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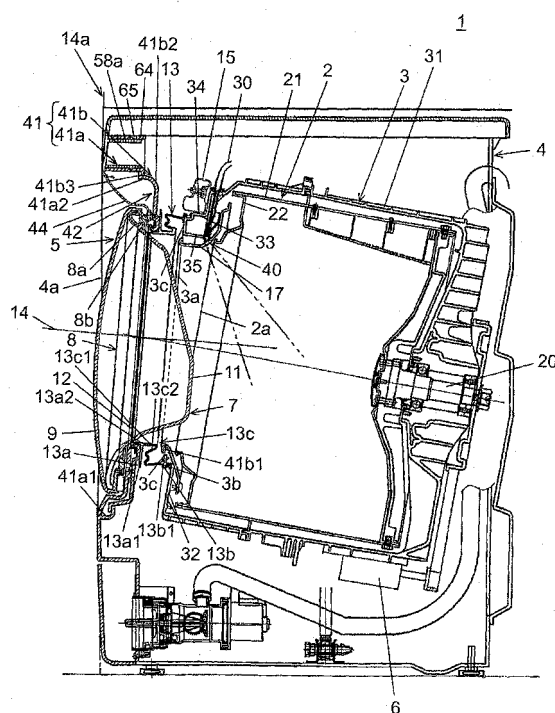
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(54) **DRUM TYPE WASHING MACHINE**

(57) A rotary drum is installed in a water tank so that the rotation shaft may be inclined downward from the horizontal direction, from the opened front side to the back side at the bottom, and the laundry is put into the rotary drum, and by driving the motor, at least one of washing process, rinsing process, and dewatering process is carried out, in which an opening-closing lid is inclined to the rear side from a body panel forming the front part of the washing machine casing, an access opening opened in the bottom inclined to the rear side of the recess dented from the front part is closed, the body panel is formed by integrally bombing a frame-shaped body panel having an opening side to the front side of the recess, and a ring-shaped body panel forming the bottom side having the access opening in the recess, and the recess is fitted externally by a ring-shaped cover panel.

FIG. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to a drum type washing machine capable of carrying out at least one of washing process, rinsing process, and dewatering process.

BACKGROUND ART

[0002] Such drum type washing machine is usually provided with an opening-closing lid installed in a position parallel to the front side of the washing machine casing, so as to close the access opening opened in parallel to the front side in the bottom of a recess dented from the front side (see, for example, patent documents 1 to 3).

[0003] The opening end of the rotary drum, the access opening of the washing machine casing, and the opening-closing lid are inclined backward from the vertical direction as seen in patent documents 1 and 2, because it is known to be convenient from the viewpoint of putting in or taking out the laundry or, seeing through the laundry from outside. However, such design concept is contrary to the idea of aligning the front sides vertically together with other pieces of furniture in built-in use.

[0004] Patent document 3 discloses an example of drum type washing machine having a vertical front side, in which the opening-closing lid and the access opening are installed parallel to the front side vertical to the horizontal direction of the washing machine casing, on the basis of the conventional design in the horizontal direction at the front side of the washing machine casing. As a result, regardless of presence or absence of inclination of the rotary drum, it is inconvenient for putting in or taking out the laundry or seeing through the laundry from outside.

Prior art literature

Patent documents

[0005]

Patent document 1: Japanese Patent Unexamined Publication No. 2000-342880

Patent document 2: Japanese Patent Unexamined Publication No. 2005-137508

Patent document 3: Japanese Patent Unexamined Publication No. 2005-143794

SUMMARY OF THE INVENTION

[0006] It is hence an object of the present invention to present a drum type washing machine having the opening-closing lid and the access opening inclined backward to the front side so as to be easy to use regardless of presence or absence of inclination of the front side, and

capable of solving the problem of difficulty in machining as the depth increases in the recess having the access opening.

[0007] To achieve the object, the drum type washing machine of the present invention includes a washing machine casing, a water tank installed inside of the washing machine casing, a rotary drum installed in the water tank so that the rotation shaft direction may be a downward inclination from the horizontal direction toward the back side at the bottom from the opened front side, an opening-closing lid provided in the front part of the washing machine casing, a body panel for composing an access opening of the water tank, and a motor for driving the rotary drum, capable of carrying out at least one of washing process, rinsing process, and dewatering process, in which the body panel has a frame-shaped body panel composing the front side of the washing machine case and having an opening, and a ring-shaped body panel having provided between the frame-shaped body panel and the opening end of the water tank, and the frame-shaped body panel and the ring-shaped body panel are formed integrally, and a ring-shaped recess in the depth direction composed of the frame-shaped body panel and the ring-shaped body panel is covered with a ring-shaped cover panel and fitted outside.

[0008] In such configuration, since the opening-closing lid and the access opening are inclined backward and positioned to the front side of the washing machine casing, regardless of the angle of the front side of the washing machine casing, it is convenient for putting in or taking out the laundry, or seeing through the laundry from outside. Moreover, the angle of the front side of the washing machine casing can be selected freely. In addition, the body panel is composed of the frame-shaped body panel and the ring-shaped body panel which are formed separately and combined integrally, and the recess is covered with the cover panel and is fitted outside.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

FIG. 1 is a sectional view of a drum type washing machine in preferred embodiment 1.

