(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 444 541 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.04.2012 Bulletin 2012/17

(51) Int Cl.:
D06F 39/12 *(2006.01)*

(21) Application number: **11184951.9**

(22) Date of filing: **13.10.2011**

(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

(30) Priority: **21.10.2010 KR 20100102875**

(71) Applicant: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do 506-762 (KR)

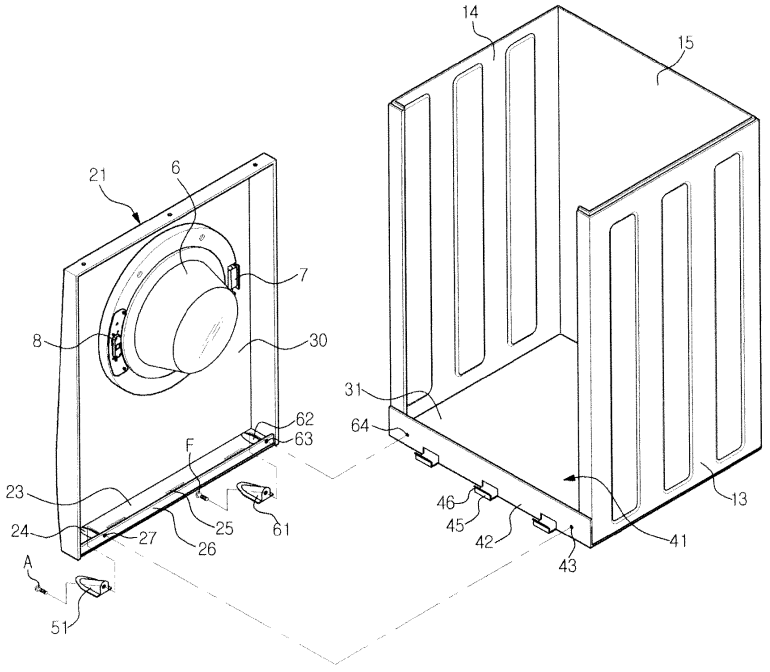
(72) Inventors:
- **Lee, Jae Soak**
  Yongin-si Gyeonggi-do (KR)
- **Ki, Young Kook**
  Suwon-si Gyeonggi-do (KR)

(74) Representative: **Grünecker, Kinkeldey,**
Stockmair & Schwanhäusser
Anwaltssozietät
Leopoldstrasse 4
80802 München (DE)

(54) **Washing machine and assembly structure thereof**

(57) A washing machine (1) having an assembly structure of a front frame (21) and a bottom frame (41) using fastening members (A), which has improved aesthetics and workability and excellent fastening force. The front frame includes a front surface part (30), an extension part (23) extended rearward from the front surface part (30), a first connection part (26) extended upward from the extension part (23), and openings (24,62) formed on the extension part, and the bottom frame includes a bottom plate and a second connection part (42) extended upward from the bottom plate and connected to the first connection part through fastening members. Each of bracket frames (51,61) installed in the openings (24,62) includes a guide channel (58) to guide entry and exit of each of the fastening members when the fastening members are fastened to the first connection part and the second connection part.

FIG. 2



EP 2 444 541 A1

Description

BACKGROUND

1. Field

[0001] The present invention relates to a washing machine in which a front frame and a bottom frame forming a housing are easily connected, and an assembly structure thereof.

2. Description of the Related Art

[0002] In general, a housing forming the external appearance of a washing machine includes a front frame, a rear frame, a top frame, a bottom frame, and two side frames. The rear frame and two side frames are formed integrally, and the bottom frame is connected to the integrally formed rear frame and two side frames by caulking, thereby forming a main frame.

[0003] In order to connect the front frame to the main frame, a method in which screws are fastened from the front part to the rear part of the front frame is conventionally used. However, such a conventional method causes the screws to be exposed to the outside of the front part of the front frame, thereby deteriorating the aesthetics of the washing machine.

[0004] Therefore, a method in which screws are fastened from the lower part to the upper part of the front frame or a method in which the front frame is connected to the main frame using a hanger structure are used.

[0005] However, if the former method is used, the main frame needs to be bent back when the screws are fastened, and thus workability during manufacture of products or after-sales service (A/S) may be lowered. Further, if the latter method is used, fastening force between the front frame and the main frame is weak and problems may occur when a motor of a washing machine is rotated at a high velocity.

SUMMARY

[0006] Therefore, it is an aspect of the present invention to provide a washing machine having an assembly structure of a front frame and a bottom frame, which has improved aesthetics and workability and excellent fastening force.

[0007] Additional aspects of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0008] In accordance with one aspect of the present invention, a washing machine includes a front frame including a front surface part, an extension part extended rearward from the front surface part, and a first connection part extended upward from the extension part, a bottom frame including a bottom plate and a second connection part extended upward from the bottom plate and connected to the first connection part through fastening members, and bracket frames, each of which includes a guide channel to guide entry and exit of each of the fastening members when the fastening members are fastened to the first connection part and the second connection part, wherein the bracket frames are respectively installed in openings formed on the extension part of the front frame.

[0009] Each of the bracket frames may further include a connection mediator part connected to the first connection part of the front frame.

[0010] Each of the bracket frames may further include a flange part such that the extension part of the front frame and the flange part are supported by each other.

[0011] The fastening members may be sequentially fastened to the connection mediator parts of the bracket frames, the first connection part of the front frame and the second connection part of the bottom frame.

[0012] The connection mediator parts of the bracket frames, the first connection part of the front frame and the second connection part of the bottom frame may respectively include forwardly inclined parts.

