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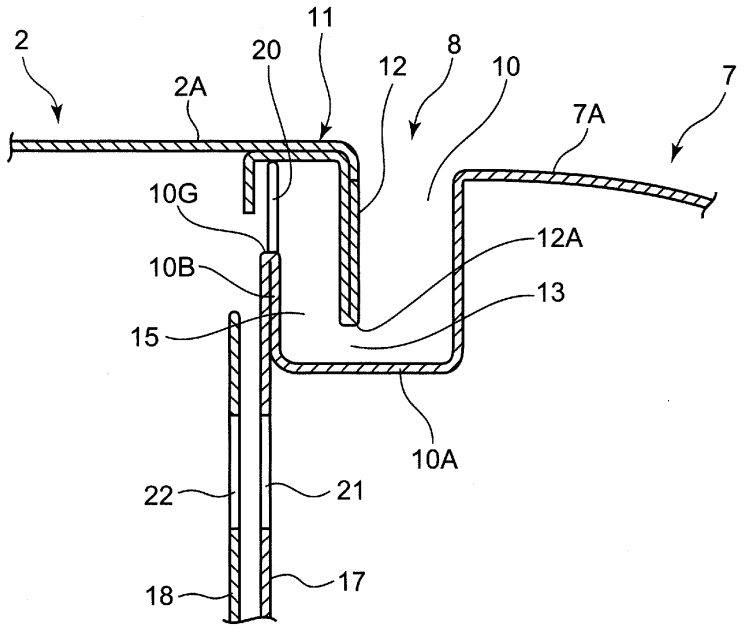
(54) **COOKING DEVICE**

(57) When water or the like splashed on a top face part (2A) of a cabinet (2) comes onto an outer edge part (11) that is a joint part in a cooking device (1), the water or the like can be made to flow sideward along a groove (10) and thus can be prevented from penetrating to inside of the cooking device (1). A bent part (12) of the cabinet (2) extends into the groove (10) on a control panel (7) and thus forms a waterproof wall against the water that is going to leak out of the groove (10), so that the water or the like splashed on the groove (10) of the control panel (7) from outside can be prevented from penetrating through the groove (10) into the cabinet (2).

Fig.2A



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Description

TECHNICAL FIELD

[0001] The present invention relates to a cooking device such as microwave oven, steam cooker and combination microwave and oven.

BACKGROUND ART

[0002] Currently, standardization of waterproof property (protection of electrical components against water leakage) is discussed as one of safety standards for domestic electrical appliances such as microwave ovens in IEC (International Electrotechnical Commission), EN (European Norm), etc.

[0003] In a cooking device 100 such as built-in type microwave oven, as shown in Fig. 5, for instance, penetration of water, broth and/or the like through a joint part 107 between a cabinet 101 and a control panel 102 as a joint part between two members raises a fear of causing failures of electrical components inside the device, electric shock, and/or the like.

[0004] As shown in Fig. 6 that is an enlarged sectional view of a portion J enclosed by a chain line in Fig. 5, conventionally, a seal member 105 such as packing made of silicone rubber, waterproof cushion, and adhesive is pasted or interposed between a joint part 103 of the cabinet 101 and a joint part 104 of the control panel 102, so that penetration of moisture or the like into inside thereof through the joint part 107 is prevented. This prevents penetration of moisture or the like onto the inside electrical components through a communication hole 106 for interconnection adjoining the joint part 103 of the cabinet 101 and a communication hole 107 for interconnection adjoining the joint part 104 of the control panel 102, for instance.

[0005] In the conventional cooking device 100, however, exposure to outside of the seal member 105 such as packing and waterproof cushion deteriorates and damages appearance thereof. Projection of the seal member 105 through the joint particularly deteriorates the appearance.

[0006] In addition, there is a problem in that long-term use thereof may damage the waterproof property through aged deterioration of the seal member made of rubber or the like.

[0007] Furthermore, bonding by the seal member made of adhesive between the joint part 103 of the cabinet 101 and the joint part 104 of the control panel 102 makes it impossible to easily separate the cabinet 101 and the control panel 102 and thus hinders maintenance operations.

CITATION LIST

PATENT LITERATURE

[0008] PATENT LITERATURE 1: JP 2000-12209 A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0009] An object of the invention is to provide a cooking device of which waterproof performance can be ensured for a long term use thereof without deterioration in appearance and maintainability.

SOLUTION TO PROBLEM

[0010] In order to achieve the object, a cooking device of the invention comprises:

a main body casing having a top face part, and
a front face panel having a top face part that is connected to the top face part of the main body casing and having electric components inside, wherein
one top face part of the top face part of the main body casing and the top face part of the front face panel has an outer edge part that extends to just over an outer edge part of the other top face part of the top face part of the main body casing and the top face part of the front face panel, wherein
the outer edge part of the one top face part includes a water droplet dropping part bent downward, and wherein
the outer edge part of the other top face part has a water droplet penetration preventing part that prevents flow of water droplets dropped from the water droplet dropping part toward the one top face part.

[0011] According to the cooking device of the invention, water or the like that is splashed on the top face part of one of the main body casing and the front face panel and that comes onto the outer edge part thereof is dropped by the bent water droplet dropping part onto the water droplet penetration preventing part of the outer edge part of the other top face part. The water droplet penetration preventing part prevents the flow of the water droplets dropped from the water droplet dropping part toward the one top face part. For instance, the water droplet penetration preventing part guides the water droplets along the other top face part in sideward directions or in a direction such that distance from the one top face part increases. Thus the water or the like that is splashed on the top face part of the main body casing or the front face panel can be prevented from penetrating into the cooking device.

[0012] By the invention, accordingly, penetration of moisture or the like to the inside through the outer edge parts that form joint part between the main body casing

and the front face panel can be prevented without use of a seal member that is formed of packing, waterproof cushion or adhesive and that is poor in durability. By the invention, as a result, waterproof performance can reliably be ensured for a long term without deterioration in appearance and maintainability.

[0013] In the cooking device in accordance with an embodiment,
the water droplet penetration preventing part is a groove that is placed so as to face lower extremity of the water droplet dropping part , that opens upward, and that extends laterally.

