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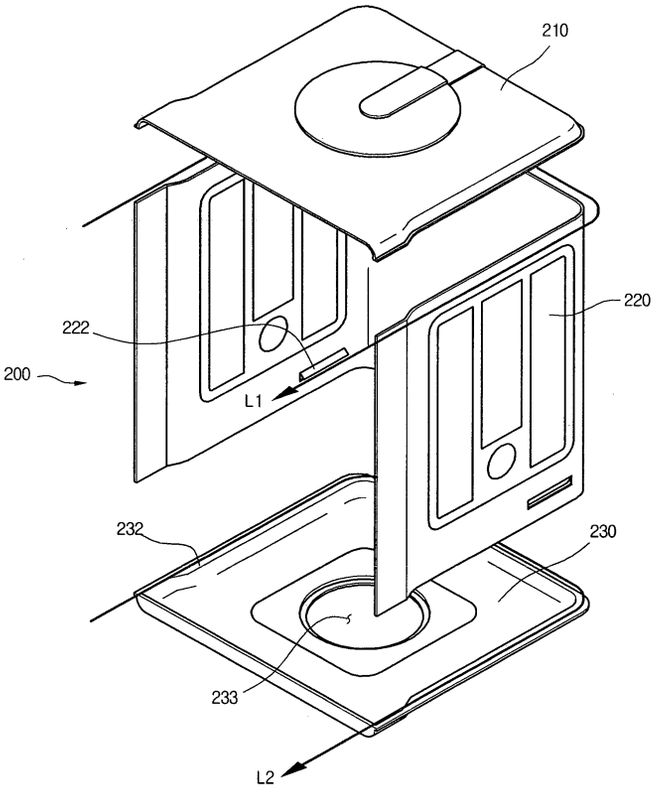
(54) Tub construction for dishwasher

(57) A tub construction for a dishwasher is provided. The tub (200) construction includes an upper panel (210), a lower panel (230) disposed below the upper panel, and an intermediate panel perpendicularly connecting the upper and lower panels. The tub construction of the present invention not only allows for a quicker assembly of the tub (200), but also an easier changing of the tub's outer dimensions. Furthermore, when seam welding, by changing the dimensions of the flanges at the corners, wrinkles at the corners are prevented, creating an even, leakproof welding line.

FIG.3



EP 1 609 403 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a dishwasher, and more particularly, to a tub construction of a dishwasher.

Description of the Related Art

[0002] In general, high-pressure jets of washing water are emitted from upper and/or lower nozzles inside a dishwasher tub to remove food particles on dishes inside the dishwasher.

[0003] Fig. 1 is an exploded view showing a process of assembling a related art dishwasher tub.

[0004] Referring to Fig. 1, a related art dishwasher 10 has a U-panel 11 forming the sides and top facets of the tub, welded to an L-panel 12 forming the back and bottom facets of the tub. In further detail, such a related art tub, having a U-panel 11 forming the sides and top facets of the tub with a single plate and an L-panel 12 forming the back and bottom facets of the tub with a single plate, allows a continuous weld line (L) to be used to weld the two panels together to form the tub.

[0005] However, in the case of the aforementioned dishwasher having a tub formed by the U-panel 11 and L-panel 12, the advantage of having a continuous weld line is negated by there being many curved portions along the weld.

[0006] To be more specific, a weld line (L1), going from the frontal lower portion to the rear lower portion of the tub, is formed to join the bottom and side facets of the tub. Furthermore, an upwardly proceeding weld line (L2) joins the peripheral edge of the rear facet to the side edge of the tub. Then, a weld line (L3) turns a corner at the periphery of the upper facet and proceeds horizontally to the opposite corner connecting the upper facet to the rear facet periphery of the tub to the other corner. Next, a weld line (L4) is formed along the juncture of the edge of the side facet and the periphery of the rear facet. Finally, a weld line (L5) connects the lower side facet edge to the bottom facet edge of the tub.

[0007] As described, a weld line for welding the U-panel 11 to the L-panel traverses four edges, complicating the welding process. It follows from the complicated welding process that the manufacturing process of the tub is lengthened, reducing productivity.

[0008] In addition, when the above tub assembling process is used, the weld line does not occur on the same two-dimensional plane, but curves three-dimensionally, thereby making it difficult to change the dimensions of the tub.

[0009] Also, seam welding, which is used in the above procedure, does not dispense the same amount of welding material on the corners as is dispensed on the straight weld portions, creating wrinkles and uneven seaming lines.