[0013] The bracket frames may be formed through injection molding using polypropylene.

[0014] A plurality of latching holes may be formed on the extension part of the front frame and the bottom frame may further include a plurality of latching protrusions inserted into the plurality of latching holes.

[0015] In accordance with another aspect of the present invention, in an assembly structure of a washing machine in which a front frame and a bottom frame are assembled, the front frame includes a front surface part, an extension part extended rearward from the front surface part, a first connection part extended upward from the extension part, and openings formed on the extension part, the bottom frame includes a bottom plate and a second connection part extended upward from the bottom plate and connected to the first connection part through fastening members, and the fastening members connect the first connection part and the second connection part under guidance of bracket frames installed in the openings.

[0016] Each of the bracket frames may include a guide channel to guide entry and exit of each of the fastening members when the fastening members are fastened to the first connection part and the second connection part.

[0017] Each of the bracket frames may further include a connection mediator part connected to the first connection part of the front frame.

[0018] Each of the bracket frames further may include a flange part such that the extension part of the front frame and the flange part are supported by each other.

[0019] The fastening members may be sequentially fastened to the connection mediator parts of the bracket frames, the first connection part of the front frame and the second connection part of the bottom frame.

[0020] The connection mediator parts of the bracket frames, the first connection part of the front frame and

the second connection part of the bottom frame may respectively include forwardly inclined parts.

[0021] The bracket frames may be formed through injection molding using polypropylene.

[0022] A plurality of latching holes may be formed on the extension part of the front frame and the bottom frame may further include a plurality of latching protrusions inserted into the plurality of latching holes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] These and/or other aspects of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view illustrating the external appearance of a washing machine in accordance with one embodiment of the present invention;

FIG. 2 is an exploded perspective of a portion of the washing machine shown in FIG. 1; FIG. 3 is a view illustrating a connection structure of a front frame and a bottom frame of the washing machine in accordance with an embodiment of the present invention;

FIG. 4 is a view illustrating a connected state of the front frame and the bottom frame of the washing machine shown in FIG. 3; FIG. 5 is a side view illustrating the connected state of the front frame and the bottom frame of the washing machine shown in FIG. 4; present invention;

FIG. 6 is a view illustrating a connected state of a front frame and a bottom frame of a washing machine in accordance with another embodiment of the present invention; and

FIG. 7 is a side view illustrating the connected state of the front frame and the bottom frame of the washing machine shown in FIG. 6.

DETAILED DESCRIPTION

[0024] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0025] FIG. 1 is a perspective view illustrating the external appearance of a washing machine in accordance with one embodiment of the present invention.

[0026] As shown in FIG. 1, the washing machine 1 in accordance with this embodiment includes a housing 11 forming the external appearance of the washing machine, a tub (not shown) provided in the housing 11 to contain wash water, a drum 2 rotatably mounted in the tub (not shown) and provided with an inlet 5 formed on the front surface thereof so that laundry is put into the drum 2 through the inlet 5, and a door 6 hinged to the housing 11 by a hinge member 7 so as to open and close the inlet 5 and locked by a locking device 8 when the inlet 5 is closed by the door 6.

[0027] Further, a control panel 16 provided with a display window to display an operating state of the washing machine and various buttons allowing a user to select one of various functions of the washing machine is installed at the upper portion of the front surface of the housing 11. A remaining water discharge hole (not shown) is formed at the lower portion of the front surface of the housing 11 so as to discharge remaining water.

[0028] Although not shown in the drawings, a drive motor (not shown) to generate rotary force to rotate the drum 2, a water supply device (not shown) and a detergent supply device (not shown) to supply wash water and detergents into the tub (not shown) and the drum 2, and a drain device (not shown) to forcibly discharge the wash water to the outside are provided in the housing 11.

[0029] In FIG. 1, reference numerals 4 and 3 respectively represent spin-drying holes formed on the circumferential surface of the drum 2 and lifters to lift up the laundry.

[0030] FIG. 2 is an exploded perspective of the washing machine in accordance with this embodiment of the present invention. With reference to FIG. 2, the housing 11 of the washing machine includes a front frame 21, a rear frame 15, a top frame 12 (with reference to FIG. 1), a bottom frame 41, two side frames 13 and 14, and hollow bracket frames 51 and 61 to connect the front frame 21 to the bottom frame 41.

[0031] The rear frame 15 and the side frames 13 and 14 can be formed integrally by bending a single plate. After the rear frame 15 and the side frames 13 and 14 are manufactured, the bottom frame 41 is assembled with the rear frame 15 and the side frames 13 and 14 by various connection methods, such as using screws or by caulking.

[0032] The bottom frame 41 includes a bottom plate 31 and a second connection part 42 extended upward from a front edge of the bottom plate 31. Second screw fastening holes 43 and 64 are formed on the second connection part 42 of the bottom frame 41 so as to be screw-connected to the front frame 21. Further, a plurality of latching protrusions 45, each of which has a hook shape, protrudes forward from the second connection part 42 of the bottom frame 41.

[0033] Although this embodiment uses screws, various fastening members including rivets, bolts and pins, in addition to the screws, may be used.

[0034] The above-described door 6 is hinged to the front frame 21 by the hinge member 7, and the locking device 8 of the door 6 is provided on the front frame 21. Further, the remaining water discharge hole (not shown) to discharge water remaining in the housing 11 after draining of water is formed on the front frame 21.

