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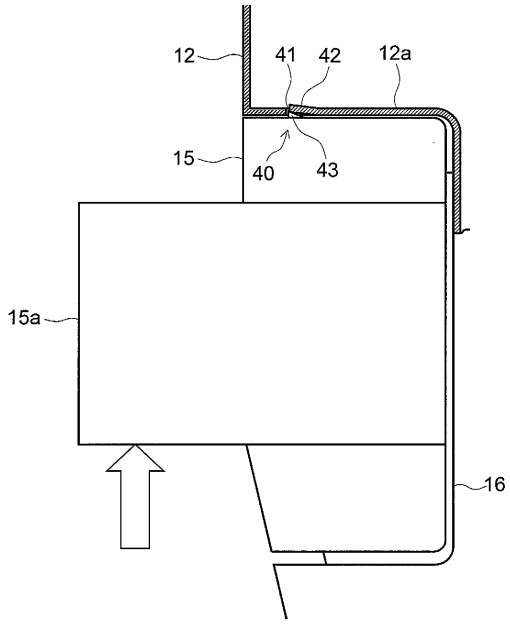
(54) COOKING DEVICE

(57) A cooker (1) can feed steam to a heating compartment with a steam generation device incorporated. A water tank (15) for feeding water to the steam generation device is provided such that the water tank (15) can be drawn out from the front of a housing (10). An engagement portion (40) is formed between the water tank and the housing. When an upward force is applied to the water tank, the engagement portion is brought into an engaged state so as to prevent the water tank from being drawn out. The engagement portion is formed with a substantially U-shaped cut groove (41) formed in a wall of the housing opposite an top of the water tank and a protrusion (43) formed on the top of the water tank opposite a tongue (42) surrounded by the cut groove.

FIG.7



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Description

Technical Field

[0001] The present invention relates to cookers.

Background Art

[0002] Oven cookers that cook food put in a heating compartment thereof are widely used for commercial purposes and domestic purposes. Among them, there are a cooker that heats food with heat emitted from a heater, a cooker that heats food with hot air (convection oven), a cooker that vibrates molecules of food with high-frequency waves (microwaves) to cook the food from inside (commonly referred to as "microwave oven") and combinations of these heating systems.

[0003] In recent cookers, steam is often combined with other heat sources to heat food. An example is disclosed in patent document 1.

[0004] Patent document 1 discloses a high-frequency cooker in which high-frequency waves and steam are fed into a heating compartment to heat stuff to be heated. At a lower part of the main body of the high-frequency cooker, a water tank that stores water for producing steam is arranged so that the water tank can be freely drawn out.

Related Art Document

Patent Document

[0005] Patent document 1: JP- A- 2007- 147275

Disclosure of the Invention

Problems to be Solved by the Invention

[0006] When a steam cooking function is added to a cooker, it is somewhat inevitable that a drawable water tank is designed such that it can be taken in and out through the front of the cooker. This is because the sides of the cooker often face a wall or another household appliance, and the top of the cooker is often used as a shelf. Incidentally, the water tank is often used as a hold when the cooker is transported. When the water tank is held to raise the cooker, if the water tank is drawn out accidentally, the cooker which has lost support at this part may drop and suffer damage. If the cooker is dropped on any part of a person's body, injury is almost inevitable.

[0007] The present invention is made in view of the foregoing respect; an object of the present invention is to provide a cooker incorporating a drawable water tank in which, even when the water tank is held for transport of the cooker, the water tank will not be drawn out, and this makes it possible to avoid various risks caused by removal of the water tank.

Means for Solving the Problem

[0008] To achieve the above object, according to the present invention, in a cooker that can feed steam to a heating compartment in a housing thereof with a steam generation device incorporated therein, a water tank is provided such that the water tank can be drawn out from a front of the housing, an engagement portion is formed between the water tank and the housing and, when an upward force is applied to the water tank, the engagement portion is brought into an engaged state so as to prevent the water tank from being drawn out.

[0009] Preferably, in the cooker configured as described above, the engagement portion is formed with a substantially U- shaped cut groove formed in a wall of the housing opposite an top of the water tank and a protrusion formed on the top of the water tank opposite a tongue surrounded by the cut groove, and, when the upward force is applied to the water tank, the protrusion bends up the tongue such that the engaged state is formed between the protrusion and the cut groove.

Advantages of the Invention

[0010] In the present invention, when the cooker is raised for transport, even if the water tank is held, the upward force exerted on the water tank allows the engagement portion between the housing and the water tank of the cooker to be brought into the engaged state, and thus the water tank is prevented from being drawn out. In this way, it is possible to prevent the following accident: the water tank is drawn out, and the cooker which has lost support at this part is dropped. It is therefore possible to safely transport the cooker.

Brief Description of Drawings

[0011]

[Fig. 1] A front view showing an embodiment of a cooker according to the present invention;
[Fig. 2] A side view of the cooker of Fig. 1;
[Fig. 3] A side view of a front panel of the cooker and a water tank inserted thereinto;
[Fig. 4] A side view of the water tank;
[Fig. 5] A partially enlarged cross-sectional view of the cooker, showing the structure of an engagement portion;
[Fig. 6] A partial top view of the engagement portion;
[Fig. 7] A partially enlarged cross-sectional view similar to Fig. 5, showing the state of operation of the engagement portion;
[Fig. 8] A back view of a door frame; and
[Fig. 9] A block configuration diagram.