SUMMARY OF THE INVENTION

[0010] Accordingly, the present invention is directed to tub construction for a dishwasher that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0011] An object of the present invention is to provide an improved construction for a dishwasher tub that minimizes the time required for tub assembly and facilitates changing of the tub's outer dimensions.

[0012] Another object of the present invention is to provide a construction for a dishwasher tub having a simplified tub assembly process, thereby improving the manufacturing efficiency of the tub.

[0013] A further object of the present invention is to provide a construction for a dishwasher tub that is not subject to wrinkling from seam welding corners, and has a uniform weld that is not prone to leaks.

[0014] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0015] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a construction for a dishwasher tub including an upper panel, a lower panel disposed below the upper panel, and an intermediate panel perpendicularly connecting the upper and lower panels.

[0016] In another aspect of the present invention, there is provided a construction for a dishwasher tub including: a tub having an upper panel, an intermediate panel seam welded to the periphery of the upper panel, and a lower panel seam welded to the lower edges of the intermediate panel; an upper rack and a lower rack respectively disposed to enter and exit from the inside of the tub and respectively having a rack roller attached on either side; and a door pivotably fixed to the front of the tub.

[0017] The above constructions for a dishwasher tub not only provide a comparatively faster time in which assembly is completed, but also allows a change in the outer dimensions of the tub.

[0018] Also, when seam welding, the dimensions of the flanges at the corners can be varied so that there are no wrinkles created, and thus, no leakage at the welded corner flanges.

[0019] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explan-

atory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings :

[0021] Fig. 1 is an exploded view showing a process of assembling a related art dishwasher tub;

[0022] Fig. 2 is a sectional view of a dishwasher with a tub, according to an embodiment of the present invention ;

[0023] Figs. 3 is an exploded view of a tub according to an embodiment of the present invention;

[0024] Fig. 4 is a perspective view of the tub in Fig. 3 when assembled ;

[0025] Fig. 5 is a section view showing the welding process of the tub according to the present invention ;

[0026] Fig. 6 is a section view of the tub in Fig. 4 taken along line I-I'; and

[0027] Fig. 7 is a perspective view showing a welding portion of a tub corner taken at part A.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0029] Fig. 2 is a sectional view of a dishwasher with a tub according to an embodiment of the present invention.

[0030] Referring to Fig. 2, a dishwasher having the tub construction of the present invention has a tub 200 forming an exterior and having dishwasher parts formed therein, a door 111 pivotably formed to open and close at the front of the tub 200, and a sump 170 formed at the central bottom portion of the tub 200 for holding washing water.

[0031] Also, a wash pump 180 is connected to the sump 170 for high-pressure pumping of the washing water stored in the sump 170, and a motor 190 attached to the rear of the wash pump 180 for driving the wash pump 180.

[0032] In addition, the dishwasher includes a water guide 140 for guiding washing water pumped by the wash pump 180, a lower nozzle 160 installed at the top of the sump 170 for spraying washing water toward the upper panel of the tub 200, an upper nozzle 150 extending to the center of the tub 200 from a point of the water guide 140 for spraying washing water towards the upper and/or lower portion of the tub 200, and a top nozzle 155 connected to one end of the water guide 140 at the ceiling of the tub 200 for spraying washing water down from the top thereof.

[0033] Furthermore, the dishwasher includes an upper rack 120 installed between the upper nozzle 150 and the top nozzle 155 so that it can be pushed into and pulled out of the dishwasher and so that dishes placed thereon are cleaned by spray from the upper nozzle 150 and/or the top nozzle 155, and a lower rack 130 installed between the lower nozzle 160 and the upper nozzle 150 so that it can be pushed into and pulled out of the dishwasher and so that dishes placed thereon are cleaned by spray from the lower nozzle 160 and/or upper nozzle 150.

[0034] In more detail, the upper rack 120 is supported by rails (not shown) on the sides inside the tub 200, which allow movement of the upper rack 120 in push and pull directions. Also, when pulled out, the lower rack 130 moves along rollers on either side thereof according to a roller home formed on the top inner portion of the door 111.

[0035] The operation of the dishwasher 100 according to the present invention will now be explained.

[0036] First, a user opens the door 111 of the dishwasher, and pulls out the upper rack 120 and/or the lower rack 130. Then, dishes are placed on the racks 120 and 130. Next, the user closes the door 111, enters the desired wash cycle settings, and presses the start button to activate the wash cycle.

[0037] When the start button is pressed on the dishwasher 100 and the wash cycle begins, washing water enters the sump 170. After the entry of the washing water into the sump 170 is completed, the motor 190 is activated. An impeller (not shown) attached to the motor 190 shaft and installed in the wash pump 180 rotates, pumping the washing water to the lower nozzle 160 and the water guide 140. Here, the washing water pumped by the wash pump 180 flows alternatively to the lower nozzle 160 and the water guide 140 at predetermined intervals.

