



(11) **EP 3 714 755 A1**

(12) **EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**30.09.2020 Bulletin 2020/40**

(51) Int Cl.:  
**A47L 15/42<sup>(2006.01)</sup>**

(21) Application number: **19735894.8**

(86) International application number:  
**PCT/KR2019/000179**

(22) Date of filing: **07.01.2019**

(87) International publication number:  
**WO 2019/135643 (11.07.2019 Gazette 2019/28)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**  
Designated Validation States:  
**KH MA MD TN**

(72) Inventors:  
• **KIM, Jindoo**  
**Suwon-si, Gyeonggi-do 16677 (KR)**  
• **LEE, Kisu**  
**Suwon-si, Gyeonggi-do 16677 (KR)**

(30) Priority: **08.01.2018 KR 20180002299**

(74) Representative: **Gulde & Partner**  
**Patent- und Rechtsanwaltskanzlei mbB**  
**Wallstraße 58/59**  
**10179 Berlin (DE)**

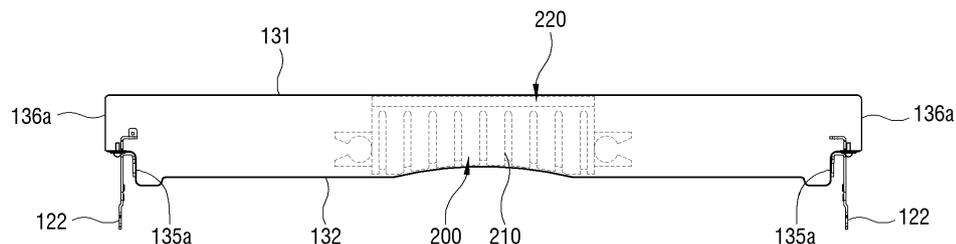
(71) Applicant: **Samsung Electronics Co., Ltd.**  
**Gyeonggi-do 16677 (KR)**

(54) **DISHWASHER**

(57) Disclosed is a dishwasher capable of preventing distortion of a door. The dishwasher includes: a main body including a dish washing compartment having a dish entrance, and a door including an outer panel and an inner panel arranged with a space therebetween to open and close the dish entrance, the door including a panel-movement preventing member in the space between the outer panel and the inner panel to prevent rel-

ative movement between the outer panel and the inner panel. In the dishwasher according to the disclosure, the panel-movement preventing member is inserted in between the inner and outer panels of the door to prevent the relative movement between the inner and outer panels, thereby preventing the distortion into a diamond shape, strengthening a door structure, and preventing leakage due to the distortion.

**FIG. 5**



**EP 3 714 755 A1**

**Description**

## [TECHNICAL FIELD]

**[0001]** The disclosure relates to a dishwasher, and more particularly to a door of a dishwasher, which has a panel-movement preventing structure for preventing distortion.

## [BACKGROUND ART]

**[0002]** A door of a dishwasher is shaped like a box, of which an inner panel and an outer panel are coupled leaving a space therebetween by a side panel to accommodate various parts such as a control circuit board, wiring, etc. therein. In this case, the door is blocked in frontward, backward, leftward, rightward, and upward directions except a downward direction, and is hollow inside. In particular, the dishwasher mostly employs a lower hinged structure for opening and closing the door to be tilted up and down, and thus a load is focused on a lower portion when the door is opened and closed.

**[0003]** Such a door, which is hollow inside, in particular, shaped like a box opened downward, is deformed from a rectangular shape to a diamond shape, i.e. distorted because the inner and outer panels move relative to each other as the load of the door is focused on the lower portion when the door is opened to be tilted up and down.

**[0004]** In particular, the inner panel and the outer panel of the door need to be separated from each other to replace and repair internal parts. Thus, the inner panel and the outer panel are coupled to be detachable from each other. Such detachable coupling between the inner panel and the outer panel causes the distortion of the door due to the relative movement between the inner and outer panels.

**[0005]** Further, a door in a large-sized dishwasher has a large area, and is thus more vulnerable to the distortion caused by the relative movement between the inner and outer panels.

**[0006]** The distortion in the door of the dishwasher not only precludes the door from being smoothly opened and closed, but also causes water to leak during the operation of the dishwasher and consumers to be dissatisfied with durability.

## [TECHNICAL PROBLEM]

**[0007]** An aspect of the disclosure is to solve the conventional problems described above, and provide a dishwasher with a simple structure for preventing a door from being distorted by relative movement between inner and outer panels.

## [TECHNICAL SOLUTION]

**[0008]** According to an embodiment of the disclosure, there is provided a dishwasher. The dishwasher includes

a main body including a dish washing compartment with a dish entrance, and a door including an outer panel and an inner panel arranged with a space therebetween to open and close the dish entrance, the door including a panel-movement preventing member in the space between the outer panel and the inner panel to prevent relative movement between the outer panel and the inner panel. In the dishwasher according to the disclosure, the panel-movement preventing member strongly supports the inner panel and the outer panel, thereby preventing the door from being distorted.

**[0009]** The panel-movement preventing member may be placed in a lower portion of the door.

**[0010]** The panel-movement preventing member may be placed including a middle portion of the door.

**[0011]** The inner panel may include a recessed portion formed in a lower portion and recessed toward the outer panel, and the panel-movement preventing member may be placed inside a lower edge of the recessed portion.

**[0012]** The panel-movement preventing member may include a panel holding block including an inner panel supporter supported on the inner panel, and an outer panel supporter supported on the outer panel.

**[0013]** The panel holding block may include two or more panel holding blocks separately placed between the inner panel and the outer panel.

**[0014]** The door may include a support bracket transversely disposed between the inner panel and the outer panel, and the panel holding block may include a middle holding block supporting the inner panel and a middle of the support bracket, and one pair of outer holding blocks respectively supporting the support bracket and opposite sides of the outer panel.

**[0015]** The door may include a lateral side connecting the inner panel and the outer panel, and the outer holding block may include a lateral contact portion being in surface contact with the lateral side.

**[0016]** The dishwasher may further include a tub protruding upward from a bottom of the dish washing compartment to prevent washing water from overflowing, and the panel holding block may include a tub avoider to avoid interference with the tub when the door is tilted.

**[0017]** The door may include one pair of lateral sides connecting opposite sides of the inner panel and the outer panel, and the panel-movement preventing member may include an inclined support holder supported on at least one position of the inner panel, inclinedly extended outward from the support position of the inner panel, and supporting the lateral sides and the outer panel therebetween.

**[0018]** The panel-movement preventing member may include a panel middle supporter supporting middles of the outer panel and the inner panel.

**[0019]** The inclined support holder may include a bending supporter being in surface contact with the inner panel or the lateral side.

**[0020]** The inclined support holder may include an inner panel supporter attached to the inner panel, and an

inclined supporter bent and inclinedly extended from the inner panel supporter.

**[0021]** The inclined supporter may be extended with a gradually expanded width.

**[0022]** The door may include a support bracket transversely disposed between the inner panel and the outer panel, and a lateral side connecting the inner panel and the outer panel, and the panel-movement preventing member may include an inclined support holder supported on at least one position of the support bracket, inclinedly extended outward from the support position, and supporting the lateral sides and the outer panel therebetween.

**[0023]** The inclined support holder may include a bracket supporter attached to the support bracket, and an inclined supporter bent and inclinedly extended from the bracket supporter.

**[0024]** The inclined supporter may be extended with a gradually expanded width.

**[0025]** The bracket supporter may be folded up to decrease the extended length.

**[0026]** According to another embodiment of the disclosure, a dishwasher includes a main body including a dish washing compartment with a dish entrance, and a door including an outer panel and an inner panel arranged with a space therebetween to open and close the dish entrance, the door including a hinge unit configured to open and close the dish entrance, a support bracket supporting the hinge unit, and a panel-movement preventing member supported on the support bracket and the outer panel or the inner panel and preventing relative movement between the outer panel and the inner panel.

**[0027]** According to still another embodiment of the disclosure, a dishwasher includes a main body including a dish washing compartment with a dish entrance, and a door including an outer panel and an inner panel arranged with a space therebetween to open and close the dish entrance, the door including an inner-side holding block attached to the inner panel, and an outer-side holding block attached to the outer panel within the space, the inner-side holding block and the outer-side holding block including concave and convex portions at opposite portions to be detachably coupled to each other.

#### [ADVANTAGEOUS EFFECTS]

**[0028]** As described above, a dishwasher according to the disclosure includes a panel-movement preventing member installed inside a door and preventing relative movement between an inner panel and an outer panel, thereby easily preventing the door from being distorted. In result, the dishwasher is not only recognized by a user as a durable dishwasher, but also has an effect on preventing a water leakage caused by the distortion of the door.

#### [DESCRIPTION OF DRAWINGS]

#### [0029]

5 FIG. 1 is a perspective view of a dishwasher according to an embodiment of the disclosure.

FIG. 2 is a front view showing a door structure of a dishwasher according to an embodiment of the disclosure.