Description of Embodiments

[0012] A structure of a cooker 1 according to an em-

bodiment of the present invention will be described with reference to accompanying drawings.

[0013] The cooker 1 includes a rectangular-parallelepiped housing 10 that is formed by combination of a sheet-metal member and a synthetic resin molded member. Within the housing 10, an unillustrated heating compartment is provided. The heating compartment has an opening portion in the front; the opening portion is closed by a door 11. The door 11 is pivoted about its left edge in a horizontal plane.

[0014] In the front of the housing 10, on the right side of the door 11, a synthetic resin panel 12 is provided. In an upper portion of the panel 12, a display portion 13 comprising a liquid crystal panel or the like is formed; in a lower portion of the panel 12, an operation portion 14 provided with a plurality of unillustrated operation keys is arranged. Below the operation portion 14, an opening portion 16 (see Figs. 2 and 3) for inserting a water tank 15 into the housing 10 is provided. The water tank 15 is of a drawer type, and a handle 15a protrudes forward therefrom. Between the top of the water tank 15 and the ceiling portion of the opening portion 16, a clearance is provided that allows the water tank 15 to move upward, the movement of the water tank will be described later.

[0015] In the cooker 1, heating by high-frequency waves, heating by hot air, heating by steam and heating by combination of the heating systems described above are possible. In order to realize it, the cooker 1 includes components shown in Fig. 9.

[0016] The cooker 1 is controlled by a controller 20. The controller 20, a core part thereof is a microcomputer, receives output signals from various components and outputs control signals to various components.

[0017] In addition to the display portion 13 and the operation portion 14 described above, the components connected to the controller 20 include the followings. First, as components for performing the high-frequency heating, there are a high-frequency drive power supply 21 that oscillates an unillustrated magnetron and an antenna motor 22 that rotates an antenna (not shown) for delivering high-frequency waves generated by the oscillation of the magnetron into the heating compartment. As components for performing the hot air heating, there are a convection heater 23 that converts air into hot air and a convection fan 24 that feeds the hot air into the heating compartment and circulates it. As components for performing the steam heating, there are a steam generation heater 25 that generates steam in an unillustrated steam generation device, a steam superheating heater 26 that converts the generated steam into the superheated steam and a water feed pump 27 that feeds water to the steam generation device. There is also a cooling fan 28 that takes cooling air from outside in the housing 10.

[0018] As components for outputting signals to the controller 20, there are a temperature sensor 29 that measures a temperature within the heating compartment, a humidity sensor 30 that measures a humidity within the heating compartment, a water-level sensor 31 that measures a water level within the steam generation device and a door-state sensor 32 that detects whether the door 11 is opened or closed.

[0019] When the water tank 15 is inserted into the housing 10, the water tank 15 is connected to the water feed pump 27, and the water feed pump 27 sucks water within the water tank 15 and feeds it to the steam generation device. Between the water tank 15 and the housing 10, more specifically, between the water tank 15 and the panel 12, an engagement portion is formed, the engagement portion is brought into an engaged state when an upward force is applied to the water tank 15. This configuration will be described below with reference to Figs. 5 to 7.

[0020] The engagement portion 40 is comprised of components formed in the panel 12 and a component formed in the water tank 15. The components formed in the panel 12 are a substantially U-shaped (see Fig. 6) cut groove 41 formed in a horizontal wall 12a opposite the top of the water tank 15, and a tongue 42 that is surrounded by the cut groove 41. A front end of the tongue 42 faces a user. Because of the elasticity of the synthetic resin that is the material of the panel 12, the tongue 42 is bent when a force is applied to the tongue 42 and is restored when the force is removed.

[0021] The component formed in the water tank 15 is a protrusion 43 that is formed on the top of the water tank 15. The protrusion 43 is triangular in cross-section thereof, and a front thereof forms a vertical wall. The protrusion 43 is disposed directly below the tongue 42.

[0022] When the water tank 15 is pushed into the opening portion 16, in a normal state, as shown in Fig. 5, the engagement portion 40 is not brought into the engaged state, and the water tank 15 can be drawn out without any problem. However, when the cooker 1 is raised in order to be transported, the water tank 15, especially, the handle 15a, is held, and thus an upward force indicated by the arrow of Fig. 7 is exerted on the water tank 15. In this way, the water tank 15 is moved upward, and the protrusion 43 pushes up the tongue 42 and enters an opening portion that is left after the retreat of the tongue 42.

[0023] Even if the water tank 15 is pulled forward, the vertical wall in the front of the protrusion 43 engages with the cut groove 41, and thus the water tank 15 is not removed from the opening portion 16. In other words, the water tank 15 is locked. In this way, it is possible to prevent the following accident: the water tank is drawn out, and the cooker which has lost support at this part is dropped. It is therefore possible to safely transport the cooker 1.

[0024] Since the engagement portion 40 is comprised of the tongue 42 formed in the panel 12 by the substantially U-shaped cut groove 41 and the protrusion 43 formed on the top of the water tank 15 opposite the tongue 42, it is not necessary to add an extra component, with the result that it is possible to significantly inexpensively form the engagement portion 40.

[0025] When steam cooking is performed, a large amount of condensate water adheres to the back (the side that faces the heating compartment) of the door 11. In order to efficiently process the condensate water, the following structure is provided on the back of the door 11.