[0038] Also, the washing water flowing to the water guide 140 moves to the top nozzle 155 and the upper nozzle 150 to be sprayed therefrom. The dishes stacked on the racks 120 and 130 are cleaned by the sprayed washing water.

[0039] Here, the top nozzle 155 sprays washing water downward, and the upper nozzle 150 sprays washing water upwards to wash the dishes stacked on the upper rack 120.

[0040] Additionally, the lower nozzle 160 sprays washing water upward to wash the dishes stacked on the lower rack 130. Also, washing water spray holes on the bottom of the upper nozzle 150 can spray washing water downward to simultaneously wash the upper portions of dishes stacked on the lower rack 130.

[0041] During the wash cycle, contaminants in the dirty wash water returning to the sump 170 are filtered by a filter (not shown). These contaminants are then ex-

pelled from the dishwasher 100 in a discharge cycle via a discharge pump (not shown).

[0042] Moreover, when washing water is discharged to the outside, clean washing water is routed into the sump 170 via an entrance hole and is discharged through the nozzles 150 and 160 according to the wash cycle selected. The clean washing water that is discharged rinses the dishes in the racks. When the rinse cycle is complete, the washing water is dispelled, and the dry cycle begins. Heat is supplied in the tub for a predetermined period during the dry cycle, and then the entire wash cycle is completed.

[0043] Figs. 3 is an exploded view of a tub according to an embodiment of the present invention, and Fig. 4 is a perspective view of the tub in Fig. 3 when assembled.

[0044] Referring to Figs. 3 and 4, the tub of a dishwasher is divided into 3 parts.

[0045] Specifically, the tub 200 according to the present invention includes an upper panel 210 forming the upper portion of the dishwasher 200, a lower panel 230 forming the lower portion of the dishwasher 200, and an intermediate panel welded to the peripheral edges of the upper panel 210 and the lower panel 230. In addition, a sump receiving hole 233 for receiving a sump (not shown) is defined in the center of the lower panel 230, and lower rack roller guides 232 are formed on the sides of the lower panel 230.

[0046] In further detail, the lower rack roller guides 232 protrude inwardly from the outer surface to the inner surface of the lower panel 230, extending for a substantial length from the rear to the front of the lower panel 230. Also, the top of the lower rack roller guide 232 maintains a horizontal position in order to allow rollers on either side of the lower rack to slide in and out along the guide 232. Furthermore, the upper portion of the lower rack roller guide 232 is smoothly finished, so that dishes placed on the lower rack 130 do not clatter when the lower rack 130 is pushed into and pulled out of the dishwasher.

[0047] Moreover, grooves and ridges may be stamped on the lower panel 230, to form rails for guiding the fore and aft movement of rollers placed thereon, thereby negating the need to install a separate roller guide on the lower panel.

[0048] Also, a lower rack roller guide 222 is formed to protrude a predetermined distance inward into the tub 200 from the inner lower portions on either side of the intermediate tub 220. The lower rack roller guide 222 is formed on either side of the intermediate tub 220 to support the rollers of the lower rack 130.

[0049] More specifically, the lower rack roller guide 222 is disposed above and spaced a predetermined distance apart from the lower rack roller guide 232 formed on the uppermost part of the lower panel 230. Accordingly, when the lower rack 130 is pulled out from and pushed into the dishwasher, the upper portions of its rollers are supported. Furthermore, the lower rack roller guide 222 can be short in length (as shown in the diagrams), or can extend along the entire depth of the tub 200.

[0050] The side and rear edges of the upper panel 210 are joined with the top end of the intermediate panel 220. Also, the side and rear edges of the lower panel 230 are joined with the bottom end of the intermediate panel 220. The upper panel 210, intermediate panel 220, and lower panel 230 are joined by seam welding.

[0051] Here, seam welding, being a type of electric resistance welding, uses roller-shaped electrodes to achieve continuous spot welds, which are suitable for applications requiring airtight and/or watertight seals.

[0052] The above tub construction using three separate panels - an upper panel 210, an intermediate panel 220, and a lower panel 230 - reduces the amount of time needed for welding. In further detail, in a welding process involving the above three panels, even if the welding lines are divided into upper and lower lines, the welding time is substantially less than those of the prior art, due to the welding occurring on a two-dimensional plane.