[0035] The front frame 21 includes a front surface part

30, an extension part 23 extended rearward from the lower edge of the front surface part 30, and a first connection part 26 extended upward from an edge of the extension part 23. First screw fastening holes 27 and 63 are formed at positions of the first connection part 26 corresponding to the second screw fastening holes 43 and 64 formed on the second connection part 42 of the bottom frame 41.

[0036] A plurality of latching holes 25, into which the plurality of latching protrusions 45 of the bottom frame 41 is inserted so as to reinforce connection force between the front frame 21 and the bottom frame 41, is formed on the extension part 23 of the front frame 21. Here, each of the latching protrusions 45 of the bottom frame 41 includes a horizontal part and a vertical part extended upward from an edge of the horizontal part, and the vertical part is inserted into each of the latching holes 25 of the front frame 21. The vertical part may include a bent part 46 inclined forward so as to be easily inserted into each of the latching holes 25.

[0037] Openings 24 and 62, into which the bracket frames 51 and 61 are inserted in the upward direction, are formed on the extension part 23 of the front frame 21.

[0038] Although FIG. 2 illustrates two bracket frames 51 and 61, two or more bracket frames may be provided. Since structures and connection relations of the two bracket frames 51 and 61 with the front frame 21 are the same, only one bracket frame 51 will be described hereinafter.

[0039] FIG. 3 is a view illustrating a connection structure of the front frame and the bottom frame of the washing machine in accordance with an embodiment of the present invention, FIG. 4 is a view illustrating a connected state of the front frame and the bottom frame of the washing machine in accordance with this embodiment of the present invention, and FIG. 5 is a side view illustrating the connected state of the front frame and the bottom frame of the washing machine in accordance with this embodiment of the present invention.

[0040] With reference to FIGS. 3 and 5, the bracket frame 51 is formed in a hill shape, and includes a bottom part 52, a connection mediator part 53 and an upper surface part 54.

[0041] A screw hole 57 is formed at a position of the connection mediator part 53 corresponding to the first screw fastening hole 27 formed on the first connection part 26 of the front frame 21 and the second screw hole 43 (with reference to FIG. 2) formed on the second connection part 42 of the bottom frame 41. Therefore, a screw A is sequentially inserted into the screw hole 57 of the connection mediator part 53, the first screw fastening hole 27 of the first connection part 26 and the second screw fastening hole 43 of the second connection part 42, thereby connecting the front frame 21 to the bottom frame 41.

[0042] The upper surface part 54 of the bracket frame 51 has an upwardly convex shape. Further, a flange part 55 is formed in the circumferential direction of the bottom part 52 of the bracket frame 51, and, when the bracket frame 51 is inserted into the opening 24 of the front frame 21, the flange part 55 is caught by the extension part 23 of the front frame 21 around the opening 24 and thus the bracket frame 51 and the front frame 21 are supported by each other.

[0043] The bracket frame 51 further includes a guide channel 58. The guide channel 58 is extended from an inlet 56 to the connection mediator part 53 of the bracket frame 51 so that the screw A may be fastened to the screw hole 57 formed on the connection mediator part 53 of the bracket frame 51.

[0044] Through such a structure, when the screw A is used to connect the front frame 21 to the bottom frame 41, the screw A is guided in the diagonal direction B from the front lower area to the rear upper area of the bracket 51, and then screwed in in the direction C. During this fastening, the main frame including the bottom frame 41 may have to be only slightly bent back in order to assemble the front frame 21 to the bottom frame 41 by fastening the screw A from the lower area to the upper area, as compared to the conventional structure in which the main frame needs to be significantly bent back, thus improving workability.

[0045] Further, since the flange part 55 of the bracket frame 51 supports the extension part 23 of the front frame 21 and the connection mediator part 53 of the bracket frame 51 supports the second connection part 42 of the bottom frame 41, the front frame 21 and the bottom frame 41 are more firmly connected.

[0046] Such a bracket frame 51 may be formed through injection molding using polypropylene so as to assure sufficient ductility.

[0047] FIG. 6 is a view illustrating a connected state of a front frame and a bottom frame of a washing machine in accordance with another embodiment of the present invention and FIG. 7 is a side view illustrating the connected state of the front frame and the bottom frame of the washing machine in accordance with this embodiment of the present invention.

[0048] In the washing machine in accordance with this embodiment, a connection mediator part 155 of a bracket frame 151 is forwardly inclined. A first connection part 126 of a front frame 121 and a second connection part 142 of a bottom frame 141 respectively include similarly forwardly inclined parts 127 and 143. Through such a structure, a screw D is guided in direction E and direction F D, and thus abrasion of parts is reduced and the screw D is more stably and easily fastened.

[0049] Hereinafter, a process of assembling the front frame 21 and the bottom frame 41 according to an assembly structure of a washing machine of an embodiment of the present invention will be briefly described.

[0050] Connection methods of the two bracket frames 51 and 61 to the front frame 21 and the bottom frame 41 are the same, and thus only the connection method of one bracket frame 51 to the front frame 21 and the bottom frame 41 will be described.

[0051] First, the bracket frame 51 is inserted in the up-

ward direction into the opening 24 formed on the extension part 23 of the front frame 21 so that the flange part 55 of the bracket frame 51 contacts the extension part 23 of the front frame 21. When the bracket frame 51 is installed on the front frame 21, the bottom frame 41 comes into contact with the front frame 21 so as to be assembled with the front frame 21.

[0052] Thereafter, the screw A is guided from the front lower area to the rear upper area through the guide channel 58 of the bracket frame 51, thereby sequentially connecting the connection mediator part 53 of the bracket frame 51, the first connection part 26 of the front frame 21 and the second connection part 42 of the bottom frame 41.