[0026] Fig. 8 shows the back side of a door frame 50 that is a main portion of the door 11. The door frame 50 is a synthetic resin molding having a rectangular shape in front view. In the center of the door frame 50, a window 51 through which the interior of the heating compartment can be seen is formed. The window 51 is shielded with a window glass formed of heat-resistant glass and a radio wave leakage prevention screen (both of which are not shown).

[0027] A drain gutter 52 is formed near the lower edge of the back of the door frame 50. In Fig. 8, the drain gutter 52 is inclined downward to the right, and has an exit 52a at the right end. Below the exit 52a, a drain pan 53 is arranged. The drain pan 53 forms part of the front of the housing 10.

[0028] Since the drain gutter 52 is inclined downward toward the exit 52a, the condensate water received by the drain gutter 52 rapidly flows downward into the drain pan 53. Hence, the condensate water is prevented from being left on the back side of the door 11 and being dripped out of the cooker 1 when the door 11 is opened. Even when the drain gutter 52 is inclined as described above, the shape of the door 11 as seen from the front is not affected by such inclination, and its design is not disfeatured.

[0029] Although the embodiment of the present invention has been described above, the scope of the present invention is not limited to this embodiment, and many modifications are possible without departing from the spirit of the invention.

Industrial Applicability

[0030] The present invention can be widely utilized in cookers that perform cooking with steam.

List of Reference Symbols

[0031]

1 cooker

10 housing

11 door

12 panel

13 display portion

14 operation portion

15 water tank

15a handle

40 engagement portion

41 cut groove

42 tongue

43 protrusion

Claims

1. A cooker comprising:

a housing;
a heating compartment that is provided in the housing;
a steam generation device that is incorporated in the housing and that feeds steam to the heating compartment; and
a water tank that feeds water to the steam generation device,
wherein the water tank is provided such that the water tank can be drawn out from a front of the housing,
an engagement portion is formed between the water tank and the housing, and
when an upward force is applied to the water tank, the engagement portion is brought into an engaged state so as to prevent the water tank from being drawn out.

2. The cooker of claim 1,
wherein the engagement portion is formed with a substantially U-shaped cut groove formed in a wall of the housing opposite an top of the water tank and a protrusion formed on the top of the water tank opposite a tongue surrounded by the cut groove, and
when the upward force is applied to the water tank, the protrusion bends up the tongue such that the engaged state is formed between the protrusion and the cut groove.