10 FIG. 3 is an exploded perspective view showing a door structure of a dishwasher according to an embodiment of the disclosure.

FIG. 4 is a cross-sectional view taken along line A-A in FIG. 2.

15 FIG. 5 is a cross-sectional view showing that a panel-movement preventing member according to a first embodiment of the disclosure is mounted to a door.

FIG. 6 is a perspective view of the panel-movement preventing member according to the first embodiment of the disclosure.

20 FIG. 7 is a partial cross-sectional view showing that the panel-movement preventing member according to the first embodiment of the disclosure is mounted to a door.

25 FIG. 8 is a cross-sectional view showing that a panel-movement preventing member according to a second embodiment of the disclosure is mounted to a door.

30 FIG. 9 is a cross-sectional view showing that a panel-movement preventing member according to a third embodiment of the disclosure is mounted to a door.

35 FIG. 10 is a cross-sectional view showing that a panel-movement preventing member according to a fourth embodiment of the disclosure is mounted to a door.

FIG. 11 is a cross-sectional view showing that a panel-movement preventing member according to a fifth embodiment of the disclosure is mounted to a door.

40 FIG. 12 is a perspective view of an inclined support holder of the panel-movement preventing member according to the fifth embodiment of the disclosure.

FIG. 13 is a perspective view of the inclined support holder of FIG. 12 in a folded-up state.

45 FIG. 14 is a perspective view of a different inclined support holder.

FIG. 15 is a cross-sectional view showing that a panel-movement preventing member according to a sixth embodiment of the disclosure is mounted to a door.

#### [BEST MODE]

50 **[0030]** Below, embodiments of the disclosure will be described in detail with reference to accompanying drawings, to be easily carried out by a person having an ordinary skill in the art. The disclosure may be embodied in various different forms, and not limited to the embodiment set forth herein. For clarity of description, like nu-

merals refer to like elements throughout.

**[0031]** Below, main operations of a dishwasher according to the disclosure and features of elements included in the dishwasher will be described in detail.

**[0032]** As shown in FIG. 1, a dishwasher 1 according to the disclosure includes a main body 100 internally formed with a washing compartment 110 opened forward, and a door 130 mounted to the front of the main body 100 and tiltable up and down to open and close the washing compartment 110.

**[0033]** Inside the washing compartment 110, dish baskets 112a and 112b for accommodating dishes or the like are provided up and down. Further, to spray washing water toward the dishes accommodated in the dish baskets 112a and 112b, a stationary spray nozzle 113a is provided in an inner upper portion of the washing compartment 110, and rotary spray nozzles 113b and 113c are respectively provided in middle and lower portions of the washing compartment 110. Further, a water supply pipe 115 with a water-supply control valve 114 is provided in the back of the washing compartment 110, so that washing water can be supplied to the inside of the washing compartment 110 at an initial stage.

**[0034]** Under the washing compartment 110, a washing pump 116 is provided to press and supply the washing water toward the spray nozzles 113a, 113b and 113c inside the washing compartment 110. Further, a water collector 117 recessed at a predetermined depth to collect the washing water and sewage is formed in a lower portion of the washing compartment 110, and the water collector 117 is provided with a filter 118 to filter out cleaned sewage. An intake pipe 119 is connected between the washing pump 116 and the water collector 117 to circulate the washing water filtered through the filter 118, a drain pump 120 is provided under the water collector 117 to drain washing water after finishing a washing operation, and a drain pipe 121 is extended from the drain pump 120 toward the outside of the main body 100.

**[0035]** As shown in FIG. 4, the door 130 is coupled to opposite front lower sides of the main body 100 by one pair of hinge units 122. The one pair of hinge units 122 are respectively provided in the lower opposite sides of the door 130. As shown in FIG. 3, the hinge unit 122 includes a portion 124a supported on a first lateral wall 135a of an inner panel 132 of the door 130, a portion 124b supported on a first coupling projection 135b of the door 130, a portion 124c supported on a support bracket 140, and a tilting lever 124d bent and extended backward from the portion 124c supported on the support bracket 140.

**[0036]** Further, a buffer spring 125 is provided in a lower inner portion of the main body 100 and allows the door 130 to be easily opened and closed. The buffer spring 125 connects a spring holder 126 provided in a lower inner portion of the main body 100 and the end of the tilting lever 124d of the hinge unit 122. The buffer spring 125 prevents the door 130 from being suddenly opened when a user opens the door 130, and allows the door

130 to be easily closed with less force.

**[0037]** Further, as shown in FIG. 3, the door 130 is formed by an outer panel 131 and the inner panel 132 which are detachably coupled to each other. Although it is not illustrated in detail in the drawings, the front of the door 130 (i.e. the front of the outer panel) is provided with a control portion which includes a plurality of control buttons for controlling device operations, a display for displaying operation states, etc. Further, the door 130 is internally provided with wiring for electric connection with the control circuit board associated with the control portion on the front of the door 130.

**[0038]** The outer panel 131 and the inner panel 132 are separately provided and assembled into the door 130. The assembled door 130 includes a first lateral side 135 of the inner panel 132 and a second lateral side 136 of the outer panel. As shown in FIG. 3, the first lateral side 135 of the inner panel 132 includes the first lateral wall 135a bent and extended backward from the left, right and upper edges of the inner panel 132, and a first coupling projection 135b transversely bent and extended from the first lateral wall 135a. The second lateral side 136 includes a second lateral wall 136a bent and extended forward from the left, right and upper edges of the outer panel 131, and a second coupling projection 136b transversely bent and extended again from the second lateral wall 136a. The outer panel 131 and the inner panel 132 are coupled in a state that the first coupling projection 135b and the second coupling projection 136b are overlapped. The first coupling projection 135b and the second coupling projection 136b to be overlapped with each other include a plurality of screw holes 138a and 138b in corresponding portions to be fastened by screw and nuts. Of course, the door 130 may include the outer panel 131 and the inner panel 132 which are formed as a single body.

**[0039]** The inner panel 132 of the door 130 includes a recessed portion 137 positioned in a lower portion thereof and recessed toward the outer panel 131. The recessed portion 137 not only reinforces the structural strength of the door 130 but also used as a space expanded from the interior of the washing compartment 110. A space between the bottom of the recessed portion 137 and the outer panel 131 is narrow, but a space between an edge 139 surrounding the recessed portion 137 and the outer panel 131 is wide.

**[0040]** According to an embodiment of the disclosure, a panel-movement preventing member 200 is placed in a lower portion of the door 130. Further, the panel-movement preventing member 200 is placed including a middle portion of the door 130. The panel-movement preventing member 200 is interposed between the inner panel 132 and the outer panel 131 of the door 130. In particular, the panel-movement preventing member 200 is provided in a middle position of the edge 139 below the recessed portion 137 of the inner panel 132. The panel-movement preventing member 200 firmly holds and supports the inner sides of the inner panel 132 and

the outer panel 131, and prevent the relative movement between the inner panel 132 and the outer panel 131. Effects on preventing the distortion of the door become better when the panel-movement preventing member 200 is extended from the lower middle portion of the door 130 in a transverse direction as long as possible. However, the wiring extended upward from the lower portion needs to be placed inside the door 130, and therefore the panel-movement preventing member 200 may have a length corresponding to one third of the transverse width of the door 130. Alternatively, the panel-movement preventing member 200 may be formed as long as possible and include a wiring through hole (not shown).

**[0041]** When the door 130 is distorted, the highest portion of the door 130, in which the control portion is positioned, is most affected by the distortion. Therefore, when a force of distorting the product is applied, the door 130 is easily distorted being deformed from a generally rectangular shape into a diamond shape. To solve this problem, it is effective to hold the middle portions of the inner panel 132 and the outer panel 131 assembled into the door 130 like an embodiment of the disclosure, rather than the opposite end portions (i.e. the hinge portions) of the door 130.

**[0042]** The panel-movement preventing member 200 may be provided as at least one panel holding block having surfaces which are in contact with and hold the inner surfaces of the outer panel 131 and the inner panel 132. Here, at least one panel holding block may be provided as a single body or an assembled body.

**[0043]** FIG. 5 is a cross-sectional view showing a mounted state of the panel-movement preventing member 200, FIG. 6 is a perspective view of the panel-movement preventing member 200 according to the first embodiment of the disclosure, and FIG. 7 is a partial cross-section view showing the mounted state of the panel-movement preventing member 200.

**[0044]** The panel-movement preventing member 200 includes an inner-side holding block 210 and an outer-side holding block 220 which are separately provided and assembled by concave and convex structures. Contact surfaces between the inner-side holding block 210 and the inner panel 132 and between the outer-side holding block 220 and the outer panel 131 may be properly set as necessary.

**[0045]** The panel-movement preventing member 200 may include the inner-side holding block 210 and the outer-side holding block 220 as shown in FIG. 6. The inner-side holding block 210 and the outer-side holding block 220 may be manufactured by plastic injection molding, but may alternatively be manufactured by a metal plate only or combination of the metal plate and the plastic.