FIG. 2 is a perspective view of appearance of the drum type washing machine.

FIG. 3 is a perspective view of essential parts of the drum type washing machine.

FIG. 4 is a front view of essential parts of the drum type washing machine.

FIG. 5 is a front view of essential parts of the drum type washing machine.

FIG. 6 is a front view of essential parts of the drum type washing machine.

FIG. 7 is a perspective view of essential parts of the drum type washing machine.

PREFERRED EMBODIMENTS FOR CARRYING OUT THE INVENTION

Preferred Embodiment 1

[0010] The drum type washing machine in preferred embodiment 1 is explained below while referring to FIG. 1 to FIG. 7. The following explanation is an exemplary example of the present invention, and is not intended to define the content the scope of the claims of the present invention.

[0011] As shown in FIG. 1 and FIG. 2, drum type washing machine 1 of preferred embodiment 1 includes rotary drum 2, formed in a cylindrical shape having a bottom, which is installed in water tank 3 floating and supported by suspension, so that the direction of rotation shaft 20 may be inclined downward from the horizontal direction, from the opened front side to the back side at the bottom. By opening opening-closing lid 5 provided at the front side of washing machine casing 4, the laundry is put into rotary drum 2, and rotary drum 2 is driven by motor 6, thereby executing at least one of washing process, rinsing process, and dewatering process. Opening-closing lid 5 is composed of lid main body 8 having window 7 framed with transparent glass plate 11 for seeing through the laundry from outside, and lid cover 9 for making the front side of lid main body 8 transparent. Lid main body 8 has its lid frame 8a formed of polypropylene, and its back frame 8b formed of polypropylene of higher chemical resistance. Lid frame 8a and back frame 8b are fixed with glass plate 11 by tightening and screw into its peripheral parts. Lid cover 9 is formed of a transparent ABS resin.

[0012] In drum type washing machine 1 in preferred embodiment 1, opening-closing lid 5, when closed, is inclined at a different angle from rotary drum opening end 2a. Since opening-closing lid 5 is inclined, it is not inconvenient for seeing through into rotary drum 2 from outside, or putting in or taking out the laundry. Herein, opening-closing lid 5 and water tank opening end 3a are sealed by ring-shaped window packing 13 excellent in durability and nearly uniform in section and sectional area in the peripheral direction. Conventionally, lid packing 13 was formed like a taper in a side view and was not uniform in the sectional shape and sectional area of each sectional part in the peripheral direction, and in such a case when a particularly large and vibrating external force is applied to water tank opening end 3a, the load applied to the packing is amplified and concentrated in a local area large in sectional area, which may lead to early injury or early breakage. Such problem is solved in the configuration of preferred embodiment 1.

[0013] Accordingly, opening-closing lid 5 and water tank opening end 3a are sealed by ring-shaped window packing 13 excellent in durability and nearly uniform in section and sectional area in the peripheral direction. To realize this configuration, water tank opening end 3a is disposed so as to be opposite at an inclination nearly

parallel to opening-closing lid 5. Thus, opening-closing lid 5 and water tank opening end 3a are sealed by ring-shaped window packing 13 nearly parallel to front end 13a and rear end 13b. As a result, after the laundry is put into rotary drum 2, opening-closing lid 5 is closed, and is tightly shut. By rotating rotary drum 2, when at least one of washing process, rinsing process, and dewatering process is executed, washing water, rinsing water, or splashes of dewatering can be prevented from leaking outside.

[0014] Water tank opening end 3a has an inclination parallel to opening-closing lid 5, so that opening-closing lid 5 and water tank opening end 3a may be sealed by ring-shaped window packing 13 nearly parallel to front end 13a and rear end 13b. Therefore, window packing 13 is uniform in the sectional shape and sectional area of each sectional part in the peripheral direction.

[0015] In this configuration, opening-closing lid 5 inclined at an angle different from rotary drum opening end 2a and water tank opening end 3a accommodating rotary drum 2 are sealed, and it is effective to prevent washing water, rinsing water, or splashes of dewatering from leaking outside appropriately. Further, ring-shaped window packing 13 is installed so that opening-closing lid 5 and water tank opening end 3a may be nearly parallel to each other, and hence window packing 13 is uniform in the sectional shape and sectional area of each sectional part in the peripheral direction. Therefore, the load due to repeated application of compression and deforming force along with displacement in the peripheral direction occurring between swinging and moving water tank opening end 3a and stopped opening-closing lid 5 is equalized in the peripheral direction and is not locally amplified and concentrated, and early damage or breakage is avoided, and a long life is realized.