[0053] Since the screw A is guided in the diagonal direction B from the front lower area to the rear upper area through the bracket frame 51 in the above-described manner, the screw A may be fastened to the front frame 21 and the bottom frame 41 simply by slightly bending the front frame 21 and the bottom frame 41 back. Further, if the front frame 21 and the bottom frame 41 are placed on a rack and are then pulled in the forward direction of the rack so as to expose the inlet 56 of the guide channel 58, the screw A may be fastened to the front frame 21 and the bottom frame without bending of the front frame 21 and the frame 41 back. If the screw A is unfastened from the front frame 21 and the bottom frame 41 in order to separate the front frame 21 from the bottom frame 41, the screw A may be conveniently unfastened in the same manner as the fastening of the screw A to the front frame 21 and the bottom frame 41.

[0054] As is apparent from the above description, a washing machine having an assembly structure of a front frame and a bottom frame in accordance with one embodiment of the present invention allows a screw to be fastened to the front frame and the bottom frame via a bracket frame inserted into the front frame, thereby preventing the screw from being exposed to the outside of the front part of the front frame and thus from being damaged, and having excellent fastening force. Further, the washing machine allows the screw to be guided in a diagonal direction from a front lower area to a rear upper area, thereby improving ease and workability.

[0055] Although various embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A washing machine comprising:

a front frame including an extension part extended rearward from the front frame, and a first connection part extended upward from the extension part;

a bottom frame including a second connection part extended upward from the bottom frame and connected to the first connection part through fastening members; and

bracket frames, each of which includes a guide channel to guide entry and exit of each of the fastening members, wherein the bracket frames are respectively installed in openings formed on the extension part of the front frame.

2. The washing machine according to claim 1, wherein each of the bracket frames further includes a connection mediator part connected to the first connection part of the front frame.

3. The washing machine according to claim 1, wherein each of the bracket frames further includes a flange part that is supported by a portion of the extension part of the front frame defining the openings.

4. The washing machine according to claim 2, wherein the fastening members are sequentially fastened to the connection mediator parts of the bracket frames, the first connection part of the front frame and the second connection part of the bottom frame.

5. The washing machine according to claim 2, wherein the connection mediator parts of the bracket frames, the first connection part of the front frame and the second connection part of the bottom frame respectively include forwardly inclined parts.

6. The washing machine according to claim 1, wherein the bracket frames are formed through injection molding using polypropylene.

7. The washing machine according to claim 1, wherein:

a plurality of latching holes is formed on the extension part of the front frame; and

the bottom frame further includes a plurality of latching protrusions respectively inserted into the plurality of latching holes.

8. The washing machine according to claim 16, wherein each fastener is selected from the group comprising screws, rivets, bolts or pins.