FIG.1

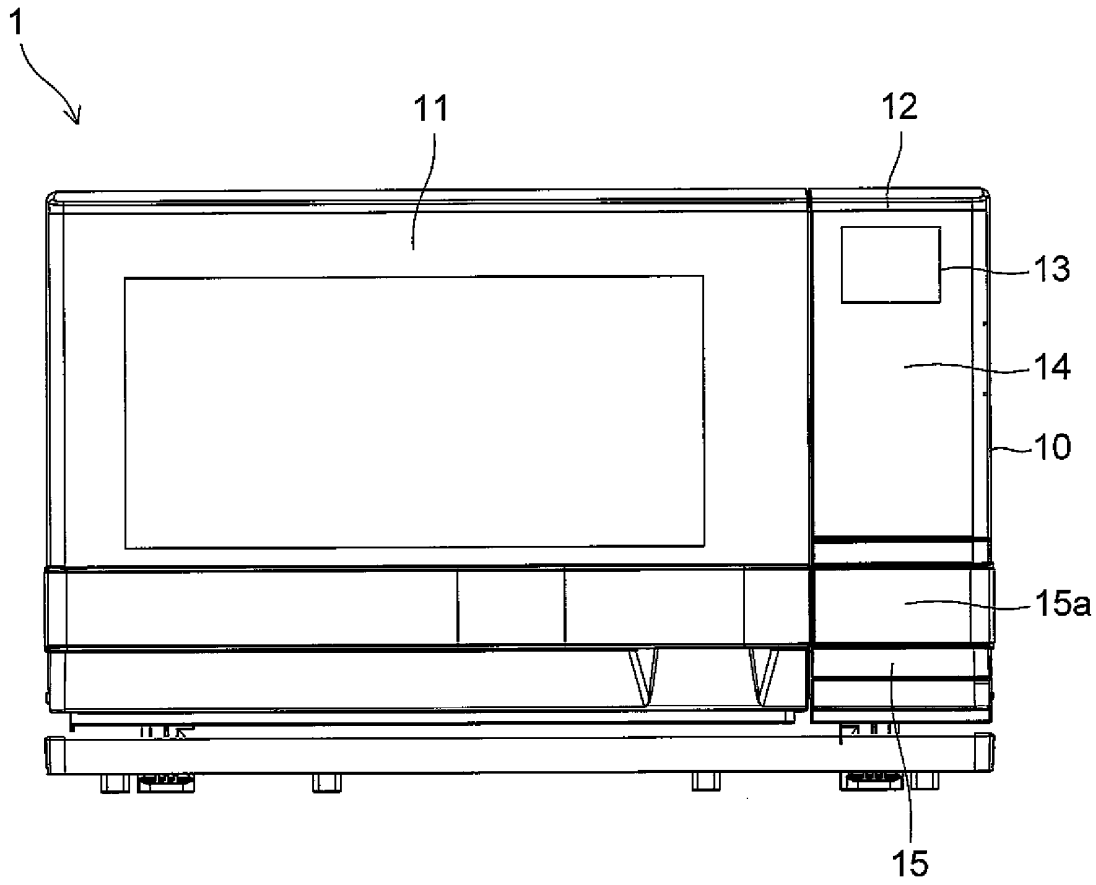


FIG.2

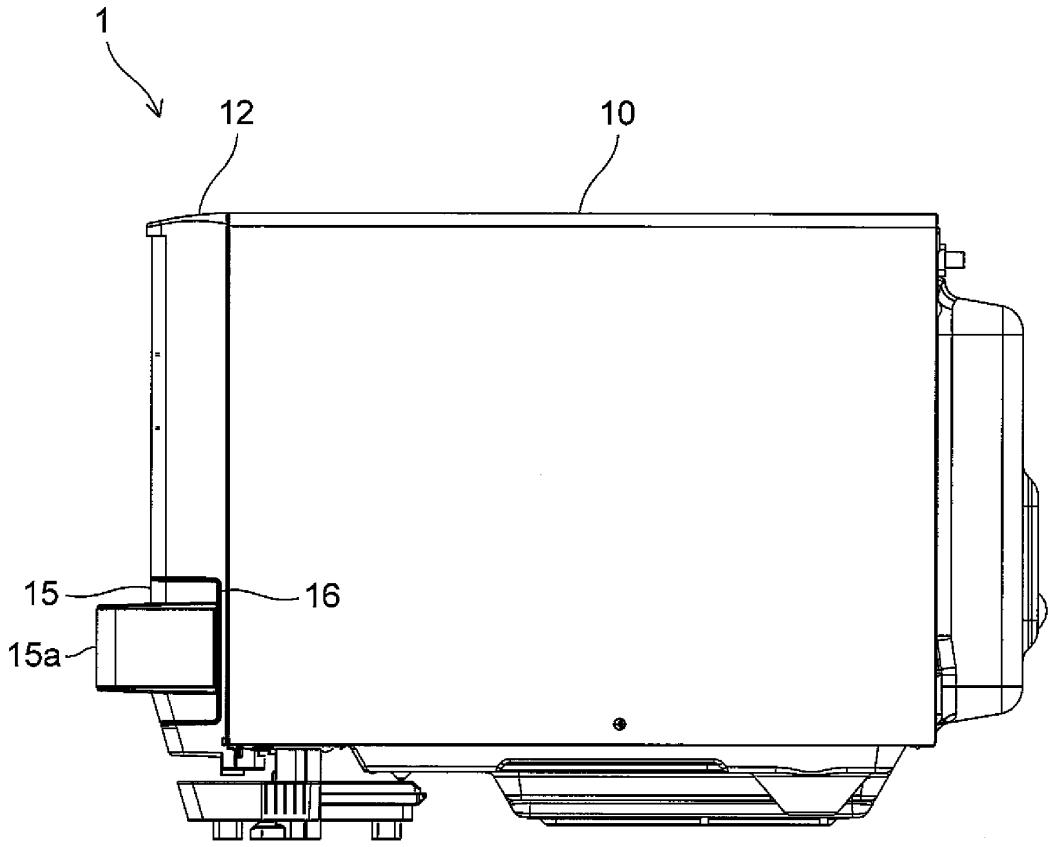


FIG.3