[0016] Herein, front end 13a is meant as an abutting end to opening-closing lid 5 and fitting end to water tank opening end 3a. Rear end 13b is elastically fitted to ring-shaped recess 3b on the outer circumference of water tank opening end 3a, and is formed as fitting seat 13b1 to be seated at the front side of inward flange 3c at the front side of ring-shaped recess 3b. Front end 13a has pressing lip 13a1 to be fitted to ring surface 5a consecutive to the inner circumferential side of the back side of lid main body 8 of opening-closing lid 5, and seal lip 13a2 to be tightly fitted to the inner circumference of window 7 of lid main body 8, formed in a bifurcate shape of a nearly right-angle section. The entire body of lid packing 13 is formed by linking between the nearly central position in the width direction of flange 3c of fitting seat 13b1, and the bifurcate coupling part of seal lip 13a2 with linkage part 13c.

[0017] Linkage part 13c has M-shaped part 13c1 and folding part 13c2. In M-shaped part 13c1, since the linkage diameter to the bifurcate coupling part is smaller than the rising diameter of fitting seat 13b1, an M-section shape is formed from fitting seat 13b1, and one foot part is raised so as to be slightly outward and oblique to the

front side. Folding part 13c2 is folded from other end of the non-rising side of M-shaped part 13c1 to the front side, and is linked to the bifurcate coupling part in parallel to axial line 14 of opening-closing lid 5 to seal lip 13a2.

[0018] Between the closed opening-closing lid 5 and flange 3c at water tank opening end 3a, lid packing 13 has a necessary seal pressure. Therefore, lid packing 13 deflects and moves together with water tank opening end 3a, and functions as an elastic buffer part.

[0019] Incidentally, opening-closing lid 5 is inclined at an angle between rotary drum opening end 2a and the vertical plane, and washing machine casing 4 has its front side 4a formed almost vertically. As a result, the angle difference from rotary drum opening end 2a of opening-closing lid 5 is suppressed. Also the angle difference from the nearly vertical front side 4a of washing machine casing 4 is suppressed, and extent of projection or depression from the vertical profile of washing machine casing 4 is suppressed. Hence, if washing machine casing 4 is installed in a built-in configuration partly indicated by virtual line 14a so that the front surfaces may be aligned, extent of projection or depression by inclination to the front side is suppressed, and the appearance of the washing machine in line with other furniture may be enhanced.

[0020] As shown in FIG. 7, water tank 3 has water tank shoulder part 32 directed to the inside diameter side nearly in parallel to rotary drum opening end 2a at the front side of its water tank shell part 31. From this water tank shoulder part 32 to a position nearly parallel to the closed opening-closing lid 5, water tank opening end 3a is formed by building rising wall 33 different in height in the peripheral direction. At the rising end portion of this rising wall 33, rear end 13b of window packing 13 is fitted. As a result, at the front side of water tank shell part 31, water tank shoulder part 32 directed to the inside diameter side nearly in parallel to rotary drum opening end 2a is provided, and the necessary front region at the side of rotary drum shell part 21 is covered, and the rotating rotary drum 2 is protected from outside and the safety is assured. Still more, water tank opening end 3a is formed almost parallel to opening-closing lid 5 by means of rising wall 33 different in height in the peripheral direction from water tank shoulder part 32, and the backup position necessary for sealing window packing 13 parallel between front end 13a and rear end 13b together with opening-closing lid 5 is formed in M-shaped part 13c so as to be supported satisfactorily. Thus, sufficient sealing is achieved by window packing 13 having a sectional area of minimum necessary limit.

[0021] As shown in FIG. 5, in peripheral direction step part 34 formed between water tank shoulder part 32 and rising wall part 33, spindle 15 of a size to be completely accommodated in the step range is fastened by screws by fixing to a plurality of boss parts 32a on water tank shoulder part 32. Such spindle 15 is used for dispersing and damping the vibration energy by receiving the vibrations of water tank 3. Spindle 15 is provided in peripheral

direction step part 34 formed between water tank shoulder part 32 at the front end of the most largely moving portion of water tank 3 and rising wall part 33, and therefore the vibration suppression efficiency is enhanced.

Moreover, the size of spindle 15 is small enough to be completely accommodated in step part 34. Accordingly, if spindle 15 vibrates while deforming window packing 13 together with water tank 3, interference with window packing 13 is avoided, and window packing 13 is not damaged. In particular, in the upper part where the step difference of step part 34 is larger, the size of spindle 15 to be provided in this place may be increased depending on the step, the weight per unit length in the peripheral direction may be raised, and the vibration suppression efficiency may be enhanced.

[0022] Water feed pipe 30 communicates with the inside of water tank shoulder part 32 provided with spindle 15, and is disposed by avoiding boss parts 32a of water tank shoulder part 32 having spindle 15 provided from outside of water tank 3. As a result, water is injected into rotary drum 2 through water feed port 40 of covering member 17 as indicated by virtual line, and is poured effectively onto the laundry, in particular, clothes.