[0014] In the embodiment, water droplets are dropped from the water droplet dropping part into the groove, and the water can be made to flow along the groove in sideward directions, so that penetration of the water to the inside of the cooking device through the outer edge parts that form the joint part between the main body casing and the front face panel can be prevented.

[0015] In the cooking device in accordance with an embodiment,
the water droplet dropping part extends from opening of the groove into the groove, and wherein
a clearance is provided between the water droplet dropping part and at least one of a groove wall of the one top face part side in the groove and groove bottom of the groove.

[0016] In the embodiment, with the clearance provided between the water droplet dropping part and the groove wall of the one top face part side in the groove, such setting of the clearance between the outer edge part of the one top face part and the groove wall in the groove on the outer edge part of the other top face part as to prevent capillarity prevents water or the like from being sucked upward by the capillarity through the clearance between the groove wall and the water droplet dropping part. Thus penetration of moisture or the like to the inside can be prevented by smooth flow of water droplets along the groove. With the clearance provided between the water droplet dropping part and the groove bottom of the groove, the penetration of water or the like to the inside through the groove can be prevented by a labyrinth structure formed of the groove on the outer edge part of the other top face part and the water droplet dropping part on the outer edge part of the one top face part.

[0017] In the cooking device in accordance with an embodiment,
the groove is inclined so as to have a slope declining toward at least one groove end.

[0018] In the embodiment, water or the like splashed on the groove on the outer edge part of the other top face part from the outside can be lowered along the inclined groove and can be discharged toward at least one groove end, so that prevention of accumulation of the water or the like in the groove and improvement in waterproof performance can be achieved.

[0019] The groove may be inclined so as to have slopes declining from center part thereof toward both the groove ends (two groove ends).

[0020] In the cooking device in accordance with an embodiment,
the outer edge part of the other top face part comprises the water droplet penetration preventing part that guides the water droplets, dropped from the water droplet dropping part, in a direction such that distance from the one top face part increases, and wherein
the water droplet penetration preventing part has a sloping surface that is inclined so as to have a slope declining in the direction in which distance from the one top face part increases.

[0021] In the embodiment, water droplets are dropped from the water droplet dropping part of the one top face part onto the sloping surface of the other top face part, and the water is guided along the sloping surface in the direction such that the distance from the one top face part increases, so that penetration of the water to the inside of the cooking device through the outer edge parts that form the joint part between the main body casing and the front face panel can be prevented.

ADVANTAGEOUS EFFECTS OF INVENTION

[0022] In the cooking device of the invention, water or the like that is splashed on the top face part of one of the main body casing and the front face panel and that comes onto the outer edge part is dropped by the bent water droplet dropping part onto the water droplet penetration preventing part of the outer edge part of the other top face part. The water droplet penetration preventing part prevents flow of water droplets, dropped from the water droplet dropping part, toward the one top face part. Thus the water or the like that is splashed on the top face part of the main body casing or the front face panel can be prevented from penetrating into the cooking device.

[0023] By the invention, accordingly, penetration of moisture or the like to the inside through the outer edge parts that form the joint part between the main body casing and the front face panel can be prevented without use of a seal member that is formed of packing, waterproof cushion or adhesive and that is poor in durability. By the invention, as a result, waterproof performance can reliably be ensured for a long term without deterioration in appearance and maintainability.

BRIEF DESCRIPTION OF DRAWINGS

[0024]

Fig. 1 is a fragmentary side view of an embodiment of a cooking device of the invention;
Fig. 2A is a sectional view showing a structure of a joint part between a cabinet and a control panel in the embodiment;
Fig. 2B is a sectional view showing a modification of structure of the joint part between the cabinet and the control panel in the cooking device;

Fig. 3A is a front view schematically showing shapes of grooves formed on the control panel in the embodiment;

Fig. 3B is a front view schematically showing shapes of a modification of grooves formed on the control panel in the embodiment;

Fig. 4A is a sectional view showing another modification of structure of the joint part between the cabinet and the control panel in the embodiment;

Fig. 4B is a sectional view showing still another modification of structure of the joint part between the cabinet and the control panel in the embodiment;

Fig. 5 is a fragmentary side view of a conventional cooking device; and

Fig. 6 is a sectional view showing a structure of a joint part between a cabinet and a control panel in the conventional cooking device.

DESCRIPTION OF EMBODIMENTS

[0025] Hereinbelow, the invention will be described in detail with reference to embodiments shown in the drawings.

[0026] Fig. 1 is a fragmentary side view partially showing a side face of a cooking device 1 of the invention, and Fig. 2A is an enlarged sectional view of a portion K enclosed by a chain line in Fig. 1 and a fragmentary sectional view showing a joint part between a cabinet 2 and a control panel 7 in the cooking device 1.

[0027] The cooking device 1 is a device of built-in type that is housed in a kitchen unit, though not shown in Fig. 1, and has a cabinet 2 in which an object to be cooked is accommodated, a door 5 that is openably and closably pivoted on bottom end of an opening part 4 of the cabinet 2, and a control panel 7 that is mounted on a top part 6 of the opening part 4 of the cabinet 2. The cabinet 2 has an accommodating part (not shown) in which the object to be cooked is accommodated, and a heating part (not shown) for cooking the object to be cooked that is accommodated in the accommodating part, a power supply part (not shown), and the like are built in inside the cabinet 2. The control panel 7 constitutes an example of a front face panel and the cabinet 2 constitutes an example of a main body casing.

[0028] As shown in Fig. 2A, an outer edge part 11 of a top face part 2A of the cabinet 2 extends to just over an outer edge part 8 of a top face part 7A of the control panel 7. The top face part 7A of the control panel 7 has a groove 10, opening upward, in the outer edge part 8 that forms the joint part for the outer edge part 11 of the top face part 2A of the cabinet 2. The groove 10 forms a water droplet penetration preventing part. The top face part 2A of the cabinet 2 has a bent part 12 that is bent downward generally into shape of an inverted letter L, in the outer edge part 11 that forms the joint part for the outer edge part 8 of the top face part 7A of the control panel 7. The bent part 12 forms a water droplet dropping part and is bent so as to extend from opening of the groove 10 into the groove 10.