[0053] Furthermore, the welding lines both make a "U" shape along the upper and lower ends of the intermediate panel 220. Accordingly, a pair of welding rollers can be respectively positioned at the upper and lower ends of the intermediate panel 220 to simultaneously weld the two ends, thus welding the two welding lines at once.

[0054] Fig. 5 is a section view showing the welding process of the tub according to the present invention.

[0055] Referring to a cross section of a flange shape shown in Fig. 5 prior to the implementation of seam welding of the present invention, the welding process will now be illustrated using the example of welding the intermediate panel 220 to the lower panel 230.

[0056] In order to perform seam welding, the ends of the intermediate panel 220 and the lower panel 230 are first formed to protrude a predetermined distance outward. In more detail, the protrusive portion of the intermediate panel 220 (upper welding portion 221) is connected to the protrusive portion of the lower panel 230 (lower welding portion 231). Here, either one of the upper welding portion 220 or lower welding portion 230 is formed to protrude further than the other. Preferably, one protrudes twice the distance of the other, and the longer of the two covers the exposed portion of the shorter.

[0057] In the embodiment shown, the welding portion 221 of the intermediate panel 220 is shorter than the welding portion 231 of the lower panel 230.

[0058] Fig. 6 is a section view of the tub in Fig. 4 taken along line I-I'.

[0059] Referring to Fig. 6, an upper welding portion 221 of the intermediate panel 220 and a lower welding portion 231 of the lower panel 230 are connected to form a welding surface 300. At an end of the welding surface 300, a folded portion 231a continues upward from the lower welding portion 231 to cover the top of the upper

welding portion 221. Also, the upper welding portion 221 curves upward from the outwardly curving inner curved portion 221a. Consequently, the folded portion 231a is pressed to the outside of the intermediate panel 220. As well, a predetermined pressure is applied to the outside and inside of the welding portion, so that the welding portion is fixed firmly to the outside of the intermediate panel 220.

[0060] In such seam welding, a roller attached to the top and bottom of the welding portion applies a predetermined pressure thereon, which imparts shearing stress on the welding surface. In seam welding of prior art tubs, the folded amount differs at the corners, resulting in wrinkling. When such wrinkling occurs at the corners, uneven welding lines are formed, resulting in gaps that leak water.

[0061] Fig. 7 is a perspective view showing a welding portion of a tub corner taken at part A.

[0062] Referring to Fig. 7, in order to prevent the aforementioned wrinkling of corners and uneven welding lines, the present invention changes the dimensions of the welding portions at the corners, so that no wrinkling occurs at the corners when seam welding. The corners of the intermediate panel 220 according to the present invention will now be explained.

[0063] Specifically, by making the curve radius (R1) of the inner curved portion 221a at the corners different from the curve radius (R2) of the outer curved edge of the welding portion 221, there are no wrinkles created on the curved areas at the corners of the welding portion when seam welding. In other words, the lower portion of the intermediate panel 220, being the upper welding portion 221, is narrower in width at its corners than at its straight areas.

[0064] Accordingly, when the upper and lower parts of the welding portions 221 and 231 are pressed by a welding roller, wrinkles on the inner curved portion 221a are straightened. Furthermore, when wrinkles are straightened, they are pushed to the centers of the upper welding portion 221 corners, namely, the thinnest areas of the upper welding portion 221. Accordingly, the corners and straight portions of the upper welding portion 221 adopt the same thickness for an even welding line.

[0065] Likewise, the welding portions at the corners of the upper panel 210 and lower panel 230 can be formed in the same manner as those of the intermediate panel 220, so that their welded surfaces can also be evenly formed to prevent gaps.

[0066] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. A tub construction for a dishwasher, comprising:

   an upper panel ;
   a lower panel disposed below the upper panel ; and
   an intermediate panel connected perpendicularly between the upper panel and the lower panel.

2. The tub construction according to claim 1, wherein the intermediate panel forms side and rear facets of the dishwasher and has a horizontal cross section in a U-shape.

3. The tub construction according to claim 1, wherein the intermediate panel includes respective welding lines at upper and lower ends thereof.

4. The tub construction according to claim 1, wherein the upper panel and the intermediate panel and/or the lower panel and the intermediate panel are coupled by seam welding.

5. The tub construction according to claim 4, wherein the upper panel and lower panel are simultaneously welded to the intermediate panel by a pair of welding rollers proceeding along upper and lower ends of the intermediate panel.

6. The tub construction according to claim 1, wherein the lower panel has a first rack roller guide formed to protrude inward at each end of the lower panel.

7. The tub construction according to claim 6, wherein the first rack roller guide includes an upper surface for securing a lower rack roller.