[0023] The clearance between water tank opening end 3a and rotary drum opening end 2a is adjusted so as to cover with ring-shaped covering member 17 having a side view width suited to the inclination angle difference. That is, covering member 17 is formed in a taper shape in side view depending on the angle difference of water tank opening end 3a and rotary drum opening end 2a, and the clearance between water tank opening end 3a and rotary drum opening end 2a can be covered and closed sufficiently. Therefore, the material for covering member 17 is appropriate and economical, and the laundry is prevented from being caught in the gap between water tank opening end 3a and rotary drum opening end 2a.

[0024] Moreover, rotary drum shoulder part 22 directed to the inside diameter side is formed in the front part of rotary drum shell part 21, and the opening is formed in a smaller diameter than rotary drum shell part 21, and a sufficient depth of water necessary for washing and rinsing can be maintained. By contract, water tank shoulder part 32 forms water tank opening end 3a composing a double peripheral wall in part of inner peripheral wall 35 opposite across a specific gap to rotary drum opening end 2a, in the inner circumference of flange 3c extended to the inside diameter side from the rising end of rising wall 33. As a result, the gap width of rotary drum opening end 2a and water tank opening end 3a is different in the peripheral direction, and increase of the gap width depending on location is avoided. The front end of covering member 17 slightly projects to the front side from water tank opening end 3a near the inner circumference of water tank opening end 3a, and the inner circumference of water tank opening end 3a is covered nearly up to rotary drum opening end 2a. The inside diameter of the covering part is smaller than the inside diameter of rotary drum

opening end 2a. Covering member 17 is fastened by screws 18 to boss parts 32a from at the inner side of water tank shoulder part 32.

[0025] FIG. 3, FIG. 4, and FIG. 6 are magnified views of the part of body panel 41. Access opening 12 is formed in metal-made body panel 41 forming a region excluding the upper and lower parts of front side 4a of washing machine casing 4. If body panel 41 is formed of a single plate as in the prior art, opening-closing lid 5 is provided by inclining to the inside to the nearly vertical front side 4a, when opening-closing lid 5 closes access opening 12, the closing region and the surrounding annular region formed recess 42 dented deeply from front side 4a of body panel 41 from the lower part to the upper part, and the upper region is drawn and processed deeply. As a result, it is hard to form body panel 41 having a sufficient thickness for satisfying the strength enough to support washing machine casing 4 and opening-closing lid 5, and the cost is higher.

[0026] In preferred embodiment 1, body panel 41 is formed separately of ring-shaped body panel 41b corresponding to recess 42, and frame-shaped body panel 41a in its periphery, which are combined integrally. Hence, body panel 41 is reduced in the drawing degree to half, and is obtained by combination of frame-shaped body panel 41a and ring-shaped body panel 41b that can be processed easily and at low cost.

[0027] In preferred embodiment 1, the components are integrated by spot welding part 43, but frame-shaped body panel 41a and ring-shaped body panel 41b may be integrated also by other methods, such as welding, crimping, riveting, screwing and others. For this integration, ring-shaped body panel 41b has ring-shaped bulging part 41b1 directed to the rear side to be pressed to lid packing 15 formed in the inner circumference like a groove at the front side, and also has outer peripheral wall 41b2 bending and rising at the lower side by forming a large curved surface at the upper side after extending from this ring-shaped bulging part flatly to the periphery. At the front end of outer peripheral wall 41b2, outward flange part 41b3 is also formed, and frame-shaped body panel 41a forms side peripheral wall 41a1 corresponding to the outer circumference of recess 42 in the forming region of front side 4a of washing machine casing 4. At the rear edge of this side peripheral wall 41a1, inward recess peripheral wall 41a2 is formed to be fitted to flange part 41b3 from behind. The overlapping portion of peripheral wall 41a3 and recess peripheral wall 41a2 is bonded by spot welding at plural positions in the circumferential direction as indicated by spot welding part 43.

[0028] Herein, hinge unit 51 is fitted to one of right left sides of ring-shaped body panel 41b from the front side, and is fastened by screws, and opening-closing lid 5 is supported by this hinge unit 51 so as to be opened and closed. At other side, engaging piece 5a is received and locked in lock window 53a, and opening-closing lid 5 is fixed in closed state, and lid lock part 53 provided with lid close detection switch is fitted, and fixed with screws.

Lid open button 54 for unlocking the lid is fitted from the front side, and is fixed with screws.

[0029] Further, frame-shaped body panel 41a has peripheral wall 41a3 forming front side 4a of washing machine casing 4, round peripheral wall 41a1 extended about the extent of width of recess 42 formed in the upper part of peripheral wall 41a3, and ring-shaped recess peripheral wall 41a2. Ring-shaped body panel 41b is thick, and frame-shaped body panel 41a is thin, and plates different in thickness are combined. Therefore, the overlapping spot welding structure and solid shape of frame-shaped body panel 41a and ring-shaped body panel 41b are combined, and the necessary strength is satisfied. Moreover, by the portion of reducing the plate thickness of frame-shaped body panel 41a larger in area, the weight of washing machine casing 4 is reduced and the cost is lowered.