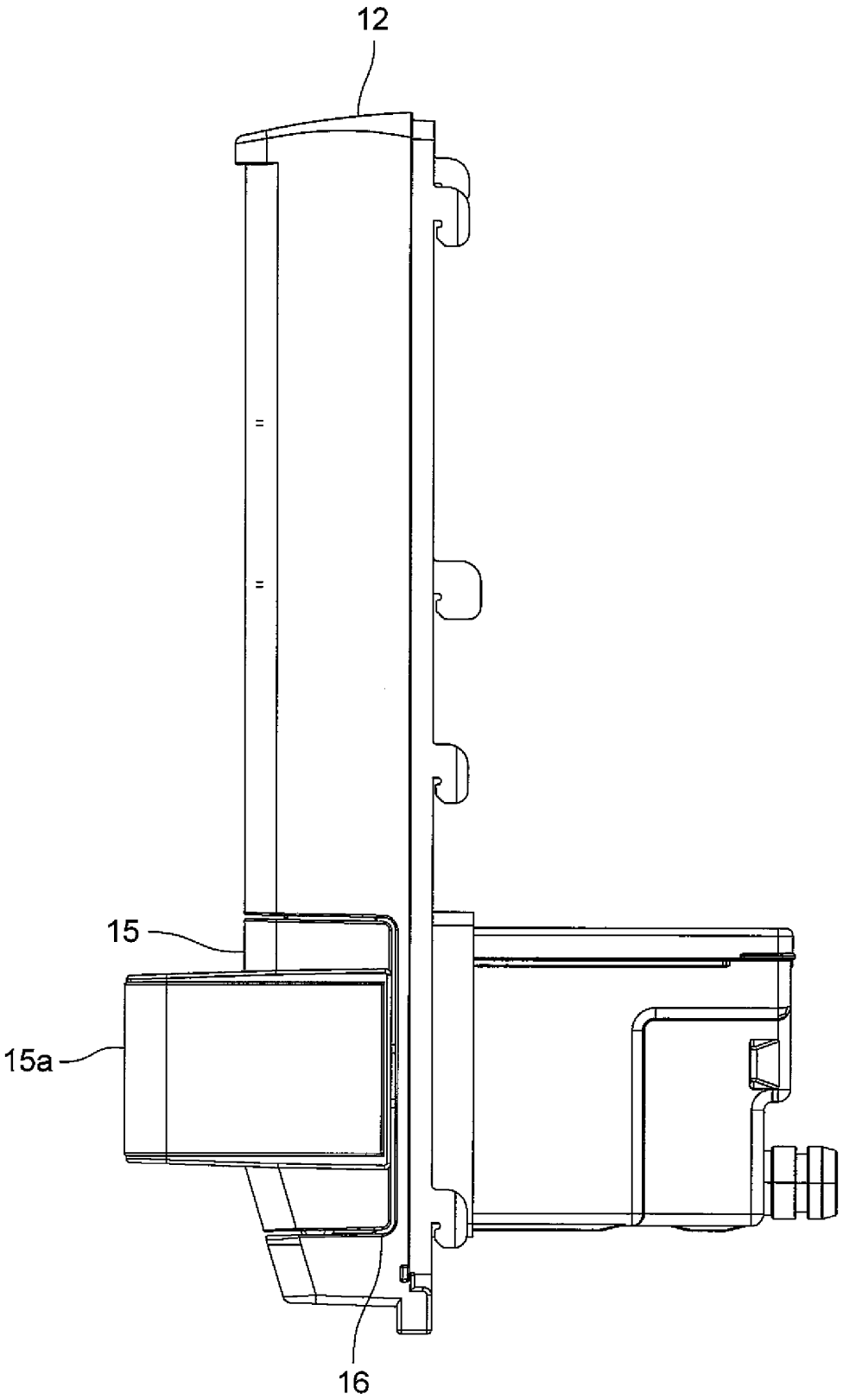


FIG.4

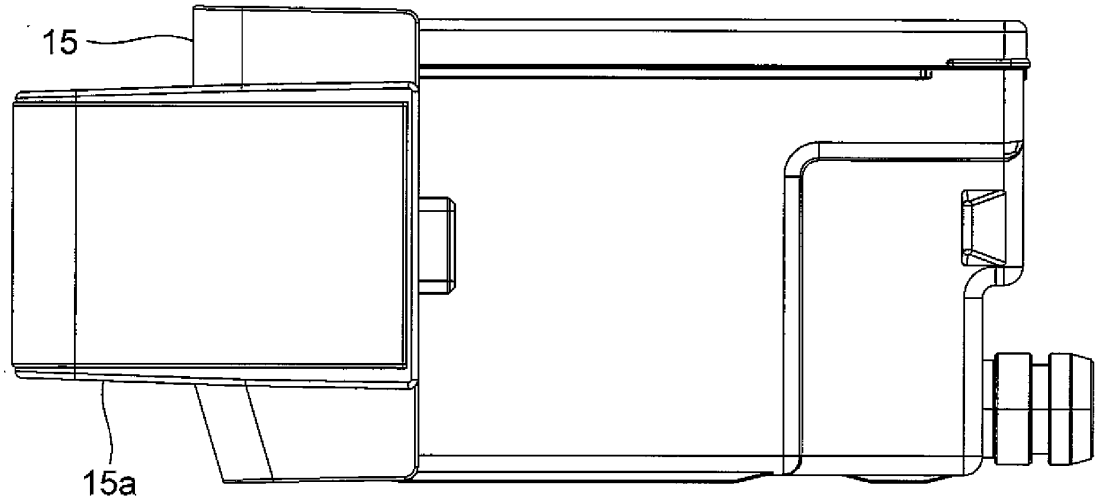


FIG.5