FIG. 1

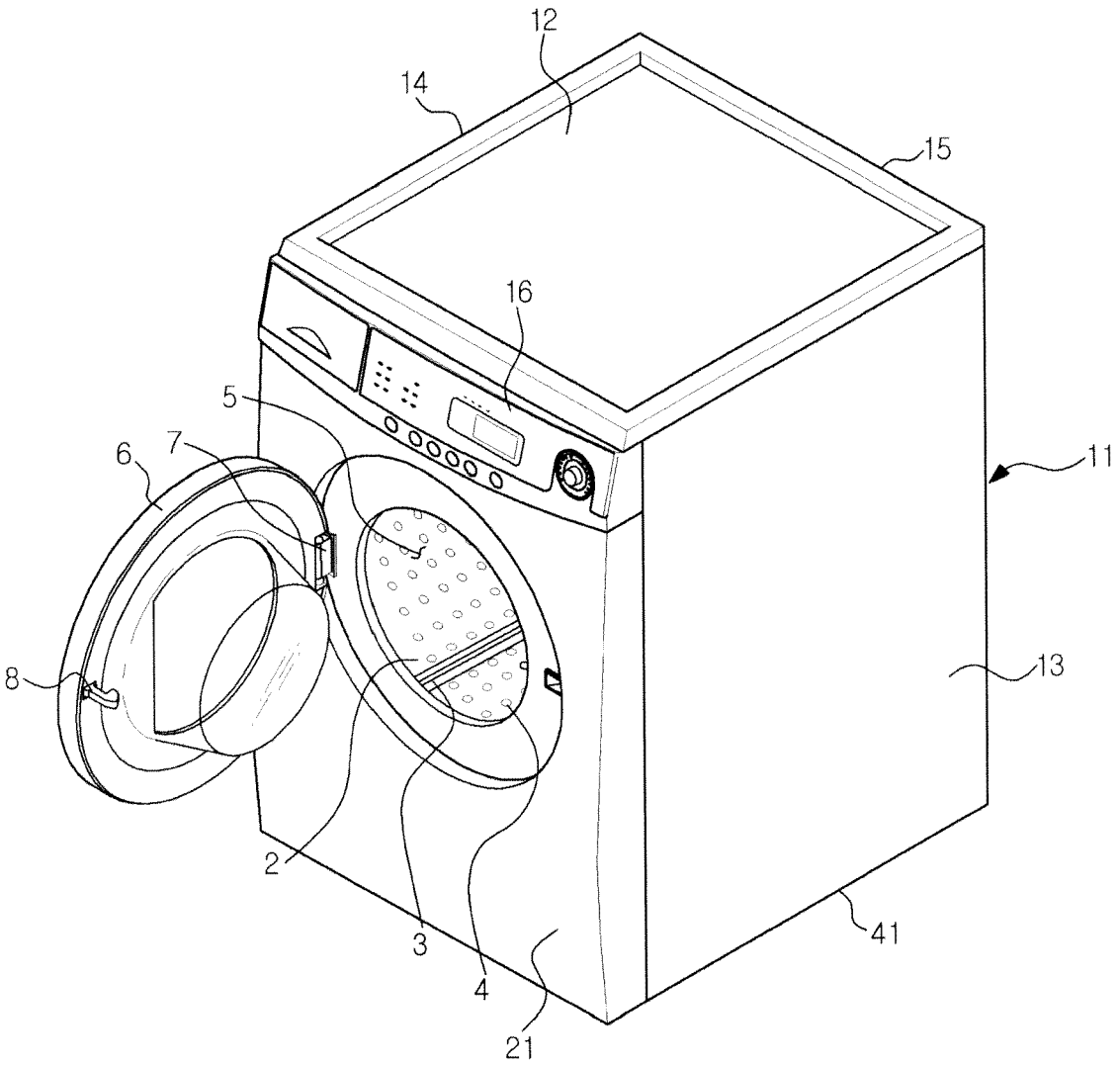


FIG. 2

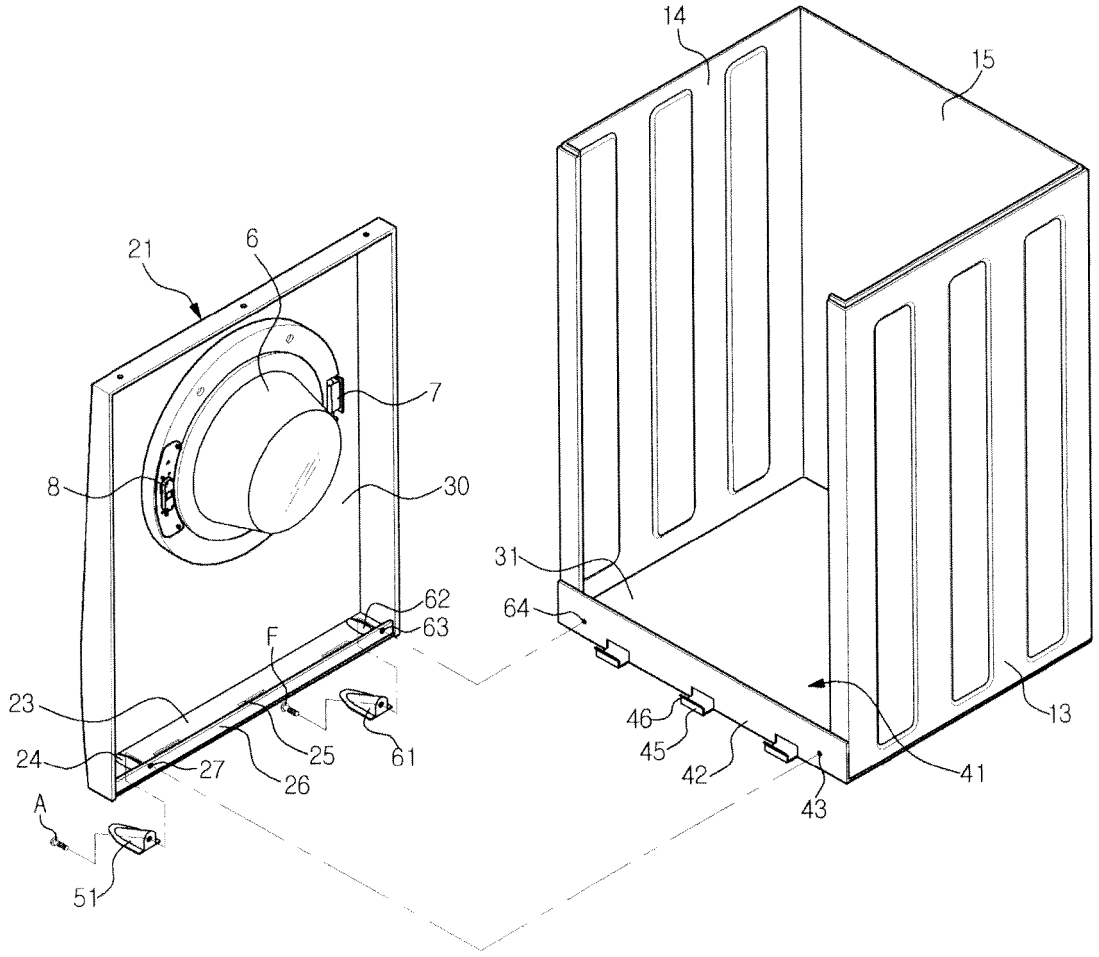


FIG. 3

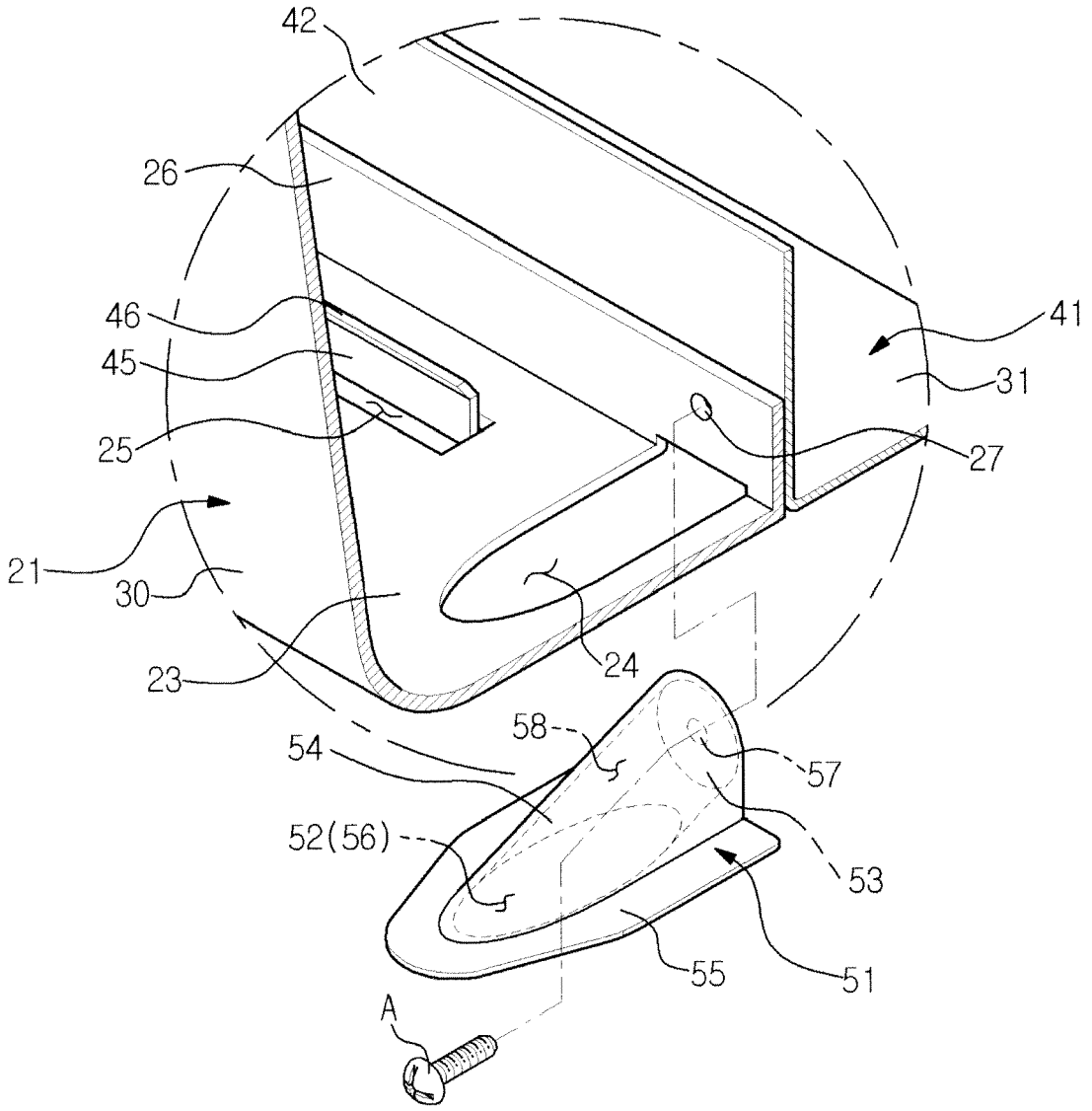


FIG. 4

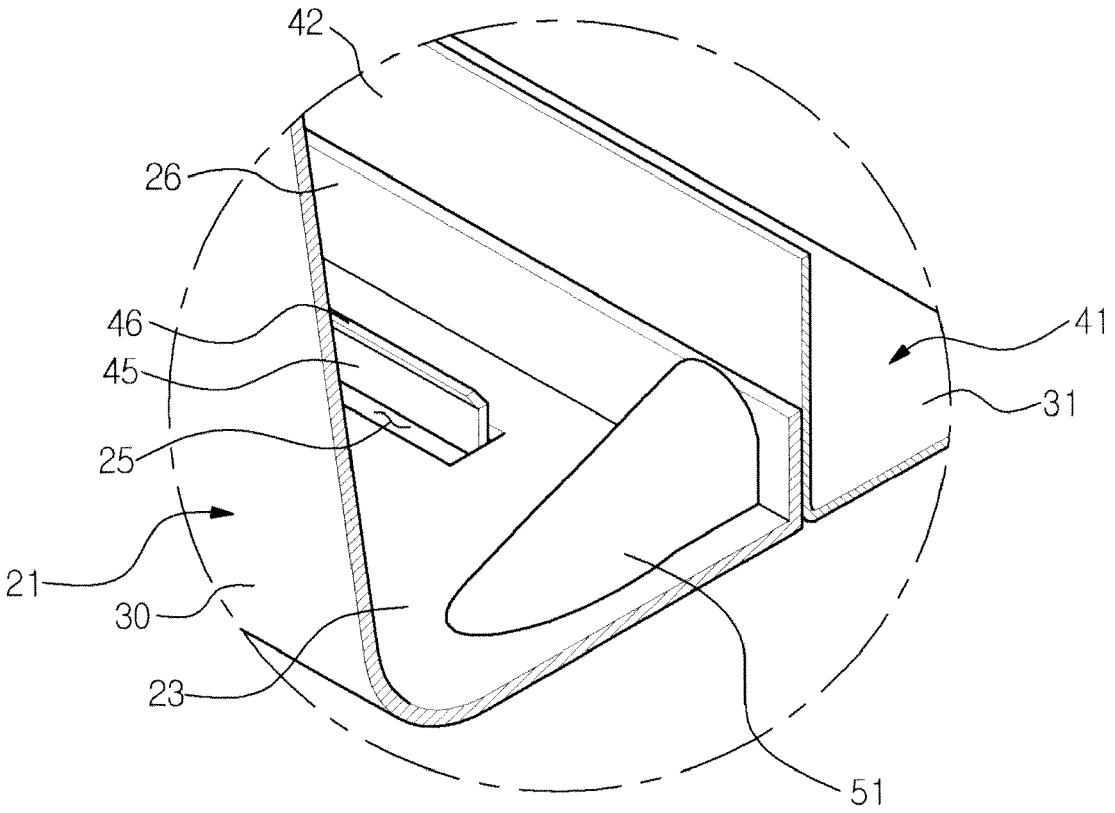


FIG. 5

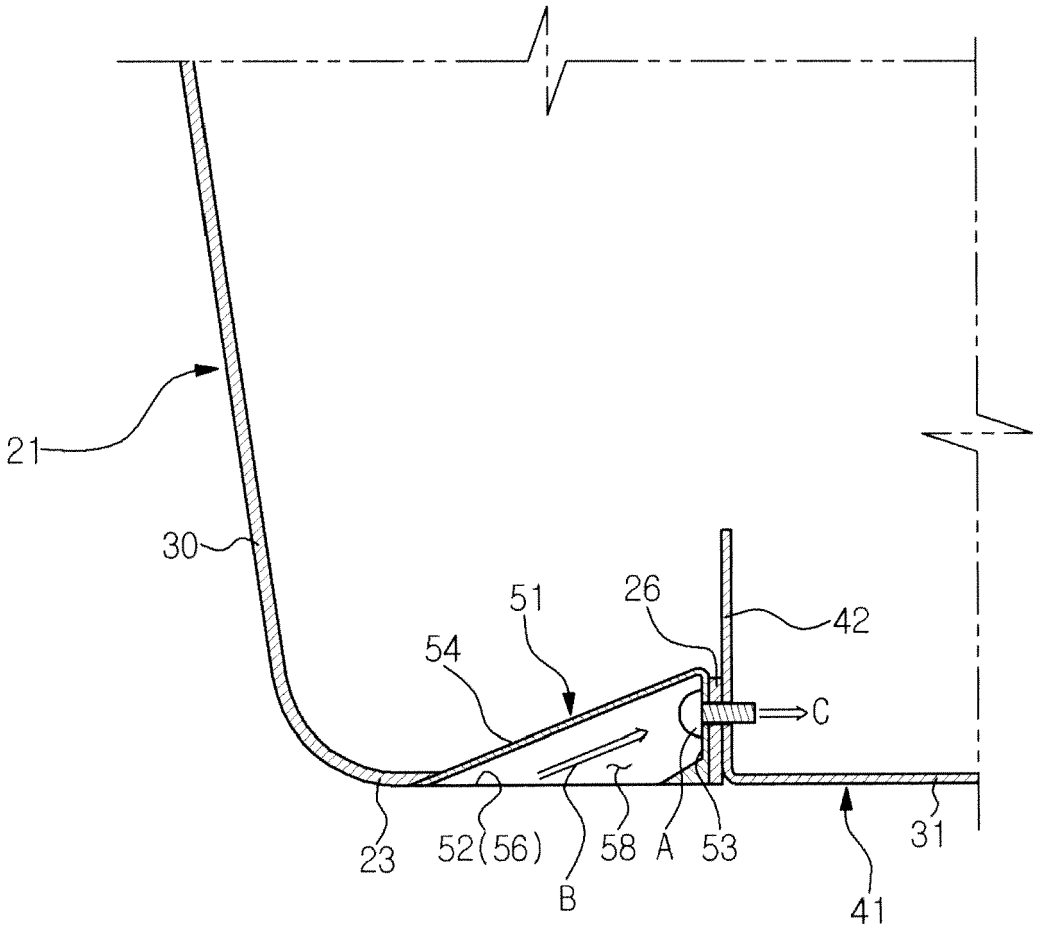


FIG. 6

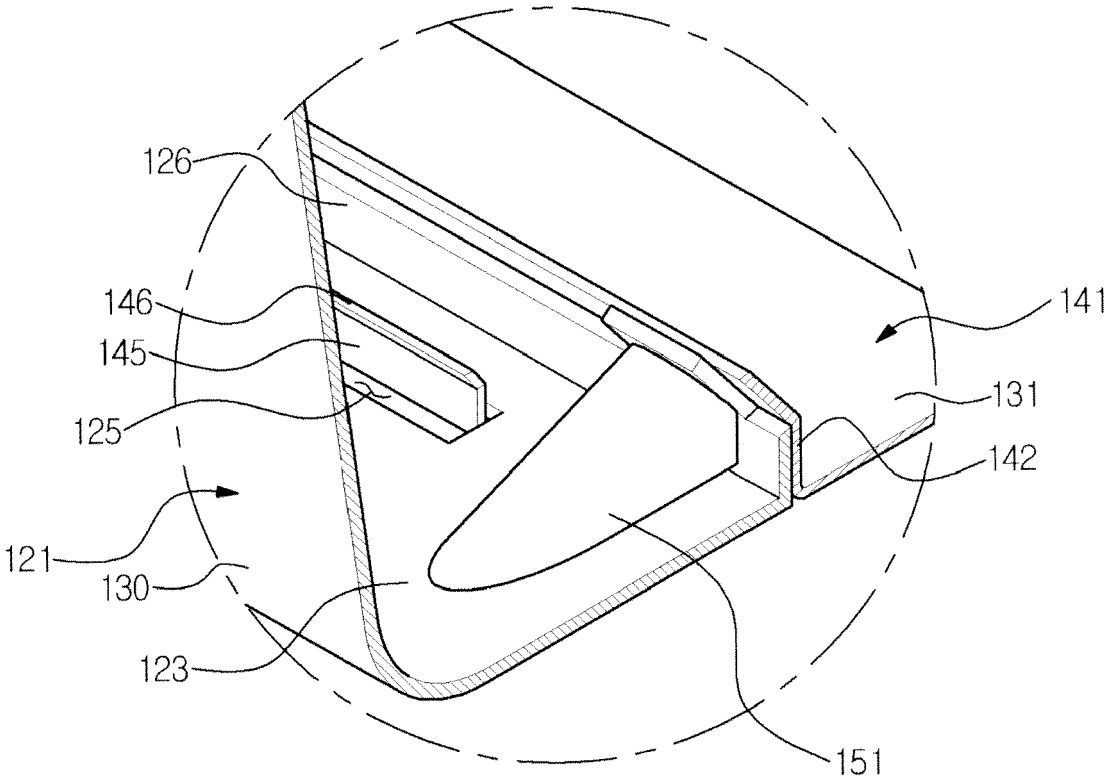
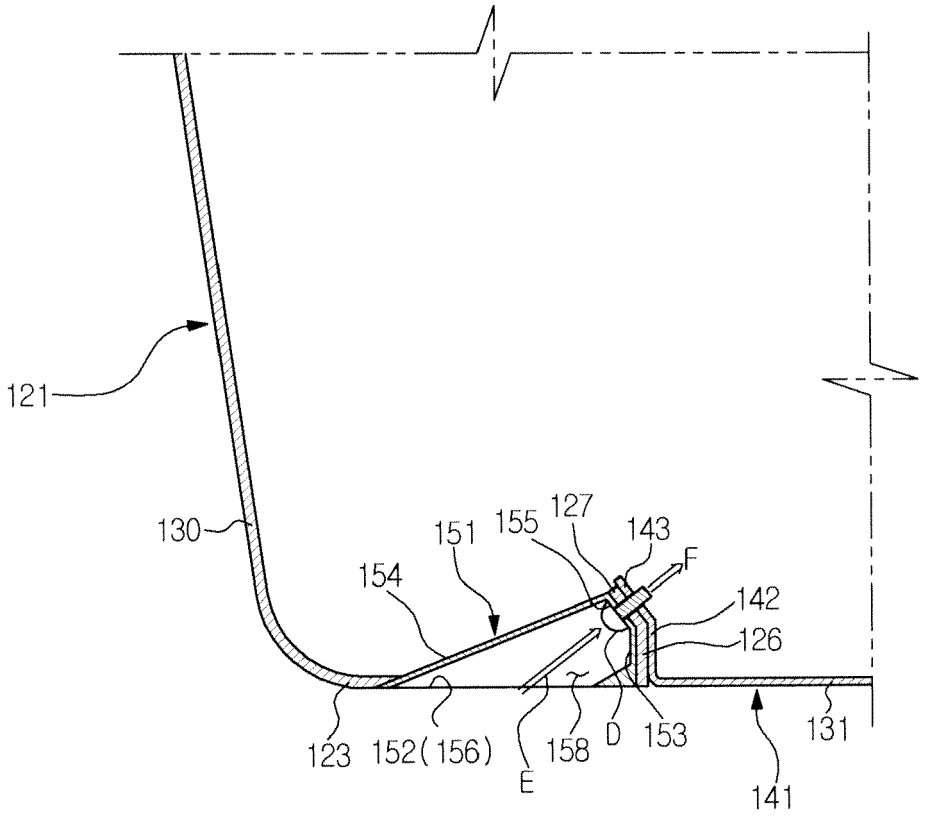


FIG. 7


121
130
151
155
127
143
F
154
142
126
123
152(156)
158
E
D
153
131
141

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 11 18 4951