[0030] Hinge unit 51 of body panel 41, and recess 42 forming lid lock part 53 and lid open button 54 are fitted externally, except for lid open button 54, by covering with resin-made ring-shaped cover panel 44. Cover panel 44 is fastened with screws at plural positions in the peripheral direction to ring-shaped body panel 41b. As a result, when cover panel 44 is detached to the front side, hinge unit 51, lid lock part 53, and lid open button 54 provided in body panel 41 are exposed, so that they can be repaired or replaced easily, and the maintenance is enhanced.

[0031] Front side 4a of washing machine casing 4 is formed of frame-shaped body panel 41a, resin-made top mark unit 58 for closing between its upper part and top plate 57, and resin-made opening-closing panel 59 for closing so as to detach the lower part of frame-shaped body panel 41a. Top mark unit 58 is an operation panel including start and stop switch keys 61, mode setting units 62, liquid crystal display part 63, and display lamp.

[0032] Cover panel 44 and top mark unit 58 are both made of resin formed parts. Mutually vertically adjacent opposite sides 44a, 58a are formed consecutively at right angle on the surface, and can be fitted end to end without clearance.

[0033] Hence, on a wide and slender resin surface forming the upper part of front side 4a of washing machine casing 4, the resin surface inclined to the rear side toward the central side is formed in a buried state in the upper part without gap, consecutively in different colors, so that a specific appearance is formed.

[0034] In these consecutive cover panel 44 and top mark unit 58, opposite sides 44b, 58b of metal-made frame-shaped body panel 41a of different materials are adjacent to peripheral wall 41a3 and side peripheral wall 41a1 of frame-shaped body panel 41a. By bending and forming peripheral wall 41a3 and side peripheral wall 41a1, round corner parts form abutting parts having a clearance, and the appearance or structure emphasizing the presence and independence of these surfaces is realized.

[0035] Abutting of cover panel 44 and top mark unit 58

is realized by covering of top mark unit 58 on the front end of recess peripheral wall 41a2 of frame-shaped body panel 41a. This covering structure is realized by fitting and mounting top mark unit 58 on the upper part of frame-shaped body panel 41a from the front side, so as to be covered with the front side of peripheral wall 41a3 of frame-shaped body panel 41a. Therefore, to dismount frame-shaped body panel 41a, top mark unit 58 must be dismounted in the first place. By contrast, top mark unit 58 is assembled by fitting upper wall 58a and lower wall 58b from the front part between side peripheral wall 41a1 of frame-shaped body panel 41a and fixed wall 64 at the side of washing machine casing 4 provided at its outer side. In upper wall 58a and lower wall 58b, outward formed counter-reverse protrusions are elastically engaged with stopping holes 65 formed in peripheral wall 41a3 and fixed wall 64, thereby preventing from slipping out. By dismounting force capable of overcoming this slipping preventive force, frame-shaped body panel 41a can be dismounted easily.

[0036] In this configuration, the drum type washing machine of the present invention includes a washing machine casing, a water tank installed inside of the washing machine casing, a rotary drum installed in the water tank so that the rotation shaft direction may be a downward inclination from the horizontal direction toward the back side at the bottom from the opened front side, an opening-closing lid provided in the front part of the washing machine casing, a body panel for composing an access opening of the water tank, and a motor for driving the rotary drum, capable of carrying out at least one of washing process, rinsing process, and dewatering process, in which the body panel has a frame-shaped body panel composing the front side of the washing machine case and having an opening, and a ring-shaped body panel having provided between the frame-shaped body panel and the opening end of the water tank, and the frame-shaped body panel and the ring-shaped body panel are formed integrally, and a ring-shaped recess in the depth direction composed of the frame-shaped body panel and the ring-shaped body panel is covered with a ring-shaped cover panel and fitted outside. In such configuration, since the opening-closing lid and the access opening are inclined backward and positioned to the front side of the washing machine casing, regardless of the angle of the front side of the washing machine casing, together with the inclined position of the rotary drum, it is convenient for putting in or taking out the laundry, or seeing through the laundry from outside. Moreover, the angle of the front side of the washing machine casing can be selected freely including the vertical configuration and backward inclination, and it is free to conform to various applications and requests. In addition, the recess from the front side formed by the body panel is a deep drawn part having a bottom opened in the access opening inclined from the front side, but since the opening side and the bottom side are formed separately and combined integrally by the frame-shaped body panel and the ring-shaped body panel

divided from the body panel, and deep-drawing process is avoided, and easy and low cost processing is realized, and only by covering with the cover panel, external fitting is realized and the appearance is enhanced.

[0037] Still more, the frame-shaped body panel and the ring-shaped body panel are integrated in the weld zone in the overlapping portion between the rear end inward flange part of the opening side of the recess formed by them and the front end outward flange part of the bottom side. Hence, a necessary strength is obtained without complicating the structure.

[0038] In addition, the body panel has a plate thickness larger in the ring-shaped body panel and in the frame-shaped body panel. As a result, the plate thickness of the frame-shaped body panel of a larger area is reduced, and the weight of the washing machine casing is reduced by a corresponding portion, so that the cost is lowered.