8. The tub construction according to claim 1, wherein the intermediate panel further includes a second rack roller guide protruding inward at lower side portions of the intermediate panel.

9. The tub construction according to claim 8, wherein the second rack roller guide guides upper portions of the lower rack.

10. The tub construction according to claim 1, wherein the upper panel, intermediate panel, and lower panel have corner welding portions with inner curve radii formed smaller than outer curve radii of the corner welding portions.

11. The tub construction according to claim 1, wherein the upper panel, intermediate panel, and lower panel have welding portions whose thickness at curved areas are less than thickness at straight areas.

12. A tub construction for a dishwasher comprising:

a tub including an upper panel, an intermediate panel connected to a peripheral edge of the upper panel by seam welding, and a lower panel connected to a lower end of the intermediate panel by seam welding ;
an upper rack and a lower rack disposed to be pulled out from and pushed into the tub, and respectively having a rack roller on either side; and
a door pivotably attached to a front facet of the tub.

13. The tub construction according to claim 12, wherein the upper panel and the intermediate panel are joined by a first welding line, and the intermediate panel and the lower panel are joined by a second welding line.

14. The tub construction according to claim 13, wherein the first and second welding lines are respectively formed in a two-dimensional plane.

15. The tub construction according to claim 12, wherein the intermediate panel includes a first rack roller guide protruding from lower sides thereof, and the lower panel includes a second rack roller guide protruding from sides thereof, the rack rollers being disposed between the first and second rack roller guides.