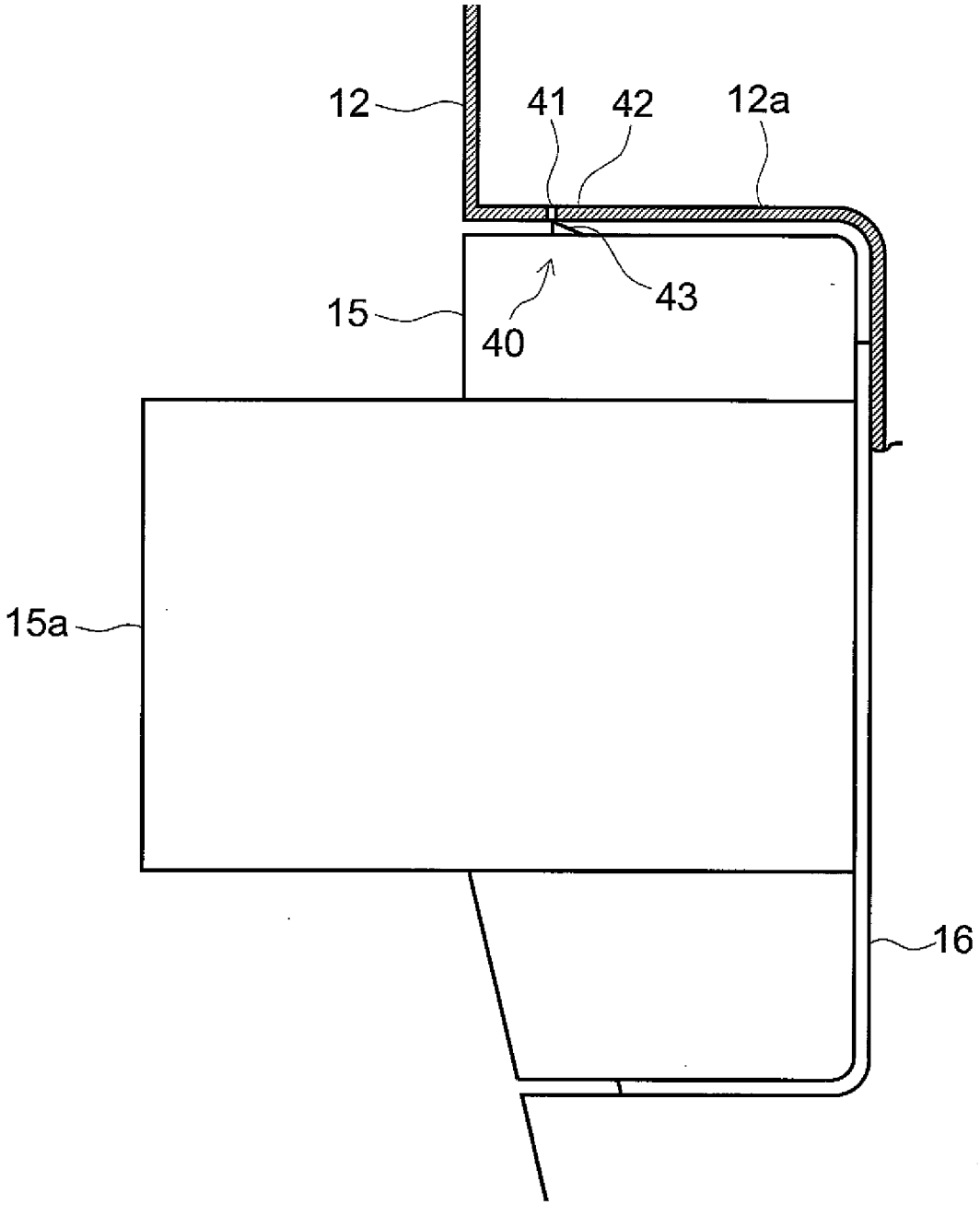


FIG.6

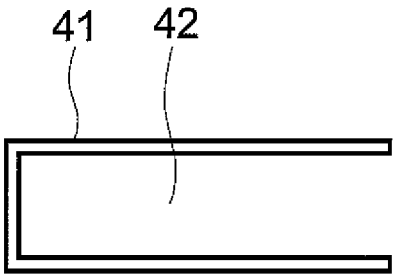


FIG.7

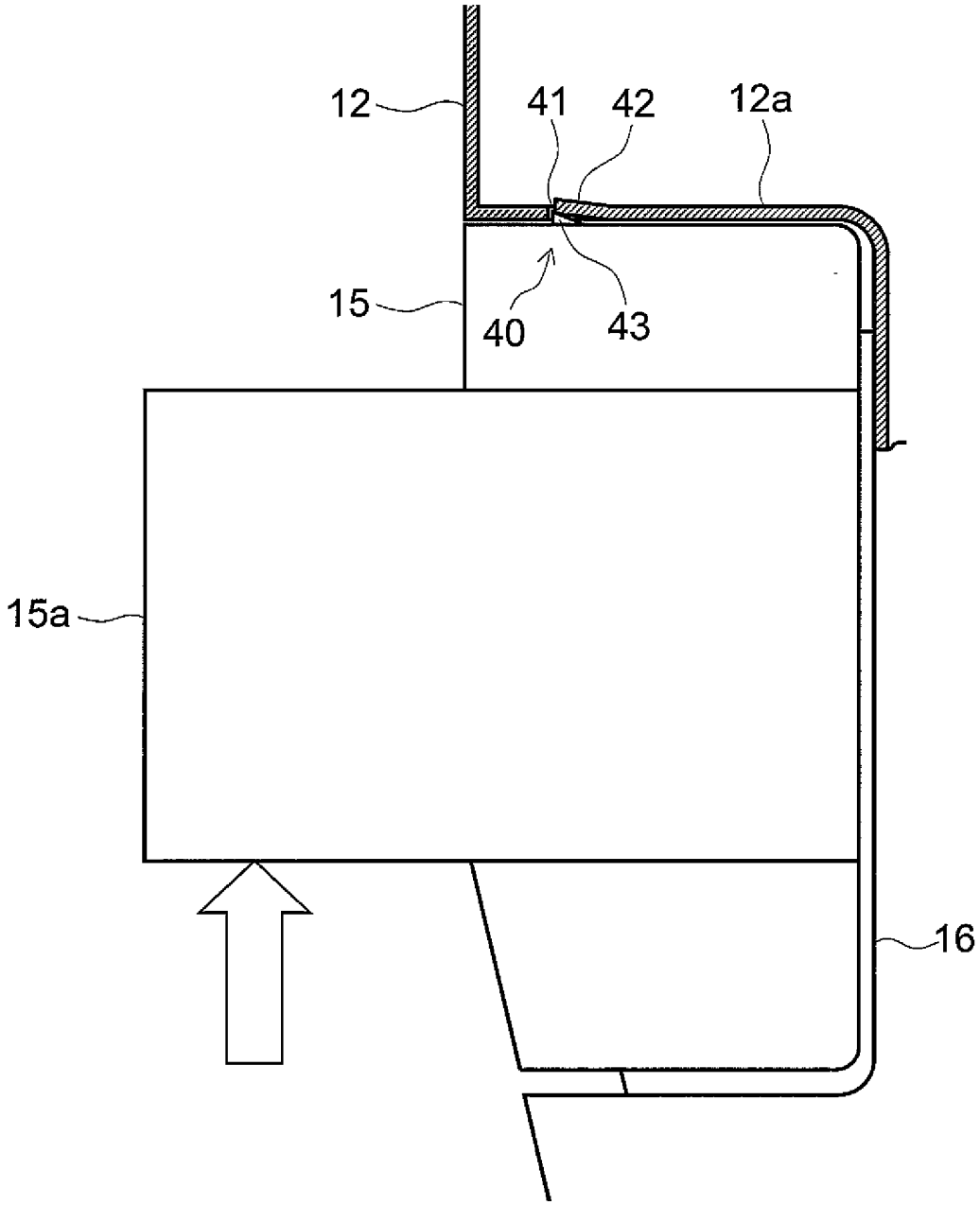