[0029] A clearance 13 is provided between groove bottom 10A of the groove 10 on the control panel 7 and the bent part 12 of the cabinet 2. A clearance 15 is provided between the bent part 12 of the cabinet 2 and a groove wall 10B of the cabinet 2 side in the groove 10 on the control panel 7.

[0030] Rear face part 17 of the control panel 7 and front face part 18 of the cabinet 2 are fastened together by screws or the like not shown. As shown in Fig. 2A, the rear face part 17 of the control panel 7 has a protrusion part 20 that partially protrudes upward, and extremity part of the protrusion part 20 is in contact with inside surface of the outer edge part 11 of the cabinet 2.

[0031] A communication hole 21 for interconnection is formed on the rear face part 17 of the control panel 7, and the communication hole 21 for interconnection faces a communication hole 22 for interconnection formed on the front face part 18 of the cabinet 2. Through the communication holes 21, 22 for interconnection, control interconnection (not shown) from the control panel 7 is connected to a control unit for the heating part built in inside the cabinet 2. Power supply interconnection (not shown) from the power supply part built in inside the cabinet 2 is connected through the communication holes 21, 22 for interconnection to electric components 9 built in inside the control panel 7. The electric components 9 are connected to operation parts, display parts, and the like not shown.

[0032] In the cooking device of this embodiment, as shown in a front view of Fig. 3A, the groove bottom 10A of the groove 10 formed on the outer edge part 8 of the control panel 7 is provided with a slope declining from one side end to the other end thereof.

[0033] In case that water or the like spilt by a user and splashed on the top face part 2A of the cabinet 2 comes onto the outer edge part 11 that is the joint part, for instance, in the cooking device 1 of the embodiment, the water or the like can be guided by the bent part 12 into the groove 10, can be made to flow sideward along the groove 10, and thus can be prevented from penetrating to inside of the cooking device 1. The bent part 12 of the cabinet 2 extends into the groove 10 of the control panel 7. Thus the bent part 12 forms a waterproof wall against water that is going to leak out of the groove 10, so that water or the like splashed on the groove 10 of the control panel 7 from outside can be prevented from penetrating through the groove 10 into the cabinet 2. By such setting of the clearance 15 between the bent part 12 of the cabinet 2 and the groove wall 10B of the groove 10 on the control panel 7 as to prevent capillarity, the water or the like is prevented from being sucked upward by the capillarity through the clearance 15 between the groove wall 10B and the bent part 12 and the water can be made to smoothly flow along the groove 10. Thus the penetration of moisture or the like to the inside can be prevented.

[0034] In the cooking device 1 of the embodiment, accordingly, the penetration of water or the like to the inside

through the outer edge parts 11, 8 that form the joint part between the cabinet 2 and the control panel 7 can be prevented without use of a seal member that is formed of packing, waterproof cushion or adhesive and that is poor in durability. In the embodiment, therefore, waterproof performance can reliably be ensured for a long term without deterioration in appearance and maintainability.

[0035] In the cooking device 1 of the embodiment, the clearance 13 is provided between the groove bottom 10A of the groove 10 on the control panel 7 and the bent part 12 of the cabinet 2, and thus the penetration of water or the like to the inside through the groove 10 can be prevented by a labyrinth structure formed of the groove 10 on the control panel 7 and the bent part 12 of the cabinet 2. Extremity 12A of the bent part 12 of the cabinet 2 may be in contact with the groove bottom 10A of the groove 10 on the control panel 7 without the provision of the clearance 13. In this configuration, penetration of water or the like through the groove 10 into the clearance 15 between the bent part 12 and the groove wall 10B can be prevented.

[0036] In the cooking device 1 of the embodiment, the extremity 12A of the bent part 12 of the cabinet 2 is directed toward the groove bottom 10A in the groove 10 as shown in Fig. 2A, and thus users are prevented from coming into contact with and being injured with the extremity 12A. The bent part 12 and the groove wall 10B of the groove 10 on the control panel 7 each have a structure in which a sheet metal is folded to be doubled as shown in Fig. 2A, and thus the extremity 12A of the bent part 12 and extremity 10G of the groove wall 10B each have a curved shape having edges removed. Therefore, there is no fear of injury even if contact with the extremity 12A of the bent part 12 occurs in maintenance.

[0037] In the cooking device 1 of the embodiment, as shown in Fig. 3A, the groove 10 on the control panel 7 has the groove bottom 10A that is inclined so as to have the slope declining from the one side end to the other end thereof. Consequently, water or the like splashed on the groove 10 of the control panel 7 from the outside can be lowered along the groove 10 and can be discharged toward groove end 10C, so that prevention of accumulation of the water or the like in the groove 10 and improvement in the waterproof performance can be achieved. Vertical grooves 7E, 5E connected to the groove end 10C of the groove 10 may be formed on side parts of the control panel 7 and the front open door 5, so that water or the like or liquid such as seasoning may be guided from the groove end 10C into the vertical grooves 7E, 5E and then may be discharged. The vertical groove 7E formed on the side part of the control panel 7 may be provided as an extension of the groove 10 formed on the outer edge part 8 to the side part, and the bent part 12 formed on the outer edge part 11 of the cabinet 2 may be extended to the side part of the cabinet 2 so that the extended bent part 12 may extend in the extended vertical groove 7E. Consequently, the waterproof performance on occasions when water or the like splashes from a lateral side of the control panel 2 can be improved.

[0038] In the groove 10 on the control panel 7, as shown in Fig. 3B, groove bottoms 10A-1 and 10A-2 may be inclined so as to have slopes declining from center thereof in general along direction of extension thereof toward both the ends. In this configuration also, water or the like splashed on the groove 10 of the control panel 7 from the outside can be lowered along the groove bottoms 10A and can be discharged toward the groove ends. Vertical grooves 7E, 7F, 5E, 5F connected to the groove ends of the groove bottoms 10A-1, 10A-2 of the groove 10 may be formed on both side parts of the control panel 7 and the front open door 5, so that the water or the like may be discharged from the groove ends of the groove bottoms 10A-1, 10A-2 into the vertical grooves 7E, 7F, 5E, 5F.