FIG.1

Related Art

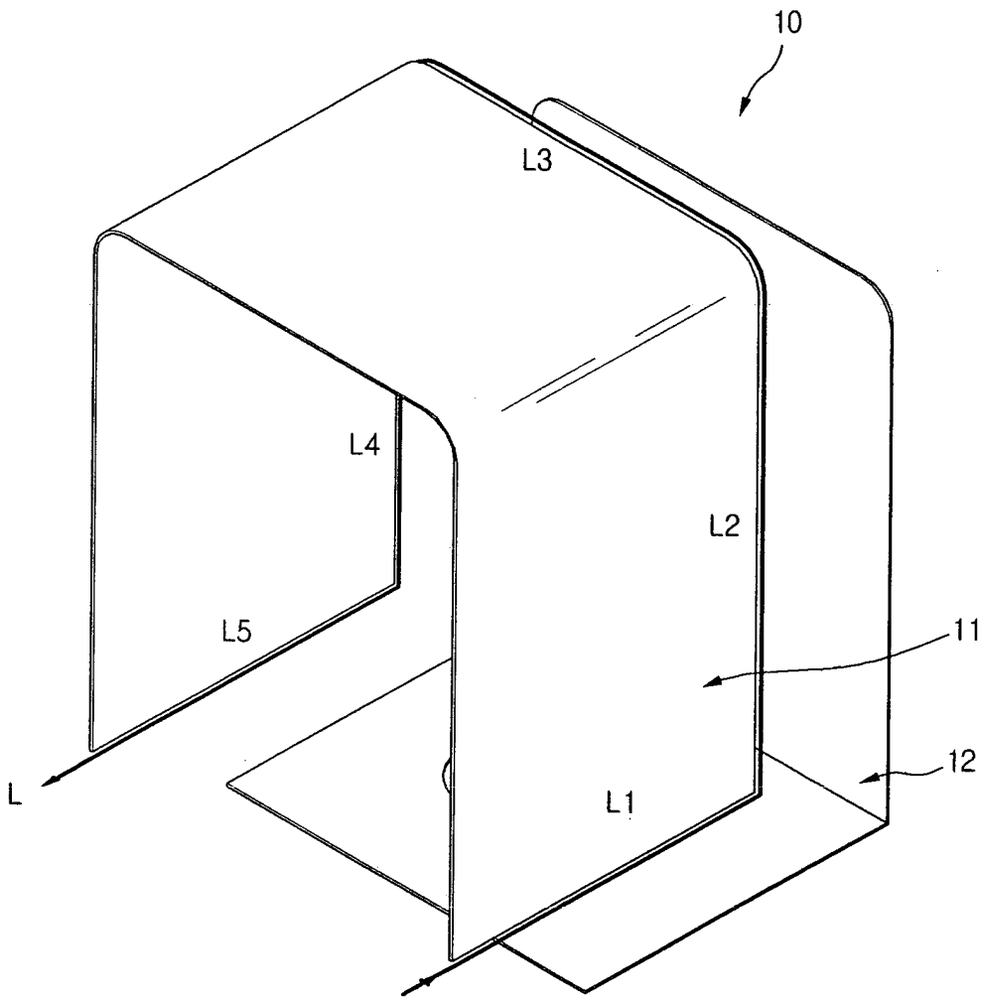


FIG.2

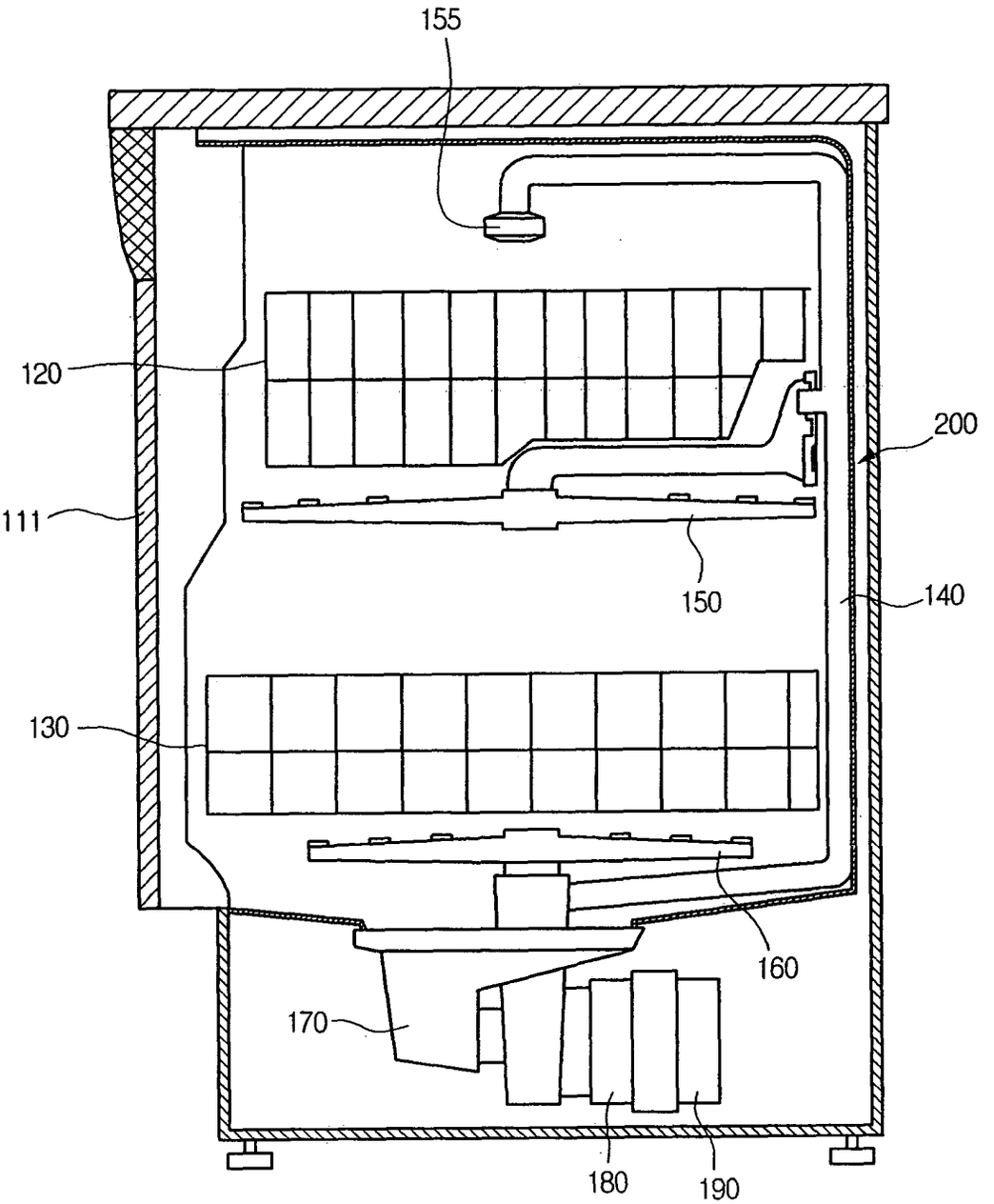