FIG.8

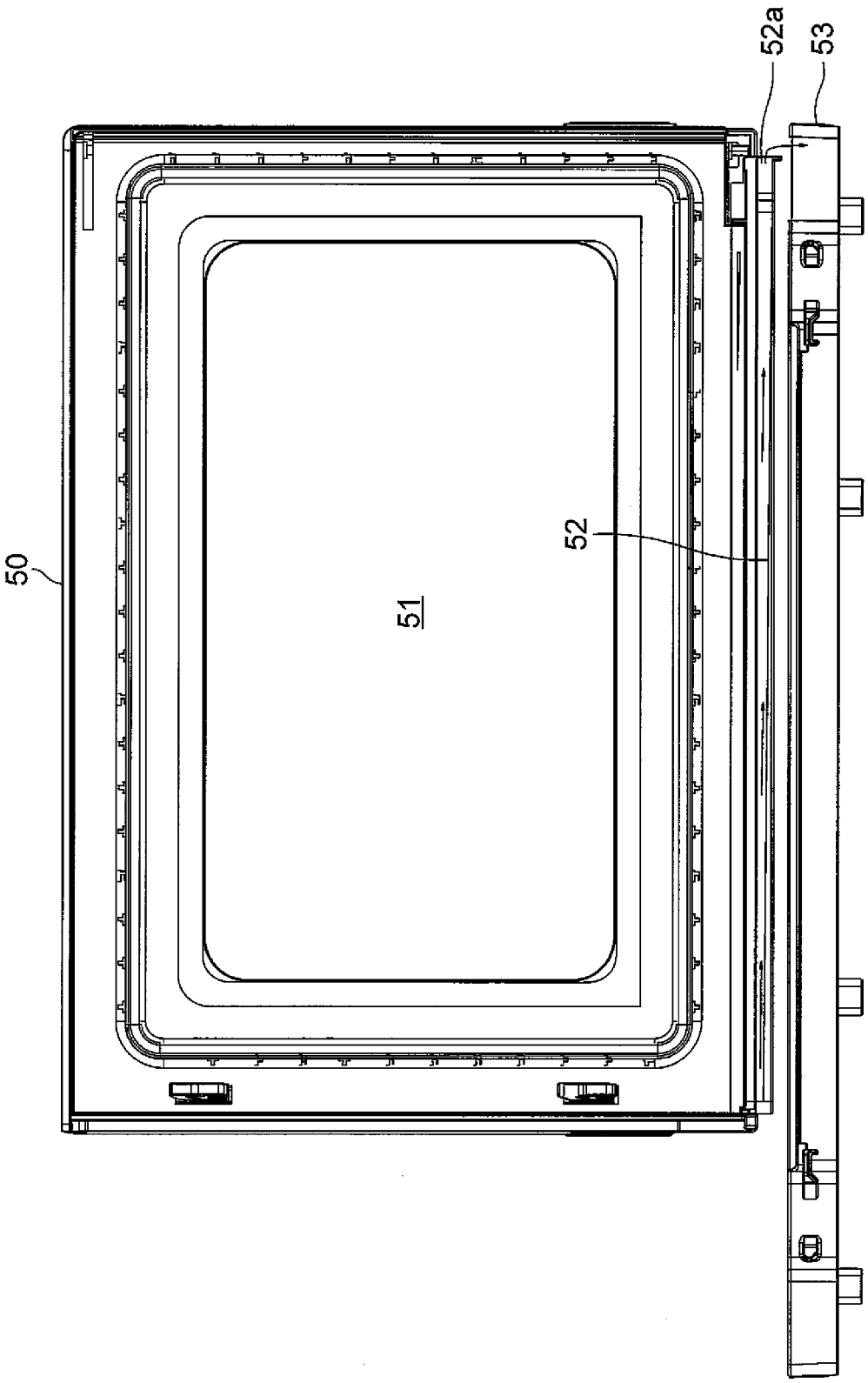
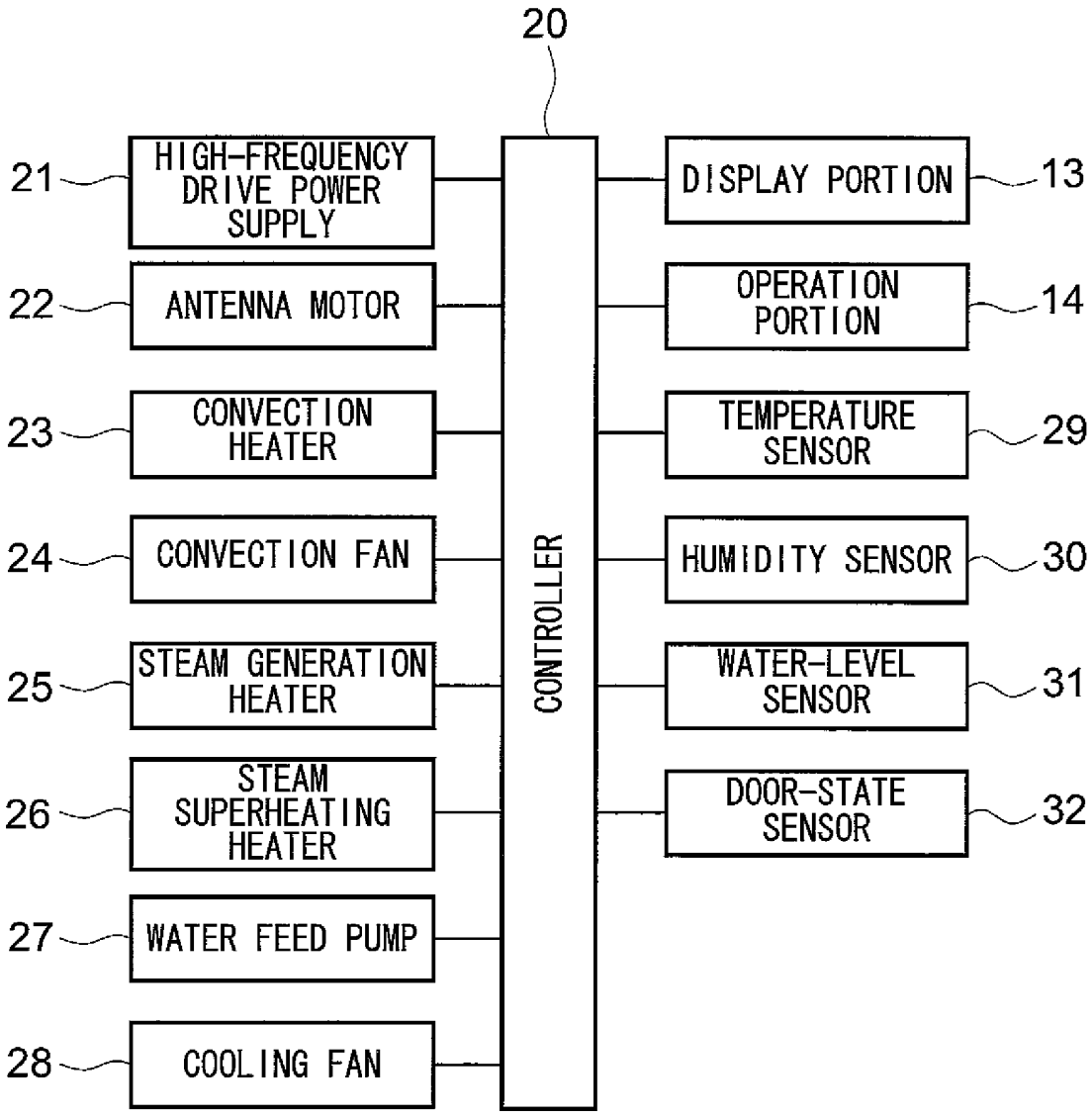