**[0046]** The inner-side holding block 210 includes an inner panel supporter 212 supported on the inner panel 132, at least one concave portion 214 formed on the opposite side to the inner panel supporter 212, a tub avoider 216 concavely and transversely formed in a lower portion

of the door, and a wiring holder 218 protruding at opposite sides.

**[0047]** The inner panel supporter 212 is attached to a lower middle inner surface (i.e. a convexly protruding portion) of the inner panel 132 by a screw or adhesive (or glue).

**[0048]** The at least one concave portion 214 receives and couples with a convex portion 224 of the outer-side holding block 220 (to be described later). The coupling between the inner-side holding block 210 and the outer-side holding block based on the concave and convex structures is needed to disassemble the inner panel 132 and the outer panel 131 to replace or repair the parts.

**[0049]** The wiring holder 218 is configured to arrange and hold the wiring extended upward from the lower portion inside the door 130. The wiring holder 218 includes first to third holding protrusions 217-1, 217-2 and 217-3 protruding from the opposite sides. The second and third holding protrusions 217-2 and 217-3 are spaced apart from each other in a transverse direction, and the first holding protrusion 217-1 is spaced apart from the middle between the second and third holding protrusions 217-2 and 217-3 in a direction perpendicular to the transverse direction. The first to third holding protrusions 217-1, 217-2 and 217-3 include wiring-accommodating grooves 219 on the surfaces facing each other to accommodate the wiring. The wiring is inserted and held in the wiring-receiving grooves 219 positioned in a space between the first to third holding protrusions 217-1, 217-2 and 217-3. The wiring holder 218 is not limited to the foregoing three holding protrusions, but may include two or more than four protrusions. Alternatively, the wiring holder 218 may be based on a wire directly compressing or binding the wiring with the spring and the like elastic body instead of fitting the wiring between the first to third holding protrusions 217-1, 217-2 and 217-3.

**[0050]** The tub avoider 216 refers to a groove for avoiding interference with a tub 128 protruding from the bottom of the washing compartment 110 when the door 130 is tiltably opened and closed. The tub 128 in the lower portion of the washing compartment 110 refers to a protrusion to prevent the washing water used in the washing process from leaking outside. The tub avoider 216 is lengthwise elongated in the lower portion of the inner-side holding block 210.

**[0051]** The outer-side holding block 220 includes an outer panel supporter 222 being in contact with and supported on the outer panel 131, and at least one convex portion 224 protruding from the side opposite to the outer panel supporter 222. The outer panel supporter 222 is attached to a lower middle inner surface of the outer panel 131 by a screw or adhesive (or glue). The at least one convex portion 224 is inserted in the at least one concave portion 214 of the inner-side holding block 210.

**[0052]** As described above, the panel-movement preventing member 200 connects and holds the inner surfaces of the inner panel 132 and the outer panel 131 to effectively reinforce the strength of the door 130, thereby

maximizing convenience in use of the dishwasher, such as stable closure, prevention of leakage due to distortion, etc.

**[0053]** According to an alternative embodiment, the panel-movement preventing member 200 may be formed as a single body of the panel holding block, and have opposite surfaces facing the inner surfaces of the inner panel 132 and the outer panel 131, both of which are attached by adhesive. However, the continuous function of the panel-movement preventing member 200 is not expected when the product is repaired or unavoidably disassembled. Therefore, the panel-movement preventing member 200 may have a fastening structure, for example, a magnet, a hook, and the like easily detachable from one of the inner panel 132 and the outer panel 131.

**[0054]** FIG. 8 is a cross-sectional view showing that the panel-movement preventing member 300 according to a second embodiment of the disclosure is mounted to a door. The panel-movement preventing member 300 includes a middle holding block 310 placed in a lower middle portion of the door 130, and one pair of outer holding blocks 320 and 330 respectively placed in lower opposite sides of the door 130. The middle holding block 310 and the one pair of outer holding blocks 320 and 330 may be manufactured by plastic injection molding, but may be manufactured by a metal plate only or combination of the metal plate and the plastic.

**[0055]** The middle holding block 310 and the one pair of outer holding blocks 320 and 330 include inner panel supporters 312, 322 and 332 to be in surface-contact with the inner surface of the inner panel 132, outer panel supporters 314, 324 and 334 to be in surface-contact with the inner surface of the outer panel 131, and a tub avoider (not shown) formed on a bottom surface.

**[0056]** The one pair of outer holding blocks 320 and 330 includes inclined lateral surfaces 326 and 336 facing corners between the outer panel 131 and the second lateral wall 136a. The inclined lateral surfaces 326 and 336 may include a lateral surface contact portion (not shown) extended being inclined toward the second lateral wall 136a and being in surface-contact with the inner surface of the second lateral wall 136a.

**[0057]** The outer panel supporters 314, 324 and 334 are attached to the inner surface of the outer panel 131 by adhesive (or glue). The inner panel supporters 312, 322 and 332 include permanent magnets 313, 323 and 333 detachably attached to the inner surface of the inner panel 132. In this case, the inner surface of the inner panel 132, to which the inner panel supporters 312, 322 and 332 are attached, include metal plates 311, 321 and 331 or magnets having opposite polarity. Instead of the permanent magnets 313, 323 and 333, one side between the inner panel supporters 312, 322 and 332 and the inner panel 132 may be provided with a hook, and the other side may be provided with a hook holder.

**[0058]** FIG. 9 is a cross-sectional view showing that the panel-movement preventing member 400 according to a third embodiment of the disclosure is mounted to the

door 130.

**[0059]** The panel-movement preventing member 400 includes one pair of inclined support holders 410 and 420 respectively placed at opposite lower sides of the door 130. The inclined support holders 410 and 420 may be manufactured by plastic injection molding, but may alternatively be manufactured by a metal plate only or combination of the metal plate and the plastic.

**[0060]** The one pair of inclined support holders 410 and 420 includes inner panel supporters 412 and 422 respectively fastened to two spaced positions of the inner panel 132, for example, positions spaced apart by a predetermined distance from the center of the lower portion toward both sides; and inclined supporters 414 and 424 integrally extended outward from the inner panel supporters 412 and 422, and inclinedly extended toward the outer panel 131 or the second lateral wall 136a, and/or a corner between the outer panel 131 and the second lateral wall 136a. Each end portion of the inclined supporters 414 and 424 has a width gradually expanded and widened. The inclined supporters 414 and 424 having such wide end portions can effectively support the door 130 throughout a wide range in up and down directions. The inner panel supporters 412 and 422 are fastened to the inner surface of the inner panel 132 by adhesive (or glue). Alternatively, the inclined supporters 414 and 424 may keep only a contact state or may be detachably fastened. The one pair of inclined support holders 410 and 420 may include a single inclined support holder in which the inner panel supporters 412 and 422 are integrally connected to each other, instead of separate bodies supporting two spaced positions of the inner panel 132. The one pair of inclined support holders 410 and 420 may include at least one bending supporter (not shown) bent from the end portion of the inclined supporters 414 and 424 and being in surface contact with the outer panel 131 and/or the second lateral wall 136a. Although it is not shown in FIG. 9, the panel-movement preventing member 400 may further include a panel middle supporter (not shown) for supporting center portions of the outer panel 131 and the inner panel 132 between the one pair of inclined support holders 410 and 420 for the purpose of stronger support.

**[0061]** FIG. 10 is a cross-sectional view showing that a panel-movement preventing member 500 according to a fourth embodiment of the disclosure is mounted to the door 130. The panel-movement preventing member 500 includes the support bracket 140 for holding and supporting one pair of hinge units 122 separately placed in lower opposite sides of the door 130, a middle holding block 510 placed in the middle on one side of the support bracket 140, and one pair of outer holding blocks 520 and 530 placed at opposite end portions on the other side of the support bracket 140. When the support bracket 140 for holding and supporting one pair of hinge units 122 is not present, the panel-movement preventing member 500 may include an additional support bracket. The middle holding block 510 and the outer holding blocks 520 and

530 may be manufactured by plastic injection molding, but may alternatively be manufactured by a metal plate only or combination of the metal plate and the plastic. The support bracket 140 may be manufactured by a metal plate, but may alternatively be manufactured by plastic only or combination of the metal plate and the plastic.

**[0062]** The middle holding block 510 has one surface attached or coupled to the middle of the support bracket 140, and the other surface attached or coupled to the lower middle of the inner panel 132. The middle holding block 510 includes a tub avoider (not shown) on a bottom surface.