FIG.3

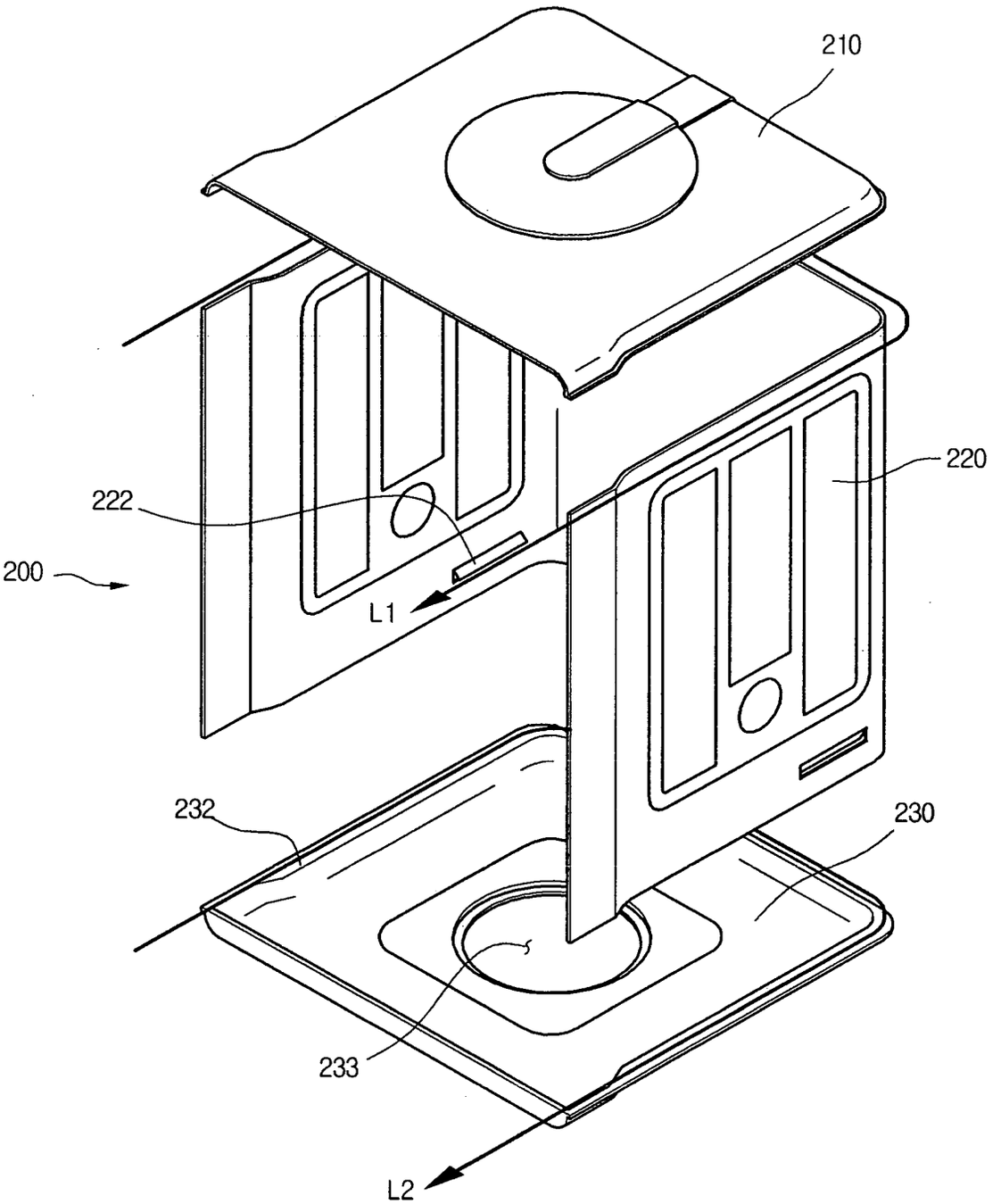


FIG.4

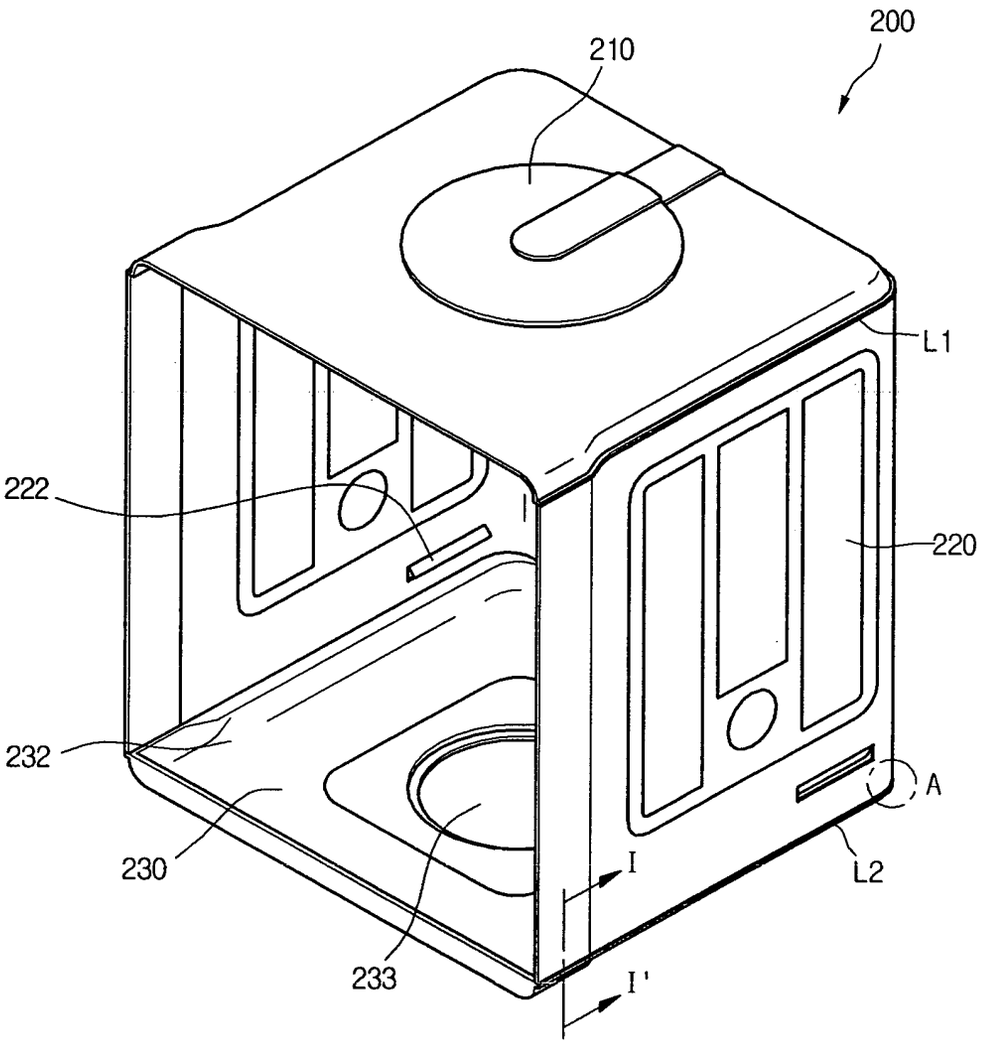