FIG.9


20
21
HIGH-FREQUENCY DRIVE POWER SUPPLY
22
ANTENNA MOTOR
23
CONVECTION HEATER
24
CONVECTION FAN
25
STEAM GENERATION HEATER
26
STEAM SUPERHEATING HEATER
27
WATER FEED PUMP
28
COOLING FAN
CONTROLLER
DISPLAY PORTION
13
OPERATION PORTION
14
TEMPERATURE SENSOR
29
HUMIDITY SENSOR
30
WATER-LEVEL SENSOR
31
DOOR-STATE SENSOR
32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/077601

A. CLASSIFICATION OF SUBJECT MATTER
F24C1/00(2006.01)i

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)
F24C1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2011
Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

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 A	JP 2010-181115 A (Panasonic Corp.), 19 August 2010 (19.08.2010), entire text & WO 2010/090043 A1	1 2
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 002968/1978(Laid-open No. 106514/1979) (Tokyo Shibaura Electric Co., Ltd.), 26 July 1979 (26.07.1979), entire text (Family: none)	1,2

☒ 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
15 December, 2011 (15.12.11)	27 December, 2011 (27.12.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/077601

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 54-44077 A (Matsushita Electric Industrial Co., Ltd.), 07 April 1979 (07.04.1979), entire text (Family: none)	1,2
A	JP 2007-147275 A (Matsushita Electric Industrial Co., Ltd.), 14 June 2007 (14.06.2007), entire text (Family: none)	1,2

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2007147275 A **[0005]**