**[0063]** The one pair of outer holding blocks 520 and 530 include one surfaces supported on the opposite end portions of the support bracket 140, and the other surfaces supporting the inner surface of the outer panel 131, or the second lateral wall 136a, and/or the corner between the outer panel 131 and the second lateral wall 136a. The one pair of outer holding blocks 520 and 530 includes inclined lateral surfaces 526 and 536 facing toward the corners between the outer panel 131 and the second lateral wall 136a, respectively. The inclined lateral surfaces 526 and 536 may include lateral contact portions inclinedly extended toward the second lateral wall 136a and being in surface contact with the second lateral wall 136a. The widths of the middle holding block 510 and the outer holding blocks 520 and 530 may be optimized in consideration of the size of the whole door.

**[0064]** FIG. 11 is a cross-sectional view showing that a panel-movement preventing member 600 according to a fifth embodiment of the disclosure is mounted to the door 130, and FIG. 12 is a perspective view of an inclined support holder 610 or 620 of the panel-movement preventing member 600 according to the fifth embodiment of the disclosure. The panel-movement preventing member 600 includes the support bracket 140 for holding and supporting one pair of hinge units 122 separately placed in lower opposite sides of the door 130, and one pair of inclined support holders 610 and 620 separately placed in opposite end portions of the support bracket 140. When the support bracket 140 for holding and supporting the one pair of hinge units 122 is absent in the panel-movement preventing member 600, an additional support bracket for supporting the panel-movement preventing member 600 may be provided. The one pair of inclined support holders 610 and 620 may be manufactured by plastic injection molding, but may alternatively be manufactured by a metal plate only or combination of the metal plate and the plastic. The support bracket 140 may be manufactured by a metal plate, but may alternatively be manufactured by plastic only or combination of the metal plate and the plastic.

**[0065]** The one pair of inclined support holders 610 and 620 includes bracket supporter 612 and 622 respectively supported opposite end portions of the support bracket 140; and inclined support holders 614 and 624 integrally extended outward from the bracket supporters 612 and 622, and inclinedly extended toward the outer panel

131 or the second lateral wall 136a, and/or a corner between the outer panel 131 and the second lateral wall 136a. The one pair of inclined support holders 610 and 620 may include at least one bending supporter (not shown) bent from the inclined supporters 614 and 624 and being in surface contact with the outer panel 131 and/or the second lateral wall 136a. The bracket supporters 612 and 622 may be fastened to the support bracket 140 by adhesive (or glue) or a screw. The inclined supporters 614 and 624 may be in contact with or detachably fastened to the outer panel 131 or the second lateral wall 136a, and/or the corner between the outer panel 131 and the second lateral wall 136a. The one pair of inclined support holders 610 and 620 may be achieved by a single body in which the bracket supporter 612 and 622 for supporting two separated positions of the support bracket 140 are integrally connected.

**[0066]** As shown in FIG. 12, the bracket supporter 612 includes two separated supporters 615 and 617 which are foldable to each other to reduce their lengths. The bracket supporter 612 includes a folding hinge unit 613 by which the two separated supporters 615 and 617 are foldable. The two separated supporters 615 and 617 include concave and convex portions 618 and 619 which can be coupled to each other when folded up with respect to the folding hinge unit 613.

**[0067]** FIG. 13 is a perspective view showing that the inclined support holder 610 is folded up in the panel-movement preventing member 600 according to the fifth embodiment of the disclosure. The dishwasher 1 may have the door 130, the width of which is narrow according to models. Thus, when the two separated supporters 615 and 617 are folded up to decrease in length, a space is decreased between the two positions supported by the inclined supporter 614 and 624 of the one pair of inclined support holders 610 and 620. Like this, change in length of the inclined support holders 610 and 620 allows the panel-movement preventing member 600 to be applicable in common to doors of products different in size, thereby reducing production costs.

**[0068]** FIG. 14 is a perspective view of a different inclined support holder 610. As shown therein, the inclined support holder 610 includes the bracket supporter 612 supported on one position of the support bracket 140; an inclined supporter 614 integrally extended from the bracket supporter 612 and inclinedly extended outward from the one position toward the corner between the outer panel 131 and the second lateral wall 136a; and at least one bending supporter 616, 618 bent from the inclined supporter 614 and being in surface contact with the outer panel 131 and the second lateral wall 136a. The bracket supporter 612 is fastened to the support bracket 140 by adhesive (or glue) or a screw. The end portion of the inclined supporter 614 is in contact with the corner between the outer panel 131 and the second lateral wall 136a. The at least one bending supporter 616, 618 is in contact with the outer panel 131 and/or the second lateral wall 136a. Here, the end portion of the inclined supporter

614 and/or the bending supporter 616, 618 may be in contact with or detachably fastened to the corner between the outer panel 131 and the second lateral wall 136a, the outer panel 131, and the second lateral wall 136a. As described above, the inclined support holder 610 can support all the corner between the outer panel 131 and the second lateral wall 136a, the outer panel 131, and the second lateral wall 136a.

**[0069]** FIG. 15 is a cross-sectional view schematically showing that a panel-movement preventing member 700 according to a sixth embodiment of the disclosure is mounted to the door 130. The panel-movement preventing member 700 includes the support bracket 140 for holding and supporting one pair of hinge units 122 separately placed in lower opposite sides of the door 130, one pair of inclined support holders 710 and 720 placed at opposite end portions of the support bracket 140, and an inner panel supporter 730 placed in the middle of the support bracket 140. When the support bracket 140 for holding and supporting the one pair of hinge units 122 is absent in the panel-movement preventing member 700, an additional support bracket for supporting the panel-movement preventing member 700 may be provided. The one pair of inclined support holders 710 and 720 may be manufactured by plastic injection molding, but may alternatively be manufactured by a metal plate only or combination of the metal plate and the plastic. The inner panel supporter 730 may be manufactured by a metal plate, but may alternatively be manufactured by plastic only or combination of the metal plate and the plastic. The support bracket 140 may be manufactured by a metal plate, but may alternatively be manufactured by plastic only or combination of the metal plate and the plastic.

**[0070]** The one pair of inclined support holders 710 and 720 has the same structure as the inclined support holder 610 of FIG. 11, and therefore repetitive descriptions will be omitted.

**[0071]** The inner panel supporter 730 is for example formed by bending and machining the opposite ends of the metal plate to have a 'j'-shaped cross-section, and has one bending side fastened to the middle of the support bracket 140 with a screw or adhesive (glue), and the other bending side fastened to the inner panel 132.

**[0072]** Although a few embodiments of the disclosure have been described in detail, various changes can be made in the disclosure without departing from the scope of claims.

## Claims

### 1. A dishwasher comprising:

a main body comprising a dish washing compartment with a dish entrance, and a door comprising an outer panel and an inner panel arranged with a space therebetween to open and

close the dish entrance,

the door comprising a panel-movement preventing member in the space between the outer panel and the inner panel to prevent relative movement between the outer panel and the inner panel.

2. The dishwasher according to claim 1, wherein the panel-movement preventing member is configured to be placed in a lower portion of the door.

3. The dishwasher according to claim 1, wherein the panel-movement preventing member is configured to be placed comprising a middle portion of the door.

4. The dishwasher according to claim 1, wherein the inner panel comprises a recessed portion formed in a lower portion and recessed toward the outer panel, and the panel-movement preventing member is configured to be placed inside a lower edge of the recessed portion.

5. The dishwasher according to claim 1, wherein the panel-movement preventing member comprises a panel holding block comprising an inner panel supporter supported on the inner panel, and an outer panel supporter supported on the outer panel.

6. The dishwasher according to claim 5, wherein the panel holding block comprises two or more panel holding blocks separately placed between the inner panel and the outer panel.

7. The dishwasher according to claim 6, wherein the door comprises a support bracket transversely disposed between the inner panel and the outer panel, and the panel holding block comprises a middle holding block supporting the inner panel and a middle of the support bracket, and one pair of outer holding blocks respectively supporting the support bracket and opposite sides of the outer panel.

8. The dishwasher according to claim 6, wherein the door comprises a lateral side connecting the inner panel and the outer panel, and the outer holding block comprises a lateral contact portion being in surface contact with the lateral side.

9. The dishwasher according to any one of claims 2 to 8, further comprising a tub protruding upward from a bottom of the dish washing compartment to prevent washing water from overflowing, and the panel holding block comprises a tub avoider to avoid interference with the tub when the door is tilted.

10. The dishwasher according to claim 1, wherein

the door comprises one pair of lateral sides connecting opposite sides of the inner panel and the outer panel, and  
 the panel-movement preventing member comprises an inclined support holder supported on at least one position of the inner panel, inclinedly extended outward from the support position of the inner panel, and supporting the lateral sides and the outer panel therebetween.

5  
 10

11. The dishwasher according to claim 10, wherein the panel-movement preventing member comprises a panel middle supporter supporting middles of the outer panel and the inner panel.

15

12. The dishwasher according to claim 10, wherein the inclined support holder comprises a bending supporter bent and extended from the support position between the lateral side and the outer panel and being in surface contact with the outer panel or the lateral side.

20

13. The dishwasher according to claim 10, wherein the inclined support holder comprises an inner panel supporter attached to the inner panel, and an inclined supporter bent and inclinedly extended from the inner panel supporter.