[0039] Moreover, the ring-shaped body panel has an opening and closing device for opening and closing of opening-closing lid provided the front part, and the cover panel is fitted so as to be detachable from the front part of the recess. Hence, the opening and closing device can be mounted with a sufficient strength and is held stably. By detaching the cover panel from the front part, the opening and closing device provided at the front part of the ring-shaped body panel can be exposed, and maintenance jobs of the opening and closing device can be accessed easily from the front side only.

[0040] In addition, the body panel is made of metal and the ring-shaped cover panel is made of resin, and in the upper part of the body panel, the top mark unit made of resin and forming the operation and display surface is provided oppositely. As a result, the ring-shaped cover panel and the top mark unit are formed of a similar sense of mass, and without effects of folding of metal plates, presence or absence of clearance, or opposing or abutting condition may be freely set or selected, and an optimum appearance including an appearance of two consecutive resin members may be obtained.

[0041] Further, the washing machine casing has the front side formed nearly vertically to the horizontal direction. As a result, in built-in application or the like, the vertical surface flush with the neighboring furniture is aligned, and the appearance is uniform and formed systematically.

[0042] In addition, the top mark unit has its front side provided at an inclination to the rear side. As a result, without practically disturbing the alignment of the front sides with the neighbouring furniture, inclination to the natural viewing line of the user is suppressed, and it is easy to view and easy to use.

Claims

1. A drum type washing machine comprising a washing machine casing, a water tank installed inside of the washing machine casing, a rotary drum installed in

the water tank so that the rotation shaft direction may be a downward inclination from the horizontal direction toward the back side at the bottom from the opened front side, an opening-closing lid provided in the front part of the washing machine casing, a body panel for composing an access opening of the water tank, and a motor for driving the rotary drum, wherein the body panel has a frame-shaped body panel composing the front side of the washing machine casing and having an opening, and a ring-shaped body panel having provided between the frame-shaped body panel and the opening end of the water tank, and the frame-shaped body panel and the ring-shaped body panel are formed integrally, and a ring-shaped recess in the depth direction composed of the frame-shaped body panel and the ring-shaped body panel is covered with a ring-shaped cover panel and fitted outside.

2. The drum type washing machine according to claim 1, wherein the frame-shaped body panel and the ring-shaped body panel are integrated by a weld zone in the overlapping portion of a rear end inward flange part at the opening side of the recess and a front end outward flange part of the bottom side.
3. The drum type washing machine according to claim 1 or 2, wherein the plate thickness of the body panel is defined so that the ring-shaped body panel is larger than the frame-shaped body panel.
4. The drum type washing machine according to claim 3, wherein the ring-shaped body panel has an opening and closing device for opening or closing the opening-closing lid provided at the front part, and the cover panel is provided so as to be detached from the front part of the recess.
5. The drum type washing machine according to claim 1 or 2, wherein the body panel is made of metal, the ring-shaped cover panel is made of resin, and a top mark unit made of resin for forming an operation and display surface is formed oppositely to the upper part of the body panel.
6. The drum type washing machine according to claim 1 or 2, wherein the washing machine casing has its front side formed vertically to the horizontal direction.
7. The drum type washing machine according to claim 1 or 2, wherein the top mark unit has its front side provided at inclination to the rear side.