[0039] Though the groove 10 is formed on the control panel 7 and the bent part 12 is formed on the cabinet 2 with one casing member provided as the control panel 7 and the other casing member provided as the cabinet 2 as shown in Fig. 2A in the cooking device 1 of the embodiment, a groove 80 opening upward may be formed on an outer edge part 71 of top face part 72A of a cabinet 72, and a bent part 82 extending from opening of the groove 80 into the groove 80 may be formed on an outer edge part 78 of top face part 77A of a control panel 77 as in an inverted modification shown in Fig. 2B. Though the groove 10 on the control panel 7 is inclined with respect to the sideward direction of the extension in the cooking device 1 of the embodiment, the groove may extend horizontally.

[0040] Fig. 4A shows a section of another modification of structure of the joint part between the cabinet and the control panel in the embodiment. The modification is different from the embodiment described above in that a control panel 87 is provided in place of the control panel 7 shown in Fig. 2A. The modification has the cabinet 2 similar to that of the embodiment described above. The control panel 87 of the modification lacks the groove 10 as the water droplet penetration preventing part, in contrast to the control panel 7. That is, the control panel 87 has a sloping part 90, as the water droplet penetration preventing part, including a curved sloping surface 90A in which an outer edge part 88 of top face part 87A is inclined so as to have a slope declining forward, i.e., in a direction such that distance from the cabinet 2 increases. The bent part 12 as the water droplet dropping part formed on the outer edge part 11 of the top face part 2A of the cabinet 2 extends to just over the sloping part 90 of the outer edge part 88 of the top face part 87A of the control panel 87. A clearance 83 is provided between the extremity 12A of the bent part 12 and the outer edge part 88. A clearance 85 is provided between the bent part 12 of the cabinet 2 and an end wall 88B facing the cabinet 2 in the outer edge part 88 of the control panel 87. A communication hole 89 for interconnection is formed on rear face part 84 of the control panel 87. In each of the extremity 12A of the bent part 12 and extremity 88G of

the end wall 88B, a sheet metal is folded to be doubled and the extremity has a curved shape having edges removed, so that there is no fear that users may be injured upon contact therewith.

[0041] In the modification, water droplets are dropped from the bent part 12 as the water droplet dropping part in the top face part 2A of the cabinet 2 onto the sloping surface 90A of the top face part 87A of the control panel 87, and the dropped water droplets are guided along the sloping surface 90A in a direction such that distance from the top face part 2A of the cabinet 2 increases, that is, in a forward direction. This prevents penetration of the water to the inside of the cooking device through the outer edge parts 88, 11 that form the joint part between the cabinet 2 as the main body casing and the control panel 87 as the front face panel. Though the sloping surface 90A as the water droplet penetration preventing part is curved in the modification, a planar sloping surface that is not curved may be substituted therefor.

[0042] Fig. 4B shows a section of still another modification of structure of the joint part between the cabinet and the control panel in the embodiment. The modification is different from the modification shown in Fig. 2B in that a cabinet 91 is provided in place of the cabinet 72 shown in Fig. 2B. The modification has the control panel 77 similar to that in the modification of Fig. 2B.

[0043] The cabinet 91 of the modification lacks the groove 80 as the water droplet penetration preventing part, in contrast to the cabinet 72 of Fig. 2B. That is, the cabinet 91 has a sloping part 93, as the water droplet penetration preventing part, including a sloping surface 93A in which an outer edge part 92 of top face part 91A is inclined so as to have a slope declining backward, i.e., in a direction such that distance from the control panel 77 increases. The bent part 82 as the water droplet dropping part formed on the outer edge part 78 of the top face part 77A of the control panel 77 extends to just over the sloping surface 93A of the top face part 91A of the cabinet 91. In the modification, water droplets are dropped from the bent part 82 of the top face part 77A of the control panel 77 onto the sloping surface 93A of the top face part 91A of the cabinet 91, and the dropped water droplets are guided along the sloping surface 93A in a direction such that distance from the top face part 77A of the control panel 77 increases, that is, in a backward direction. This prevents penetration of the water to the inside of the cooking device through the outer edge parts 78, 94 that form the joint part between the cabinet 91 as the main body casing and the control panel 77 as the front face panel.

[0044] The invention can be applied to cooking devices such as microwave oven, steam cooker and combination microwave and oven and can be applied not only to cooking devices of built-in type that are housed under kitchen counters but also to cooking devices that are independently used alone.

REFERENCE SIGNS LIST

[0045]

1 cooking device.
2, 72, 91 cabinet
2A, 72A, 91A top face part
4 opening part
5 door
5E, 5F vertical groove
6 top part
7, 77, 87 control panel
7A, 77A, 87A top face part
7E, 7F vertical groove
8, 78, 88 outer edge part
9 electric component
10, 80 groove
10A, 10A-1, 10A-2 groove bottom
10B groove wall
10C, 10D groove end
10G extremity
11, 71, 94 outer edge part
12, 82 bent part
12A extremity
13, 15, 83, 85 clearance
17 rear face part
20 protrusion part
21, 22 communication hole for interconnection
90, 93 sloping part
90A, 93A sloping surface

Claims

1. A cooking device comprising:

a main body casing (2, 72, 91) having a top face part (2A, 72A, 91A), and
a front face panel (7, 77, 87) having a top face part (7A, 77A, 87A) that is connected to the top face part (2A, 72A, 91A) of the main body casing (2, 72, 91) and having electric components (9) inside, wherein
one top face part (2A, 77A) of the top face part (2A, 72A, 91A) of the main body casing (2, 72, 91) and the top face part (7A, 77A, 87A) of the front face panel (7, 77, 87) has an outer edge part (11, 78) that extends to just over an outer edge part (8, 71, 88, 94) of the other top face part (7A, 72A, 87A, 91A) of the top face part (2A, 72A, 91A) of the main body casing (2, 72, 91) and the top face part (7A, 77A, 87A) of the front face panel (7, 77, 87), wherein
the outer edge part (11, 78) of the one top face part (2A, 77A) includes a water droplet dropping part (12, 82) bent downward, and wherein
the outer edge part (8, 71, 88, 94) of the other top face part (7A, 72A, 87A, 91A) has a water

droplet penetration preventing part (10, 80, 90, 93) that prevents flow of water droplets dropped from the water droplet dropping part (12, 82) toward the one top face part (2A, 77A).