25

14. The dishwasher according to claim 13, wherein the inclined supporter is extended with a gradually expanded width.

30

15. The dishwasher according to claim 1, wherein the door comprises a support bracket transversely disposed between the inner panel and the outer panel, and a lateral side connecting the inner panel and the outer panel, and  
 the panel-movement preventing member comprises an inclined support holder supported on at least one position of the support bracket, inclinedly extended outward from the support position, and supporting the lateral sides and the outer panel therebetween.

35

40

45

50

55

FIG. 1

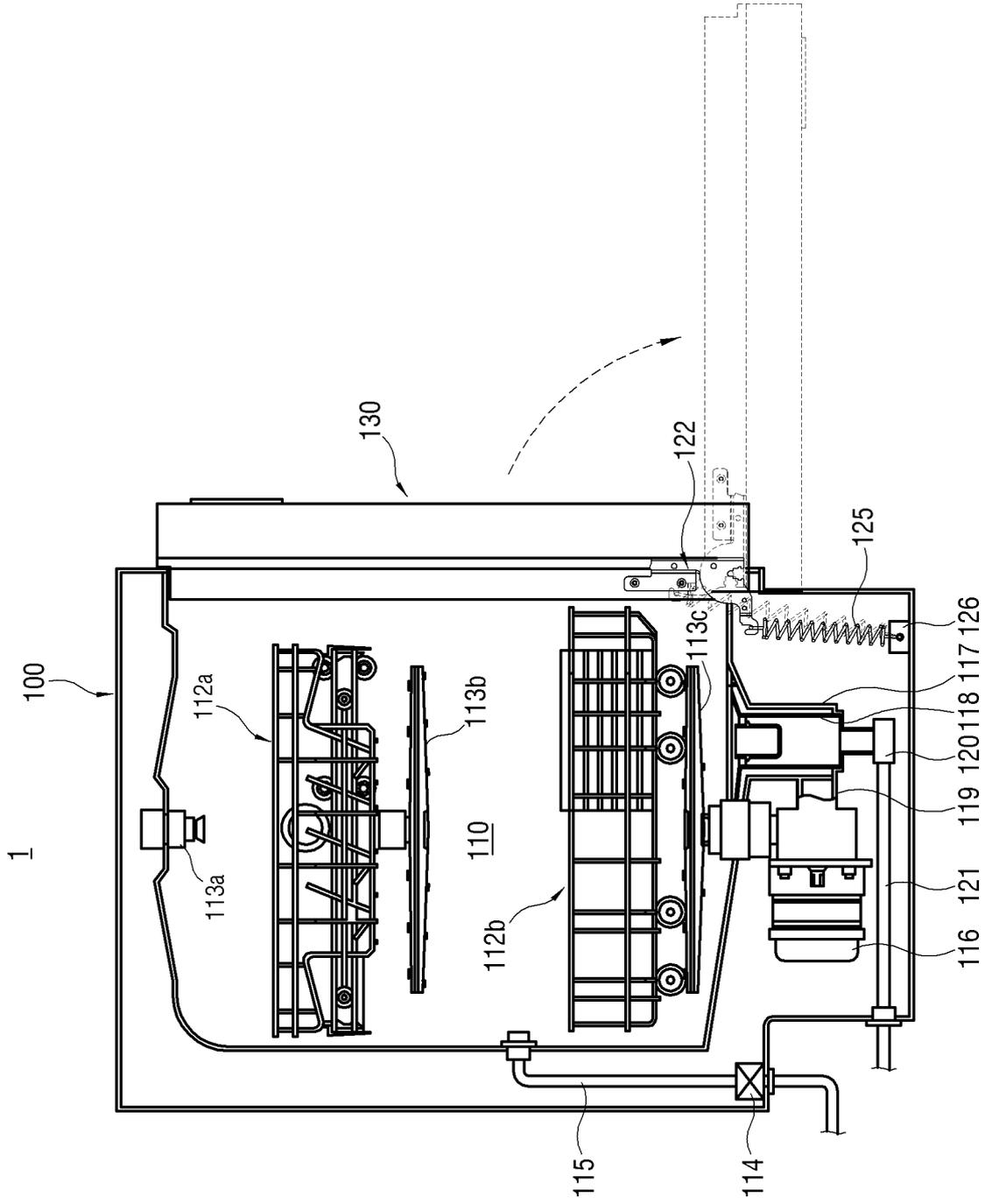


FIG. 2

130

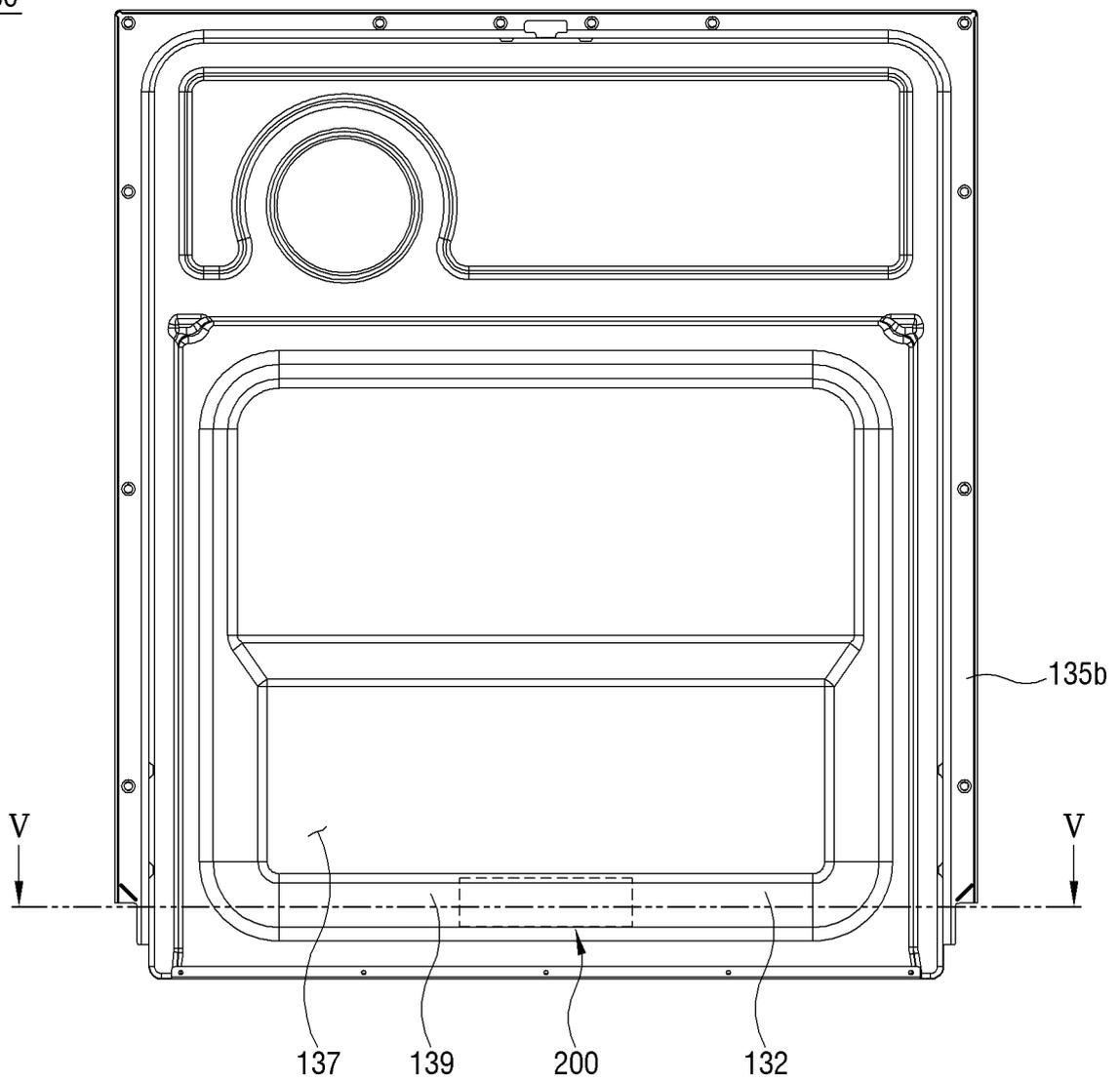




FIG. 4

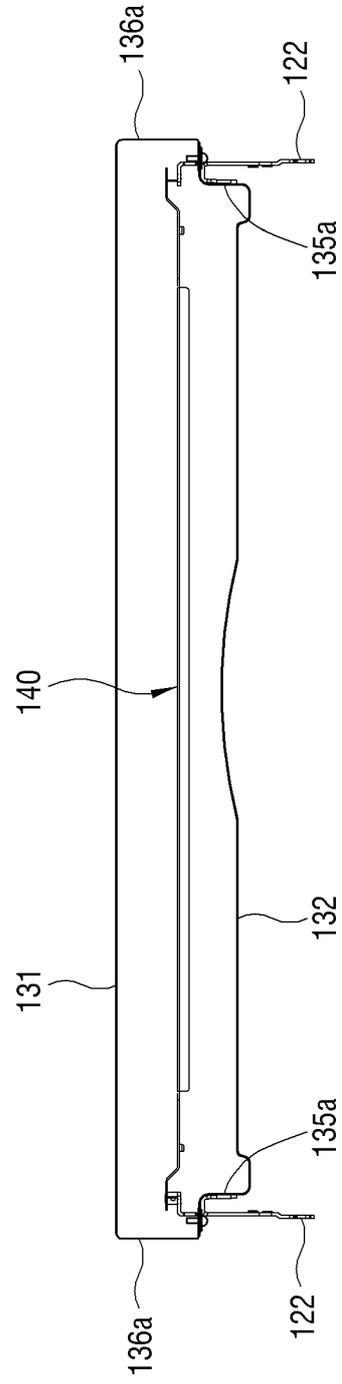


FIG. 5

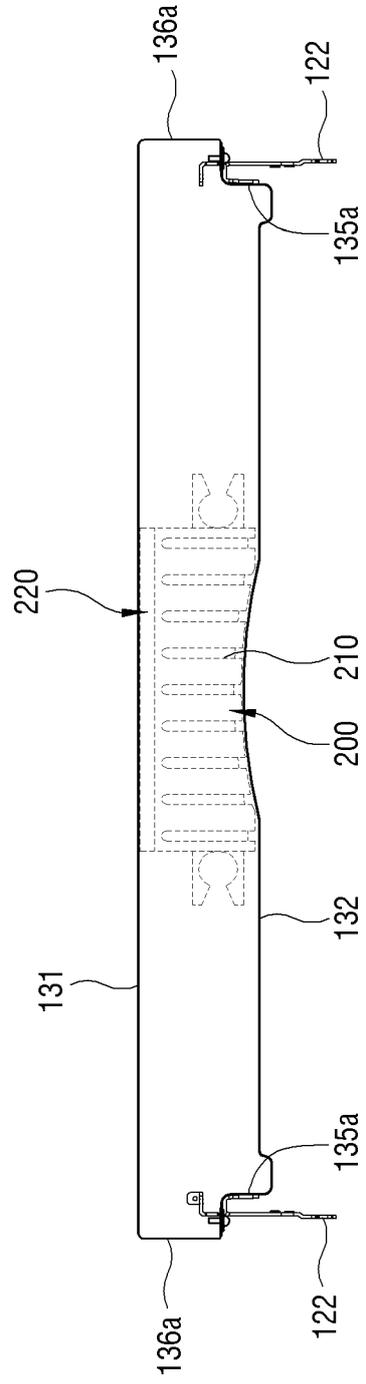


FIG. 6

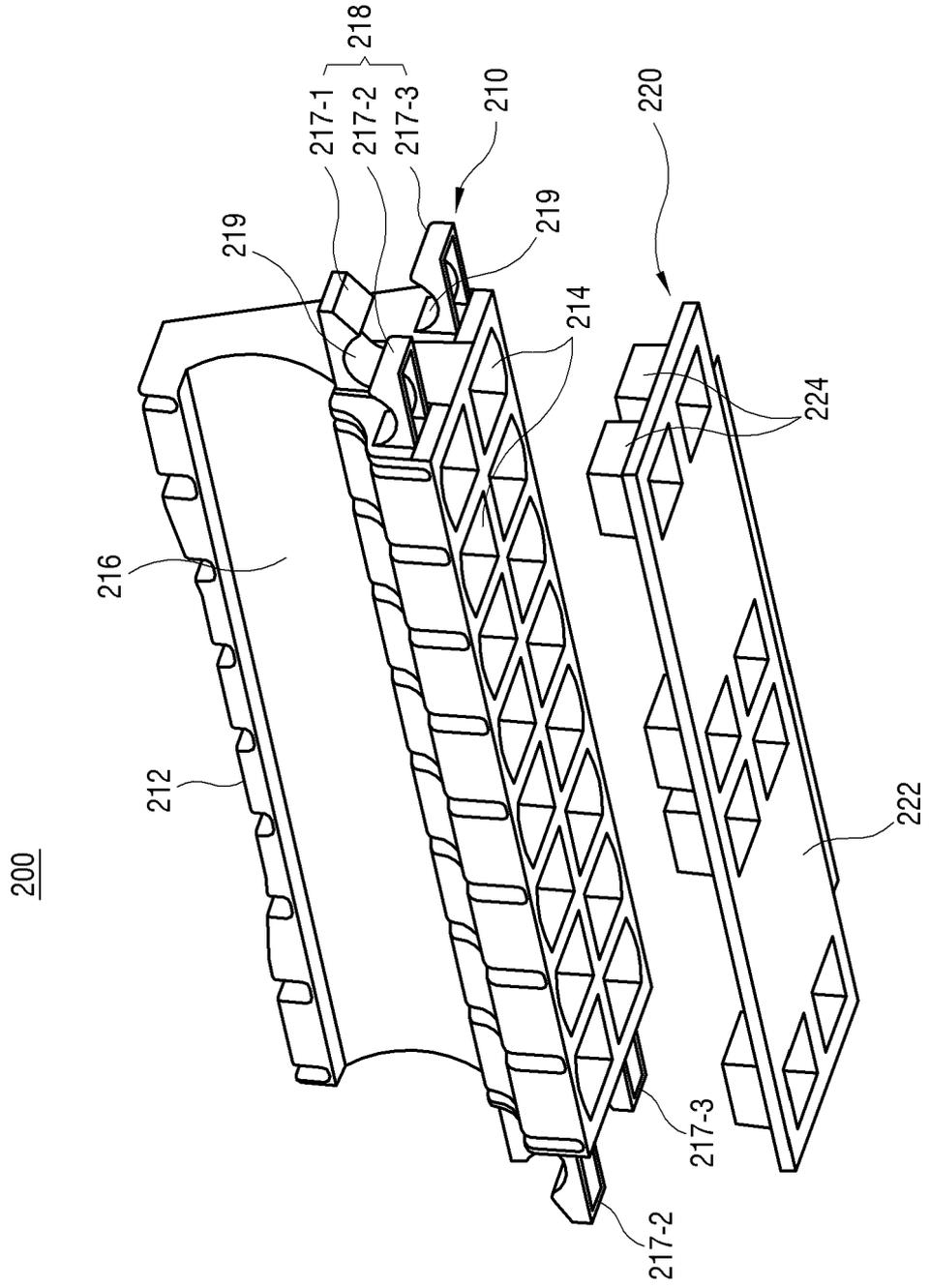


FIG. 7

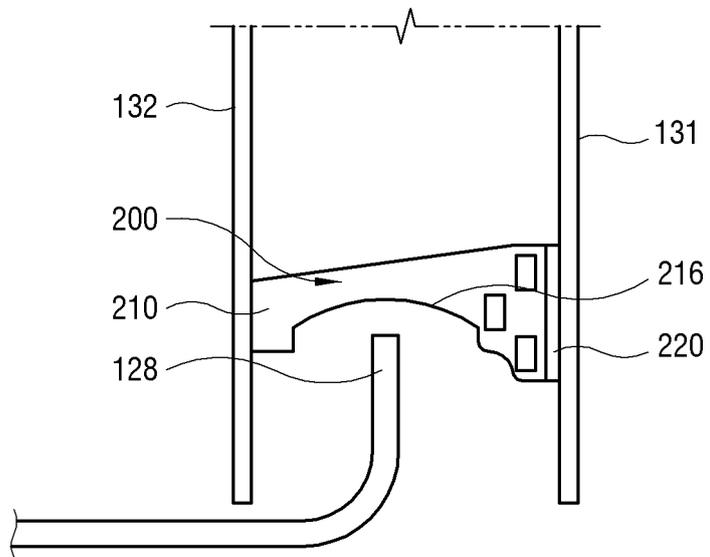


FIG. 8

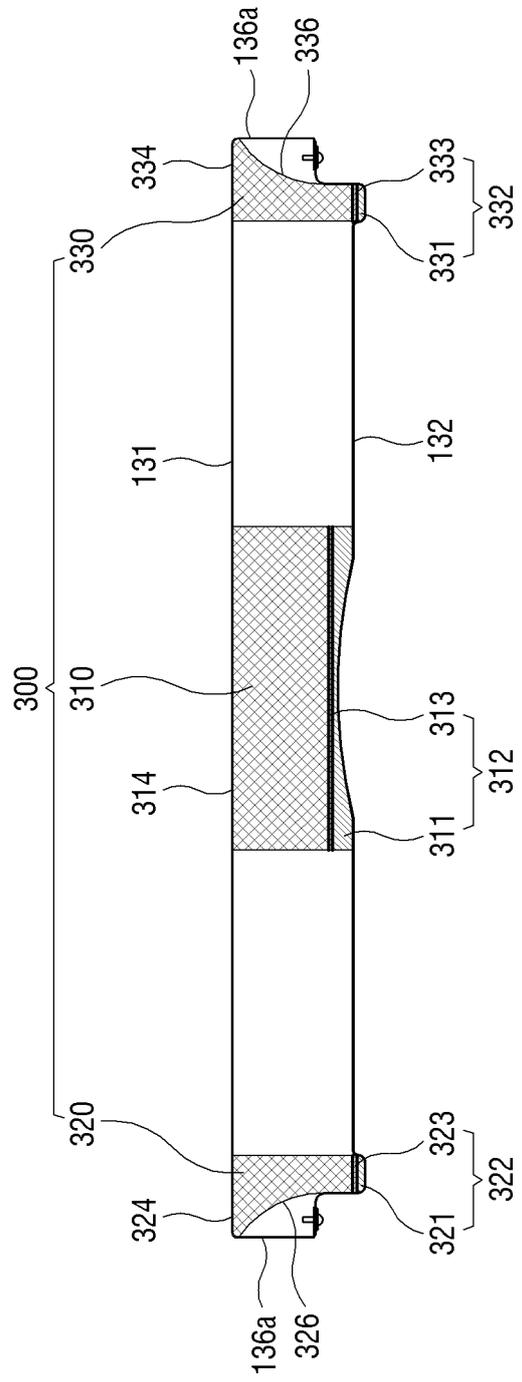


FIG. 9

400

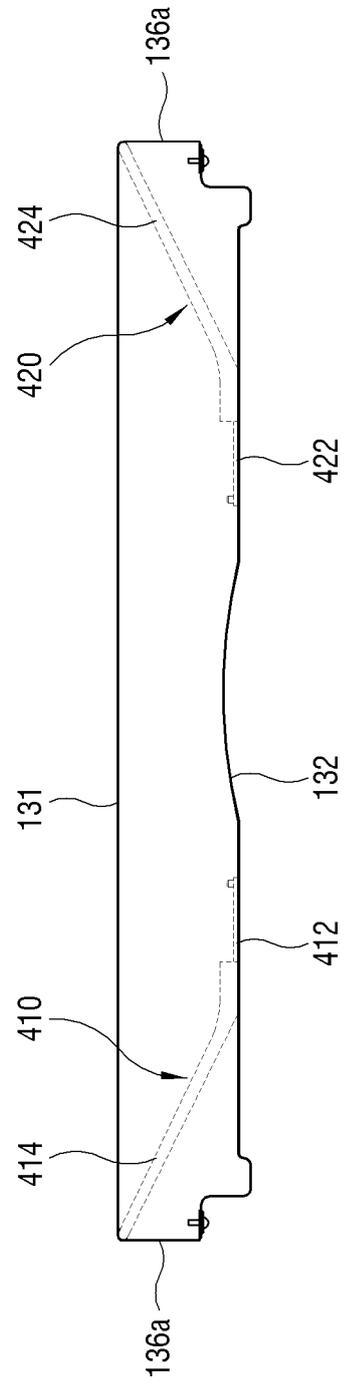


FIG. 10

500

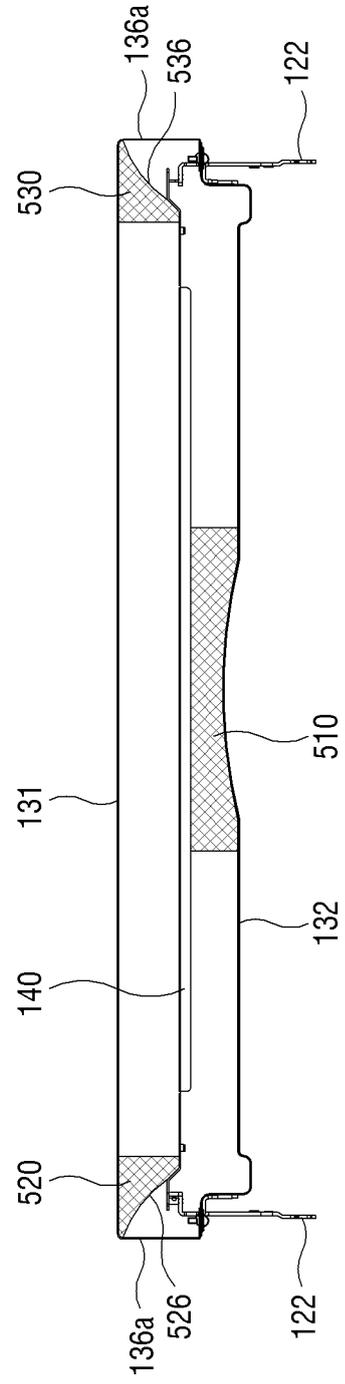


FIG. 11

600