FIG.5

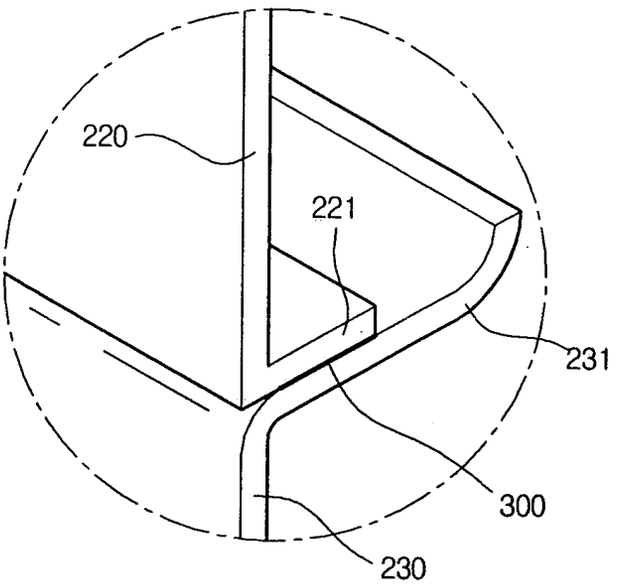


FIG.6

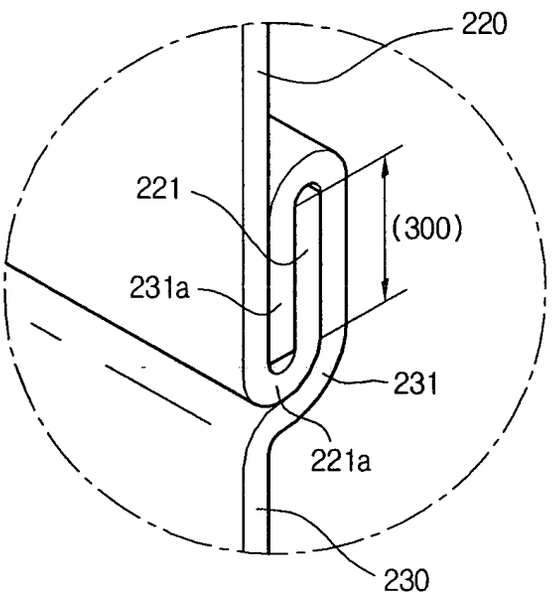


FIG.7