FIG. 1

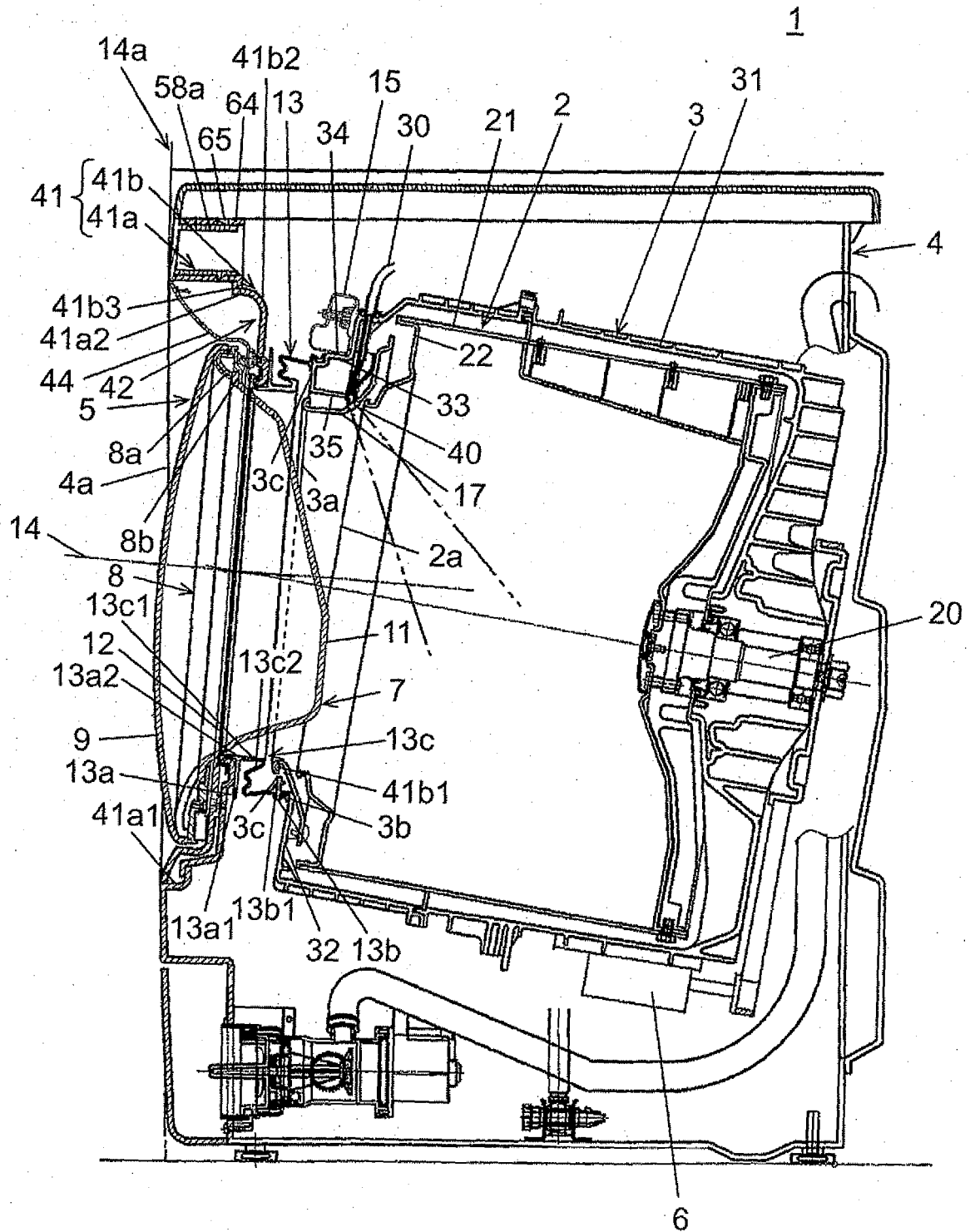


FIG. 2

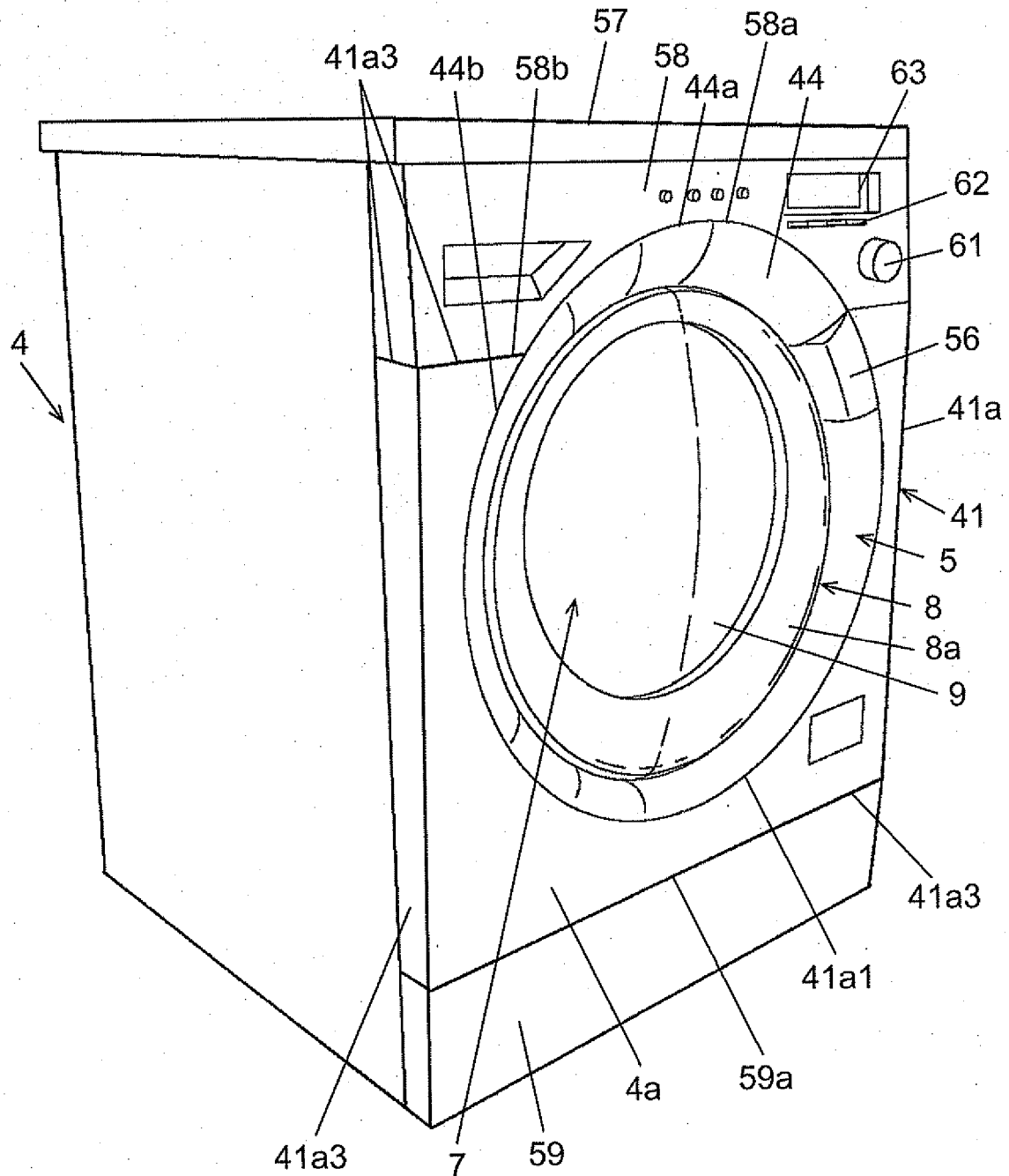