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 798 424 A (COATES DONALD A [US] ET AL) 17 January 1989 (1989-01-17)	1-6,8	INV. D06F39/12
A	* the whole document *	7	
A	EP 1 424 429 A1 (LG ELECTRONICS INC [KR]) 2 June 2004 (2004-06-02) * the whole document *	1-8	
A	WO 2007/073120 A1 (LG ELECTRONICS INC [KR]; HAN IL TAK [KR]; HWANG SUNG GI [KR]; YOON JU) 28 June 2007 (2007-06-28) * the whole document *	1-8	
A	EP 1 806 447 A2 (MIELE & CIE [DE]) 11 July 2007 (2007-07-11) * the whole document *	1-8	

TECHNICAL FIELDS SEARCHED (IPC)
D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 December 2011	Jezierski, Krzysztof

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 18 4951

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-12-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4798424 A	17-01-1989	NONE	
EP 1424429 A1	02-06-2004	AU 2003262464 A1	17-06-2004
		CN 1504601 A	16-06-2004
		EP 1424429 A1	02-06-2004
		JP 3916599 B2	16-05-2007
		JP 2004305709 A	04-11-2004
		US 2004168484 A1	02-09-2004
WO 2007073120 A1	28-06-2007	EP 1977033 A1	08-10-2008
		US 2009153004 A1	18-06-2009
		WO 2007073120 A1	28-06-2007
EP 1806447 A2	11-07-2007	AT 465292 T	15-05-2010
		DE 102006001437 A1	12-07-2007
		EP 1806447 A2	11-07-2007
		ES 2342484 T3	07-07-2010
		US 2007159034 A1	12-07-2007

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82