2. The cooking device as claimed in Claim 1, wherein the water droplet penetration preventing part (10, 80) is a groove (10, 80) that is placed so as to face lower extremity (12A) of the water droplet dropping part (12, 82), that opens upward, and that extends laterally.

3. The cooking device as claimed in Claim 2, wherein the water droplet dropping part (12, 82) extends from opening of the groove (10, 80) into the groove (10, 80), and wherein
a clearance (13, 15) is provided between the water droplet dropping part (12, 82) and at least one of a groove wall (10B) of the one top face part (2A, 77A) side in the groove (10, 80) and groove bottom (10A) of the groove (10, 80).

4. The cooking device as claimed in Claim 2 or 3, wherein the groove (10, 80) is inclined so as to have a slope declining toward at least one groove end (10C, 10D).

5. The cooking device as claimed in Claim 1, wherein the outer edge part (88, 94) of the other top face part (87A, 91A) comprises the water droplet penetration preventing part (90, 93) that guides the water droplets, dropped from the water droplet dropping part (12, 82), in a direction such that distance from the one top face part (2A, 77A) increases, and wherein the water droplet penetration preventing part (90, 93) has a sloping surface (90A, 93A) that is inclined so as to have a slope declining in the direction in which distance from the one top face part (2A, 77A) increases.