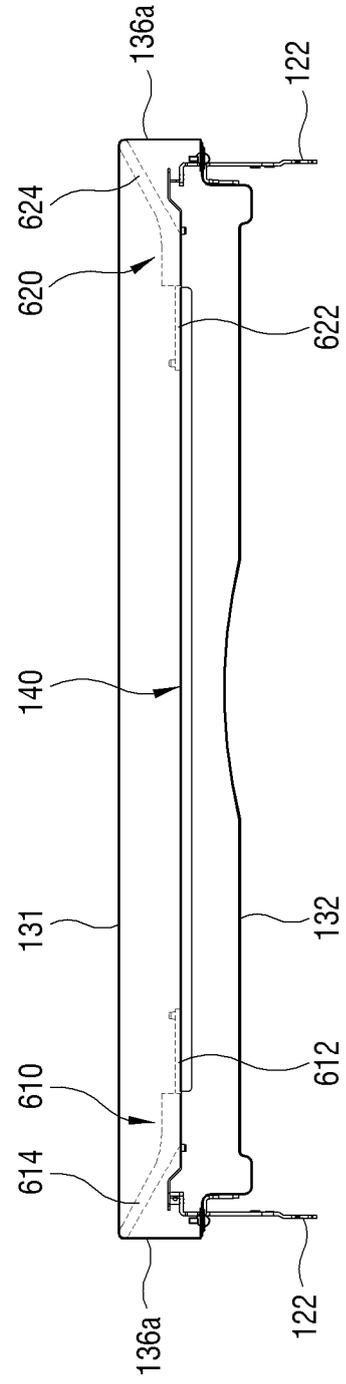


FIG. 12

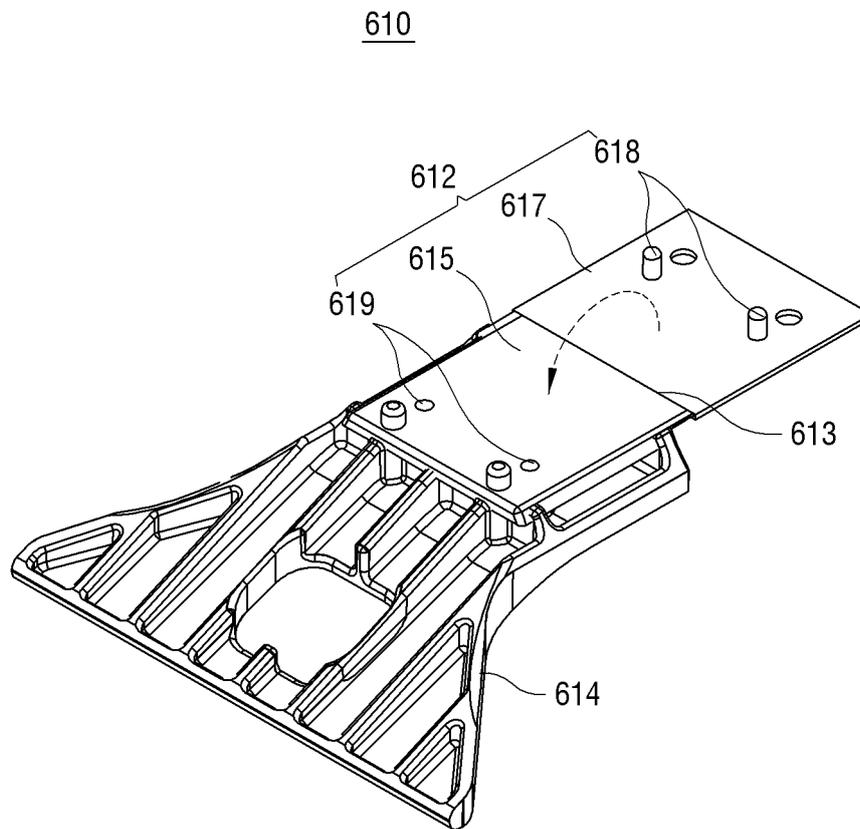


FIG. 13

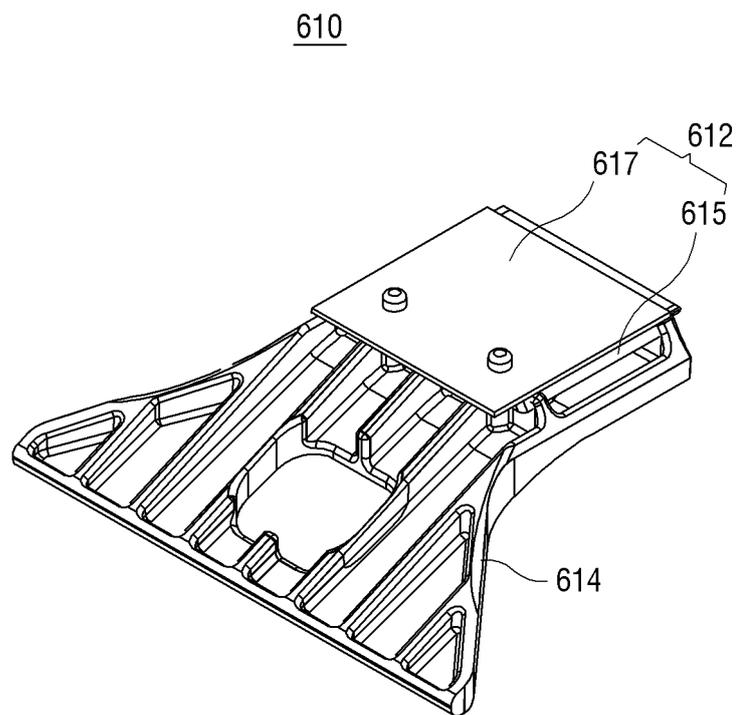


FIG. 14

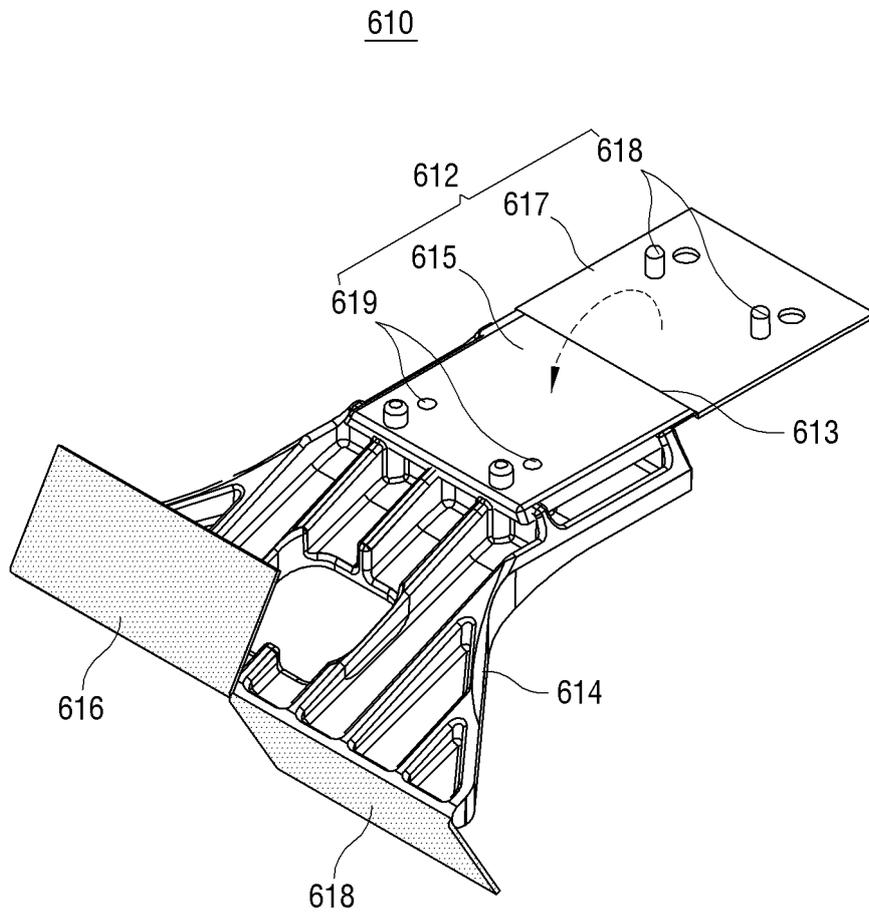
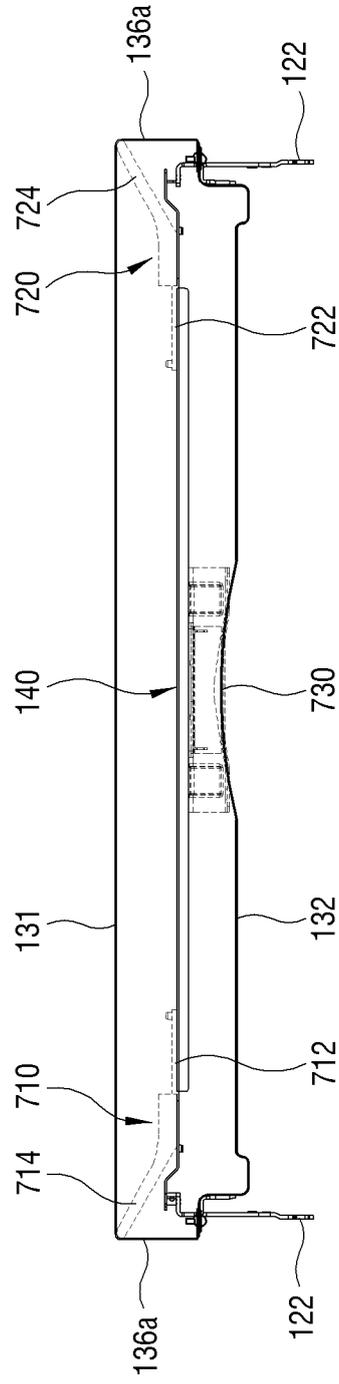


FIG. 15

700



INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR2019/000179

5

A. CLASSIFICATION OF SUBJECT MATTER  
*A47L 15/42(2006.01)i*  
According to International Patent Classification (IPC) or to both national classification and IPC

10

B. FIELDS SEARCHED  
Minimum documentation searched (classification system followed by classification symbols)  
A47L 15/42; A47B 55/00; A47B 77/08; A47L 15/00

15

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Korean utility models and applications for utility models: IPC as above  
Japanese utility models and applications for utility models: IPC as above

20

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
eKOMPASS (KIPO internal) & Key words: dish washer, door, inside panel, outside panel, support bracket, panel flow prevention member, fixing block, side surface part, slope supporting holder, tub evasion part, dent part

