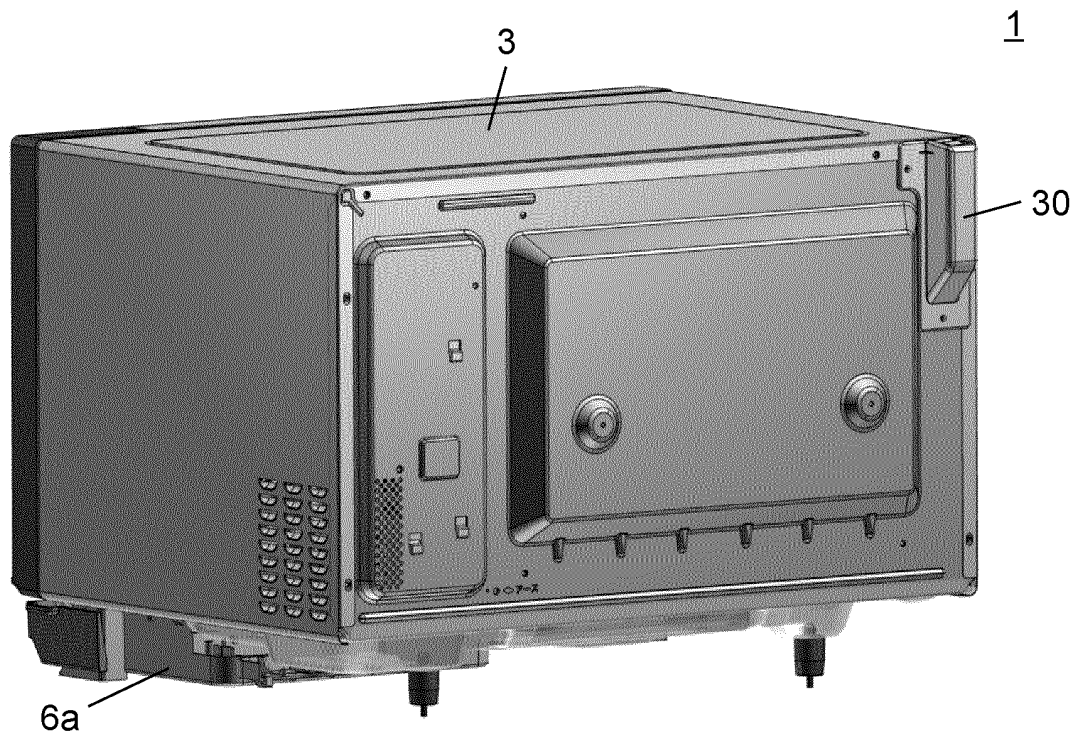


FIG. 4

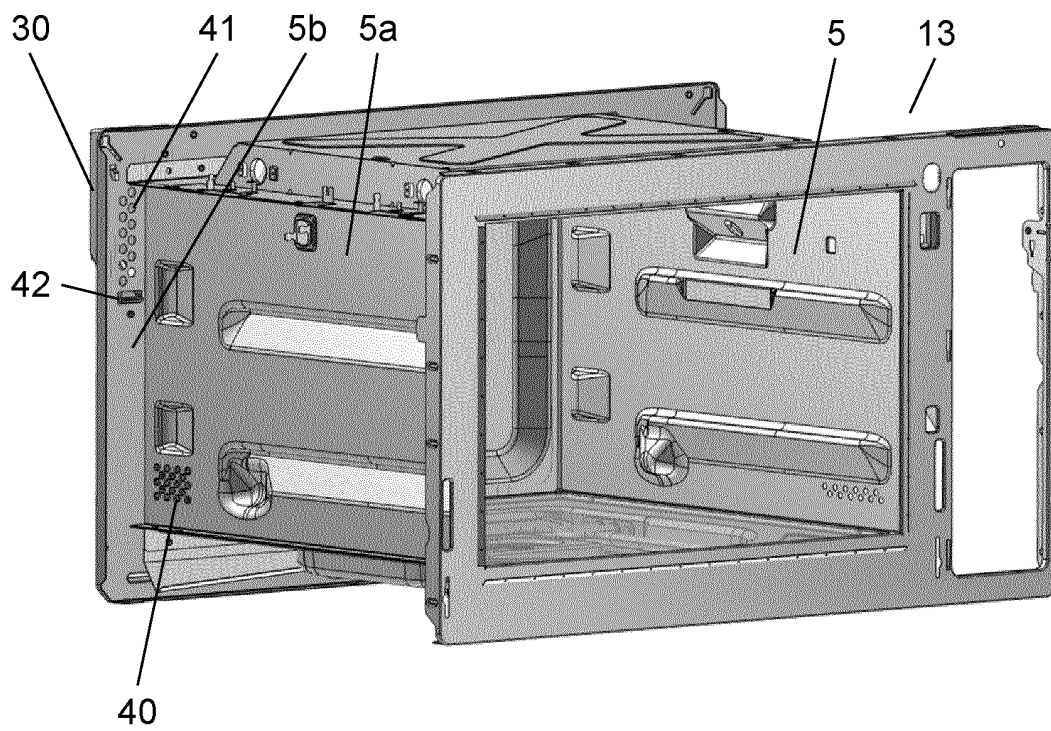


FIG. 5

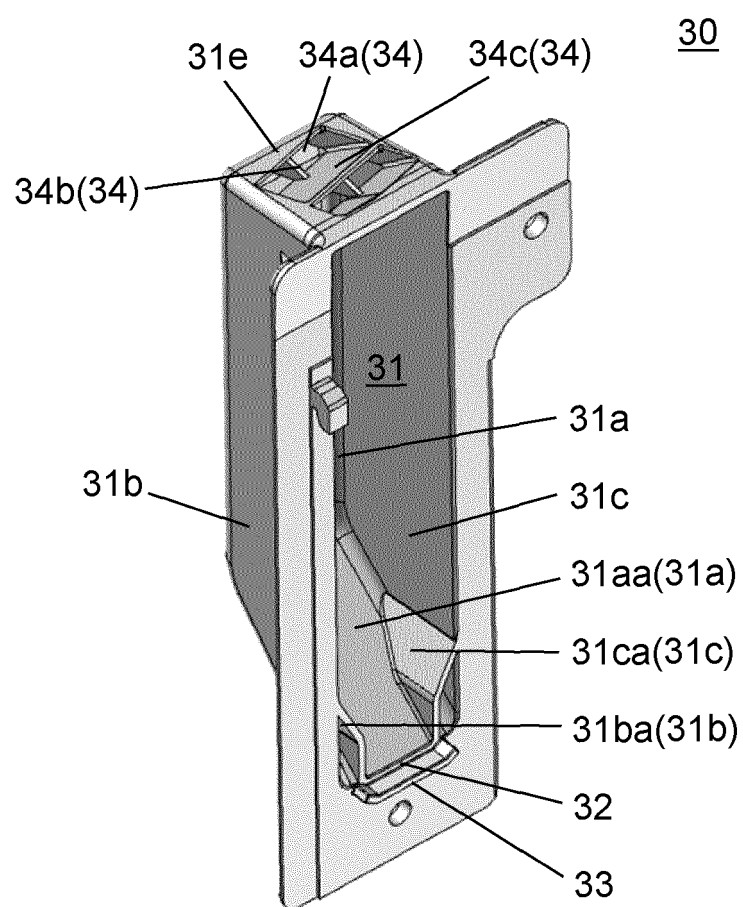


FIG. 6

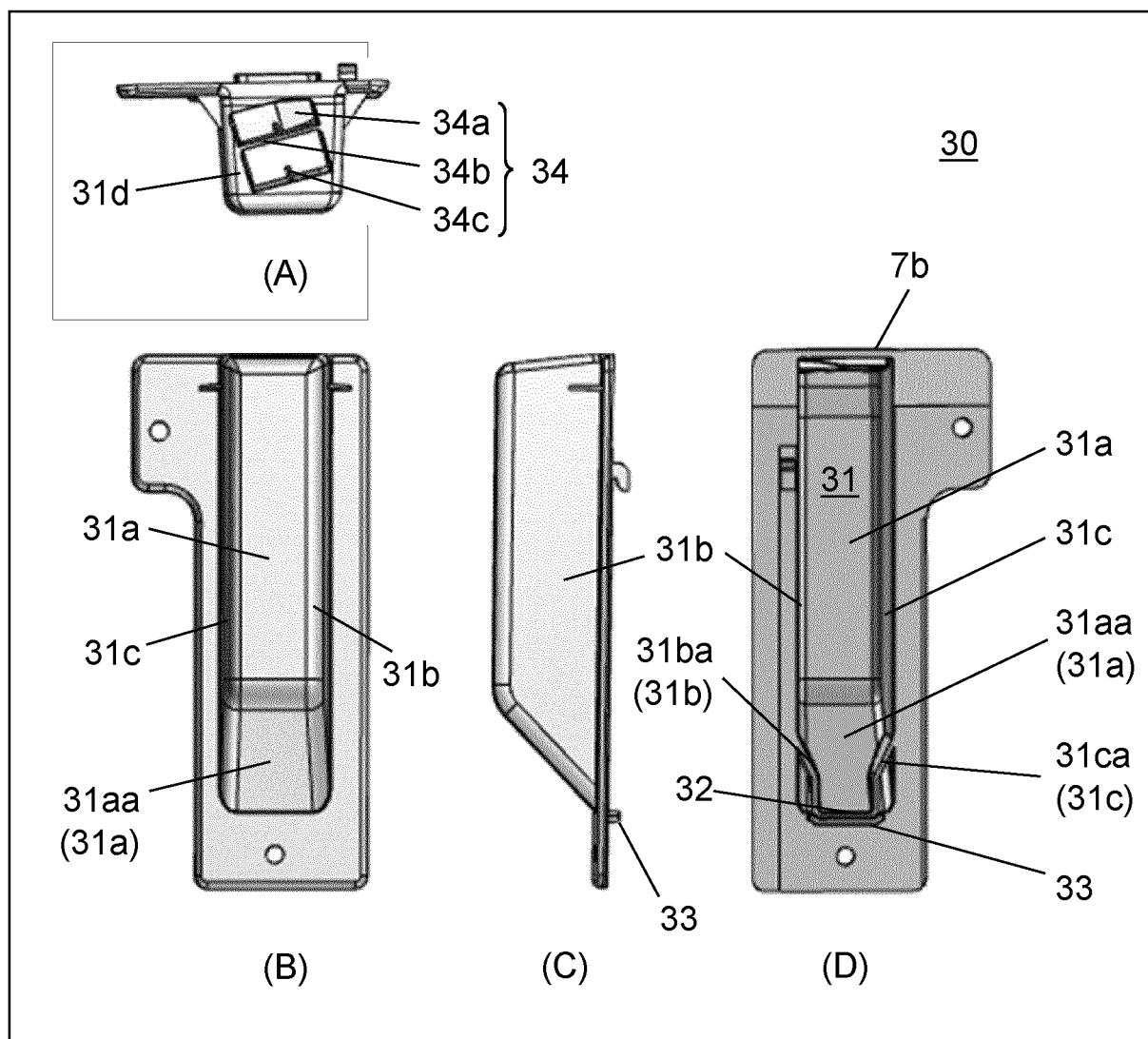
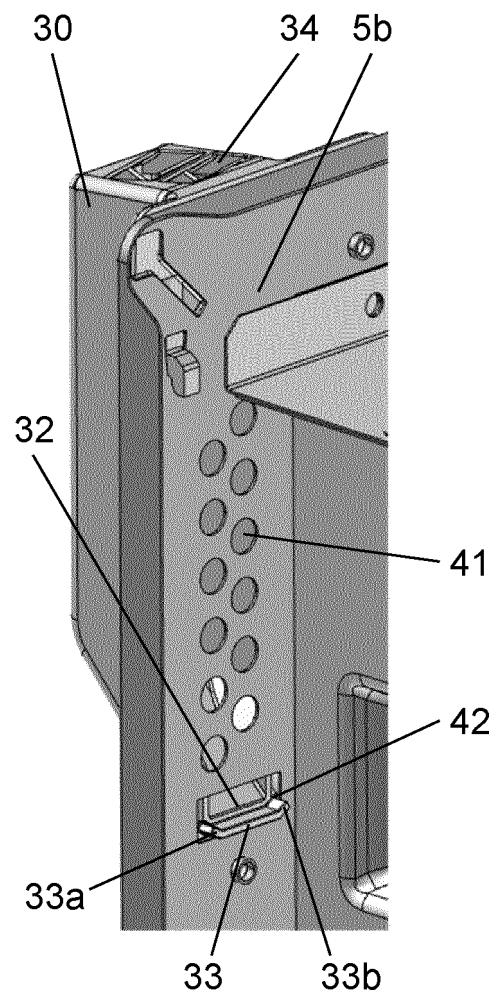


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/026949

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. F24C7/02 (2006.01) i, F24C15/20 (2006.01) i
 FI: F24C15/20 A, F24C7/02 541C

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)

Int. Cl. F24C7/02, F24C15/20

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 1971-2021
 Registered utility model specifications of Japan 1996-2021
 Published registered utility model applications of Japan 1994-2021

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.
X	WO 2012/070488 A1 (SHARP CORP.) 31 May 2012 (2012-05-31), paragraphs [0020], [0040], [0047]-[0073], fig. 1-3, 8-15	1, 4-5
Y		6-7
A		2-3
Y	JP 2008-51360 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 06 March 2008 (2008-03-06), paragraphs [0035]-[0046], fig. 1-11	6-7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search
16.08.2021

Date of mailing of the international search report
31.08.2021

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3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/026949

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
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Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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