Fig.1

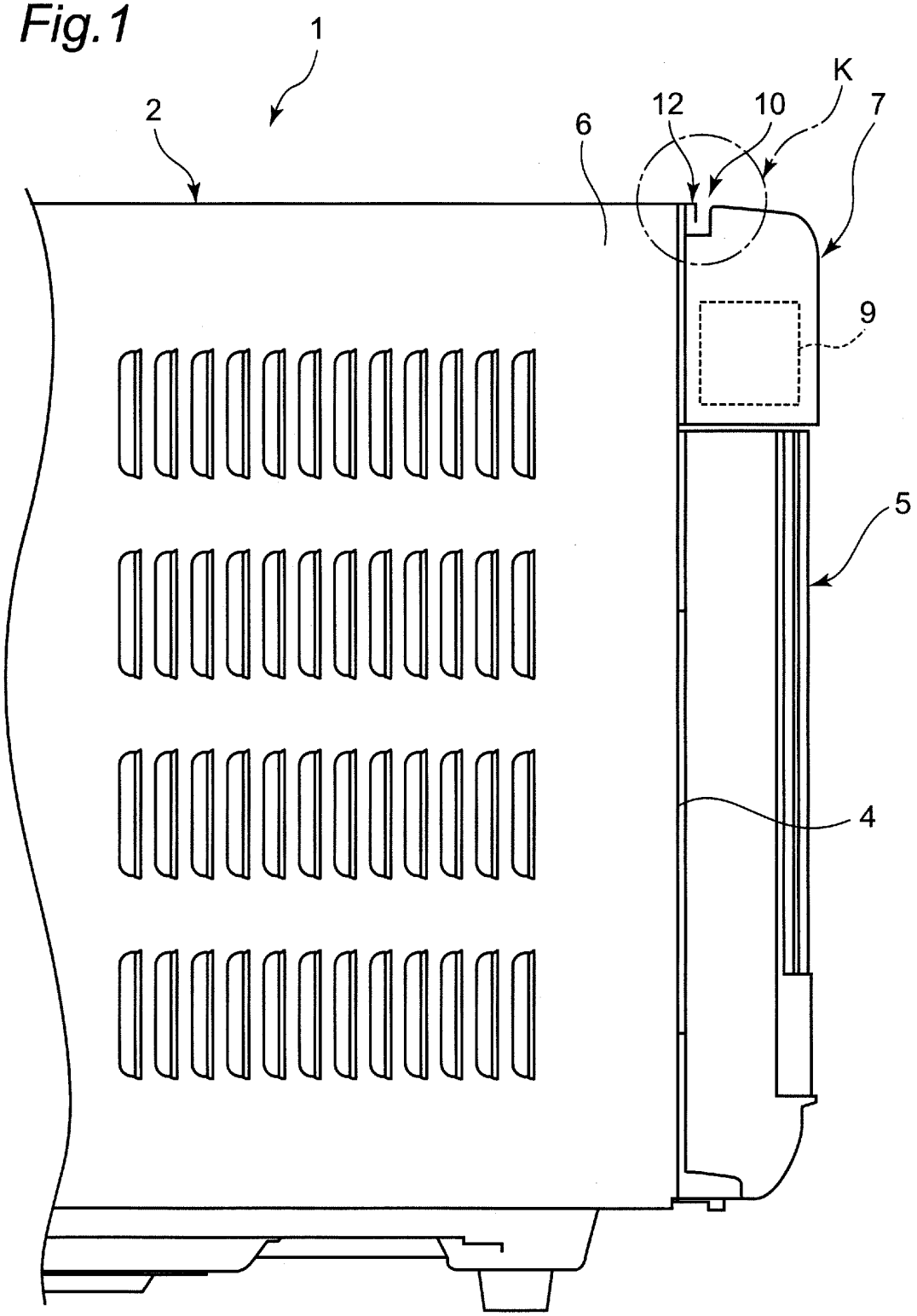


Fig.2A

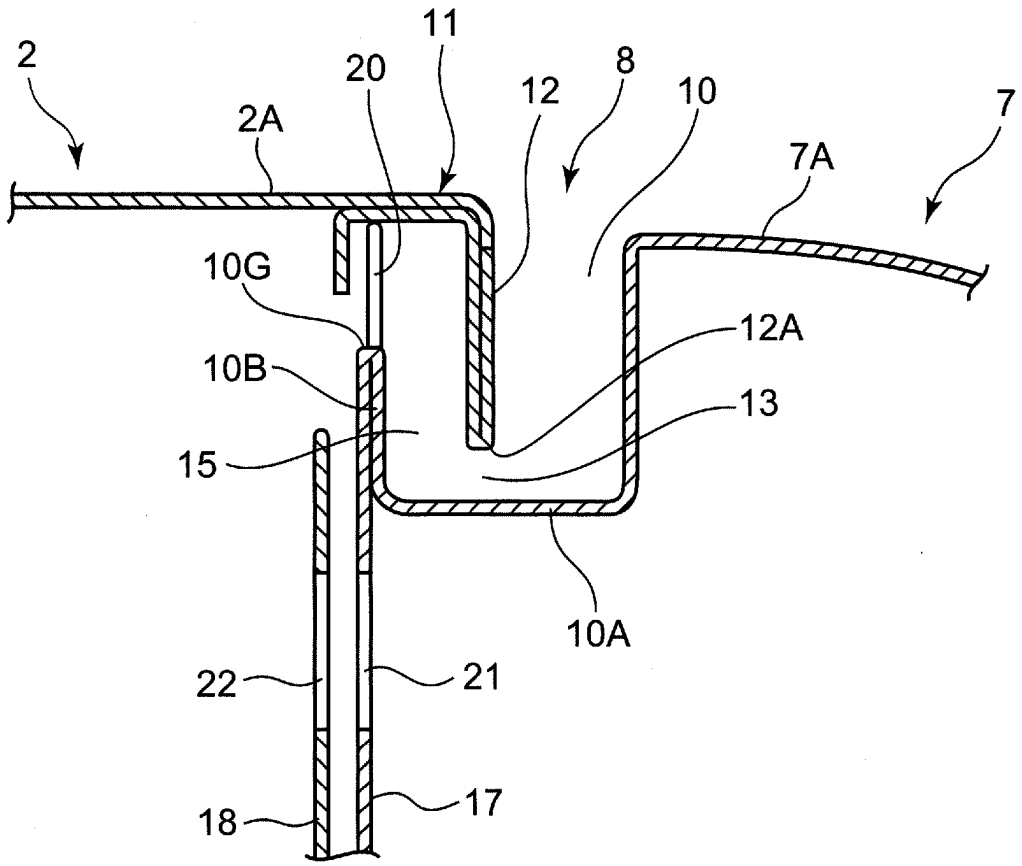


Fig.2B

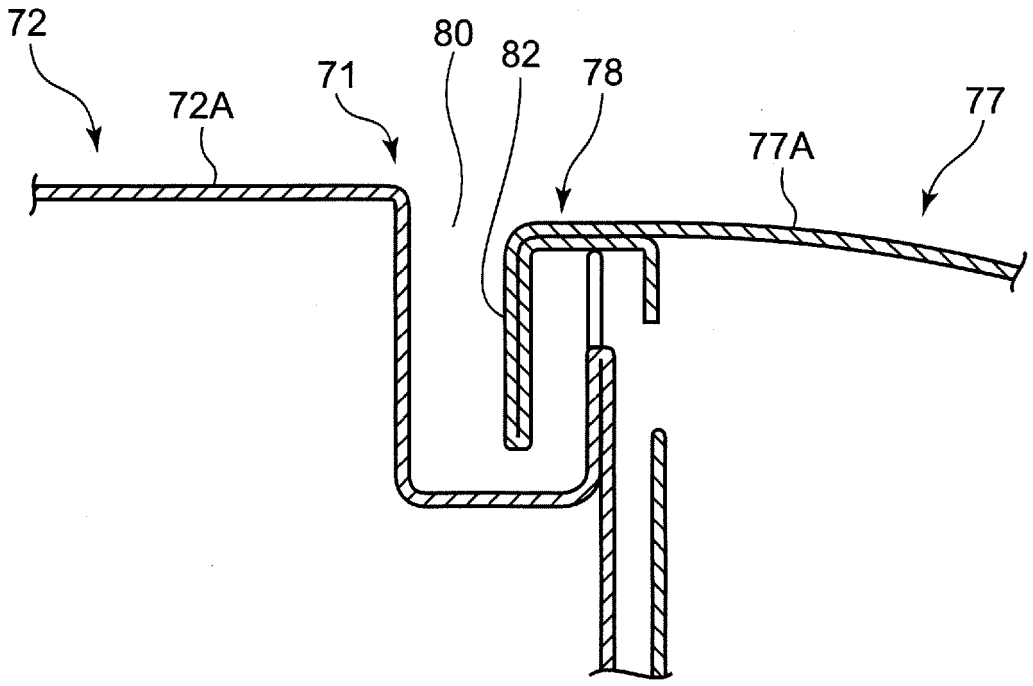


Fig.3A

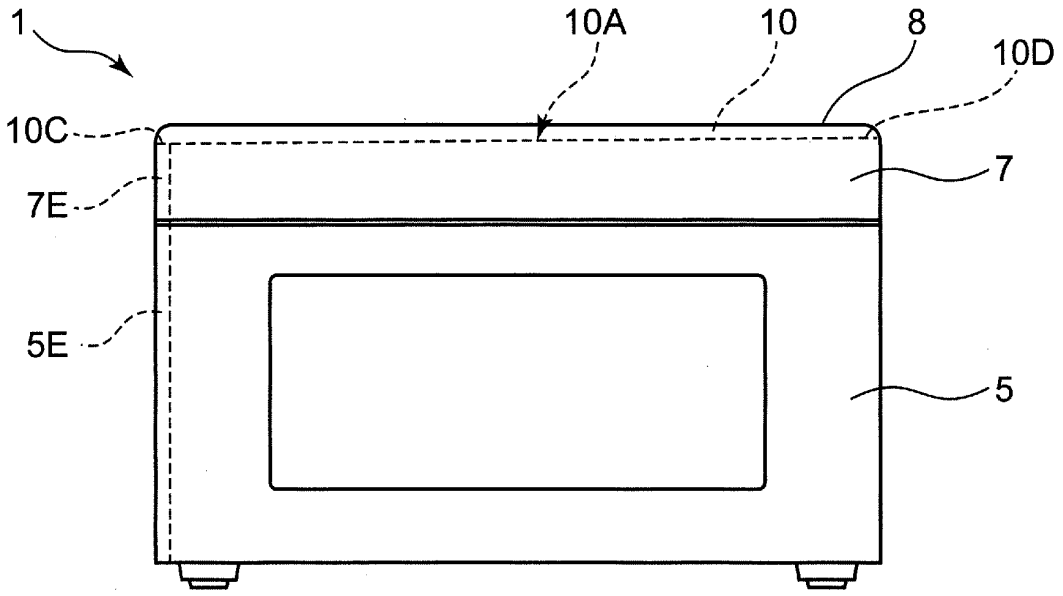


Fig.3B

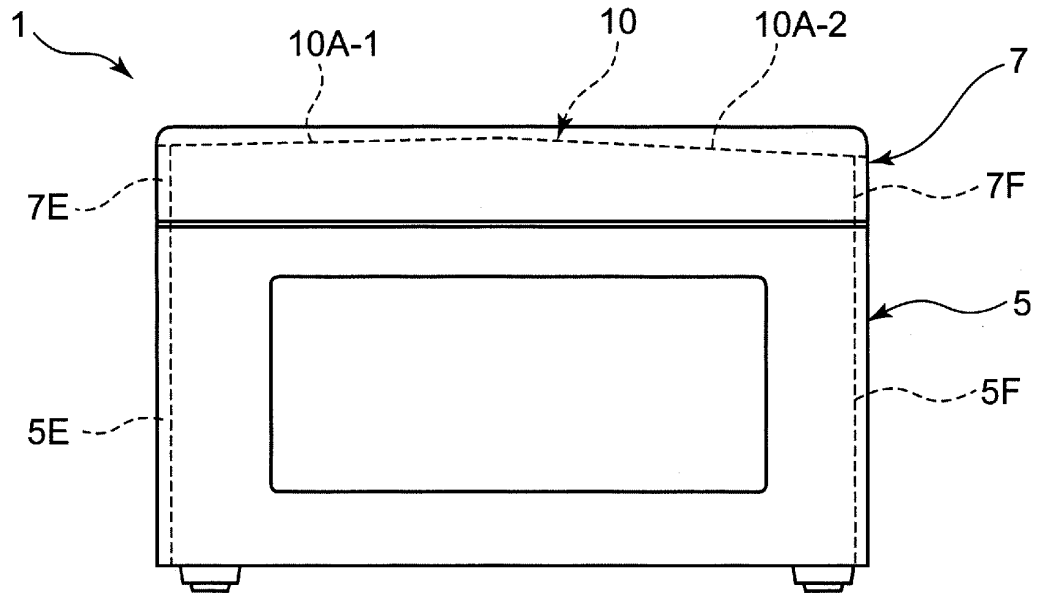


Fig.4A

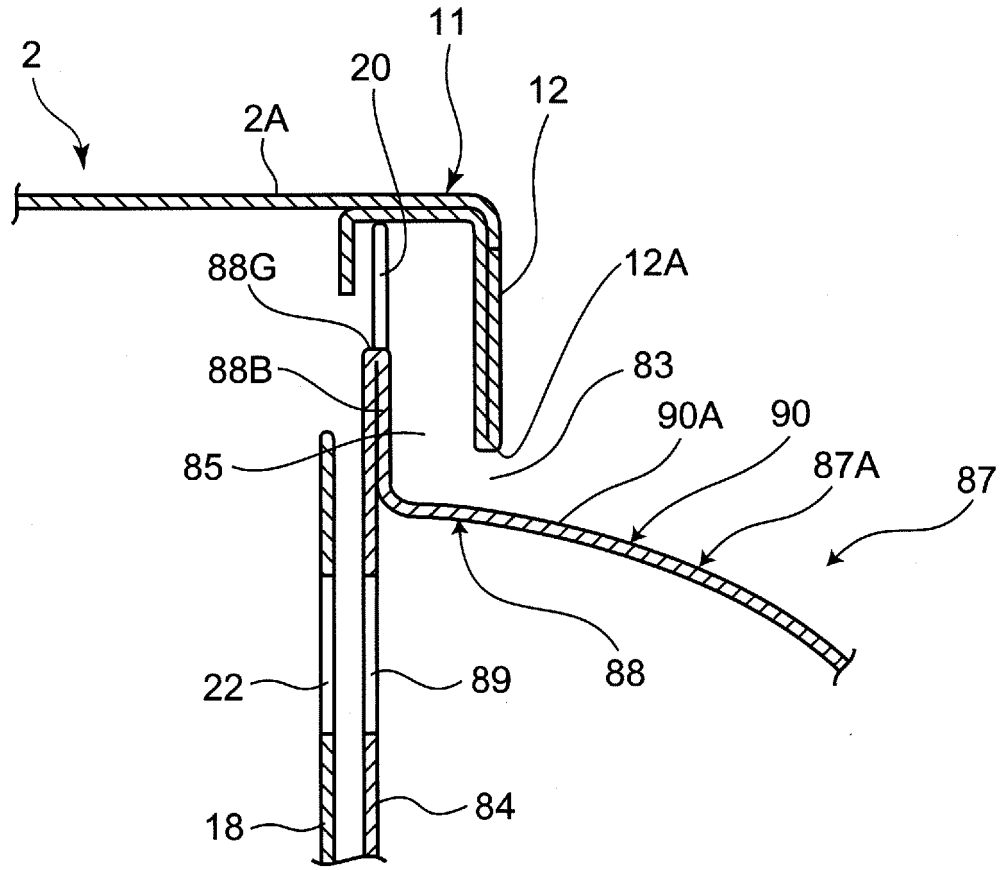


Fig.4B

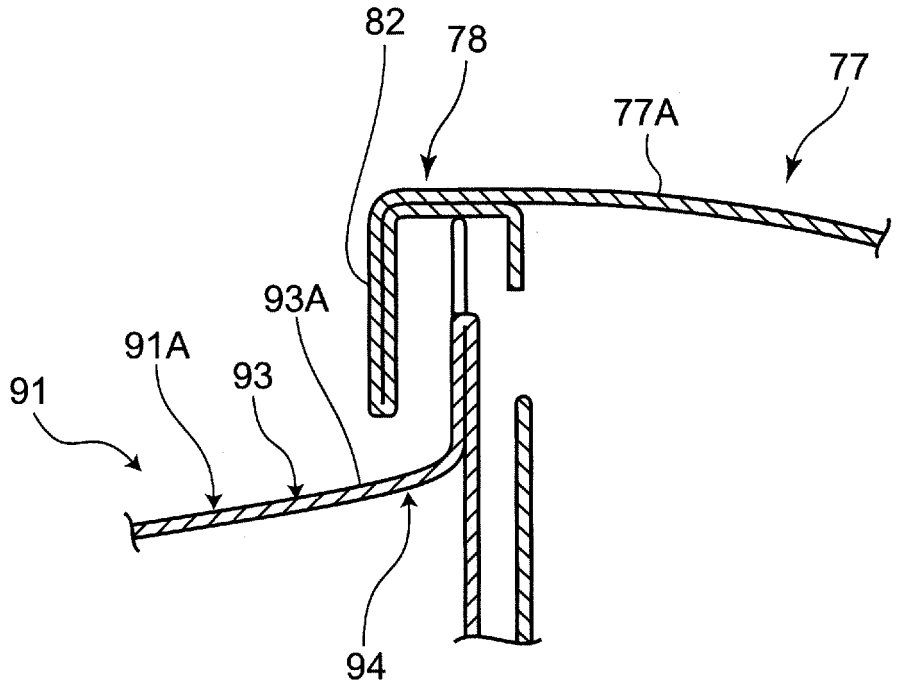


Fig.5 PRIOR ART

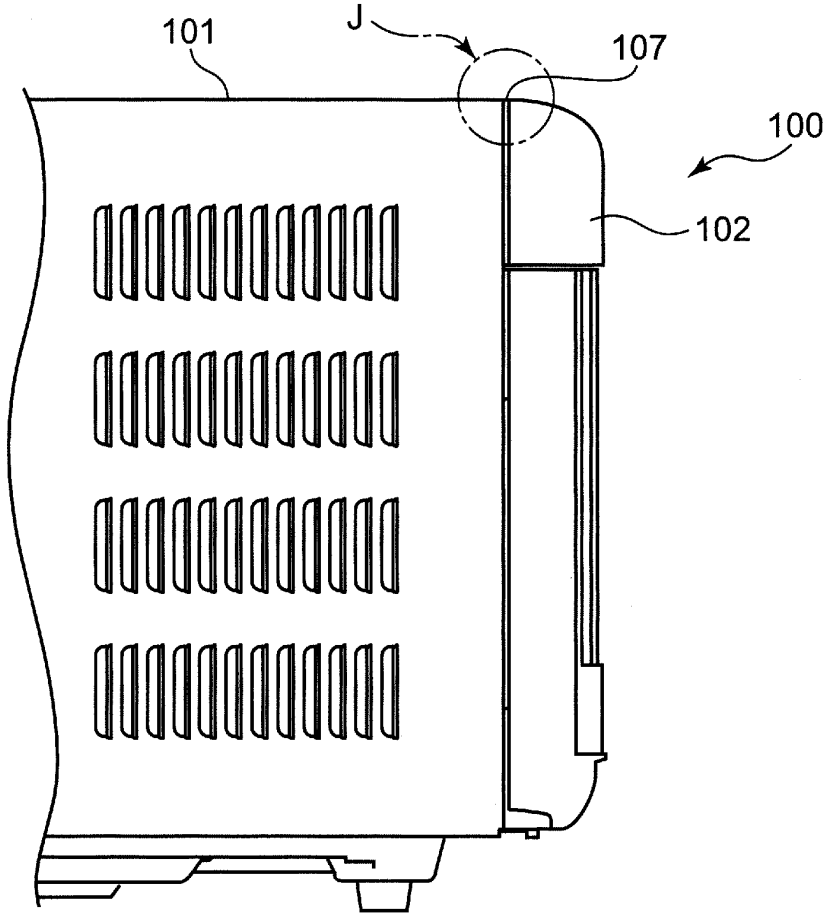
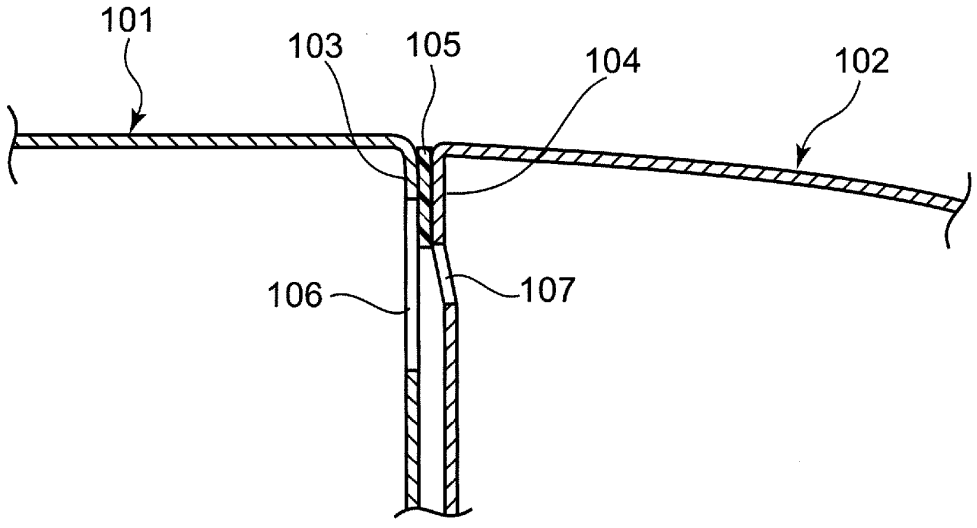


Fig.6 PRIOR ART



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/074388

A. CLASSIFICATION OF SUBJECT MATTER
F24C15/10(2006.01)i, *F24C7/02*(2006.01)i, *F24C7/04*(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)
F24C15/10, F24C7/02, F24C7/04

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.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 197274/1985(Laid-open No. 105402/1987) (Matsushita Electric Industrial Co., Ltd.), 06 July 1987 (06.07.1987), entire text (Family: none)	1-5
A	JP 63-153331 A (Matsushita Electric Industrial Co., Ltd.), 25 June 1988 (25.06.1988), entire text (Family: none)	1-5

☒ 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
09 November, 2011 (09.11.11)	22 November, 2011 (22.11.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/074388

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 165772/1978(Laid-open No. 81609/1980) (Matsushita Electric Industrial Co., Ltd.), 05 June 1980 (05.06.1980), entire text (Family: none)	1-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 22854/1986(Laid-open No. 138107/1987) (Toshiba Corp.), 31 August 1987 (31.08.1987), entire text (Family: none)	1-5

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2000012209 A **[0008]**