C. DOCUMENTS CONSIDERED TO BE RELEVANT

25

30

35

40

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2007-0078125 A (LG ELECTRONICS INC.) 31 July 2007 See paragraphs [0036]-[0037], [0044]-[0046] and figures 1-3.	1-6
A		7-15
A	KR 10-1268823 B1 (LG ELECTRONICS INC.) 28 May 2013 See paragraphs [0042]-[0045] and figures 2-8.	1-15
A	JP 2003-299533 A (HOSHIZAKI ELECTRIC CO., LTD.) 21 October 2003 See paragraphs [0020]-[0032] and figures 3-8.	1-15
A	KR 10-0598559 B1 (SAMSUNG ELECTRONICS CO., LTD.) 13 July 2006 See claims 1-3 and figures 2-3.	1-15
A	KR 10-1138884 B1 (SAMSUNG ELECTRONICS CO., LTD.) 14 May 2012 See paragraph [0034] and figures 2-4.	1-15

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

45

\* Special categories of cited documents:  
 "A" document defining the general state of the art which is not considered to be of particular relevance  
 "E" earlier application or patent but published on or after the international filing date  
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
 "O" document referring to an oral disclosure, use, exhibition or other means  
 "P" document published prior to the international filing date but later than the priority date claimed  
 "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art  
 "&" document member of the same patent family

50

Date of the actual completion of the international search 29 APRIL 2019 (29.04.2019)	Date of mailing of the international search report <b>30 APRIL 2019 (30.04.2019)</b>
---	---

55

Name and mailing address of the ISA/KR  Korean Intellectual Property Office Government Complex Daejeon Building 4, 189, Cheongsu-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	Authorized officer  Telephone No.
---	---

INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
**PCT/KR2019/000179**

5  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 10-2007-0078125 A	31/07/2007	None	
KR 10-1268823 B1	28/05/2013	KR 10-2007-0088868 A	30/08/2007
JP 2003-299533 A	21/10/2003	None	
KR 10-0598559 B1	13/07/2006	KR 10-2006-0017077 A	23/02/2006
KR 10-1138884 B1	14/05/2012	EP 1929926 A2	11/06/2008
		EP 1929926 A3	18/06/2008
		KR 10-2008-0051639 A	11/06/2008
		US 2008-0134728 A1	12/06/2008
		US 8262807 B2	11/09/2012