FIG. 3

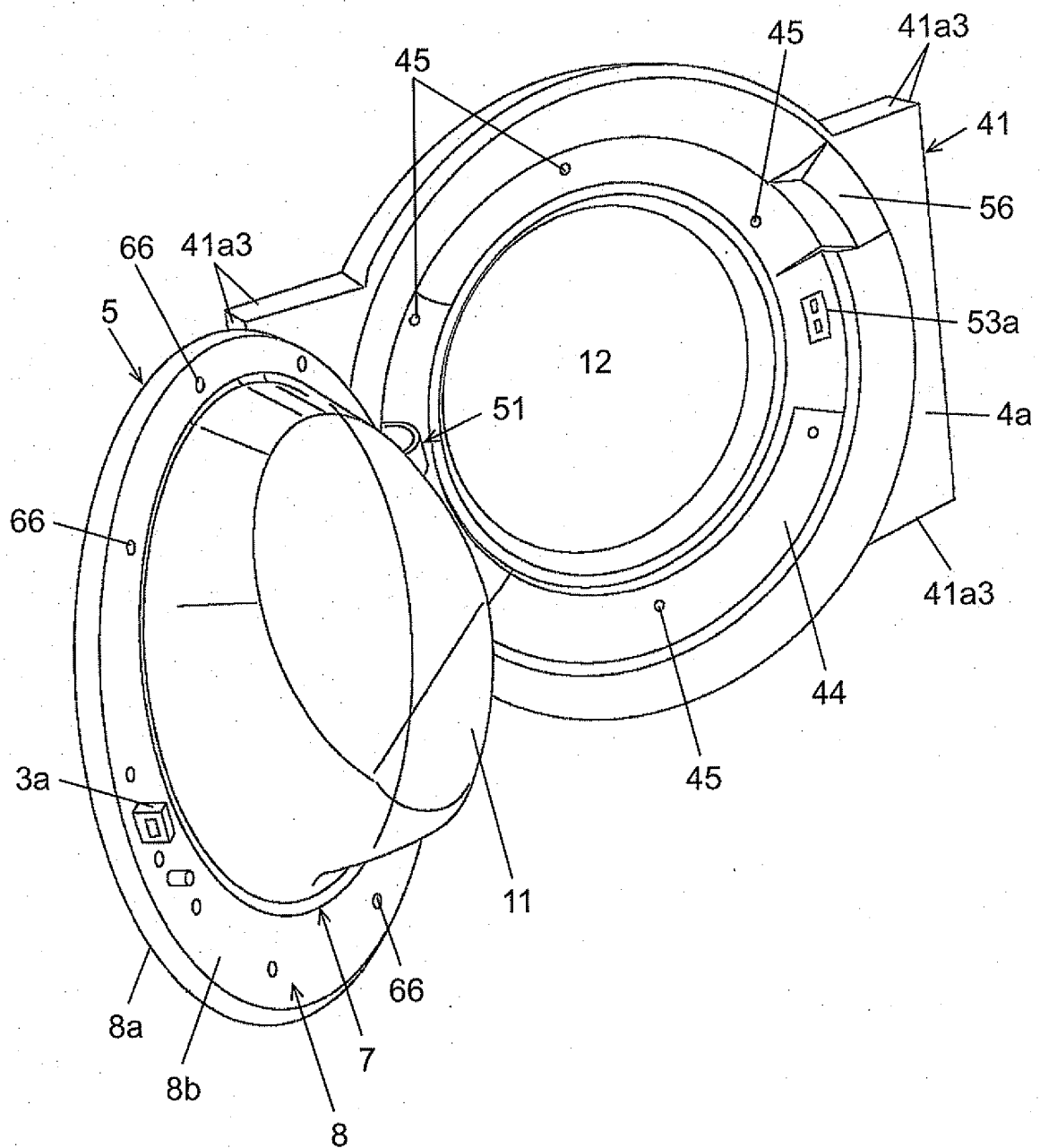


FIG. 4

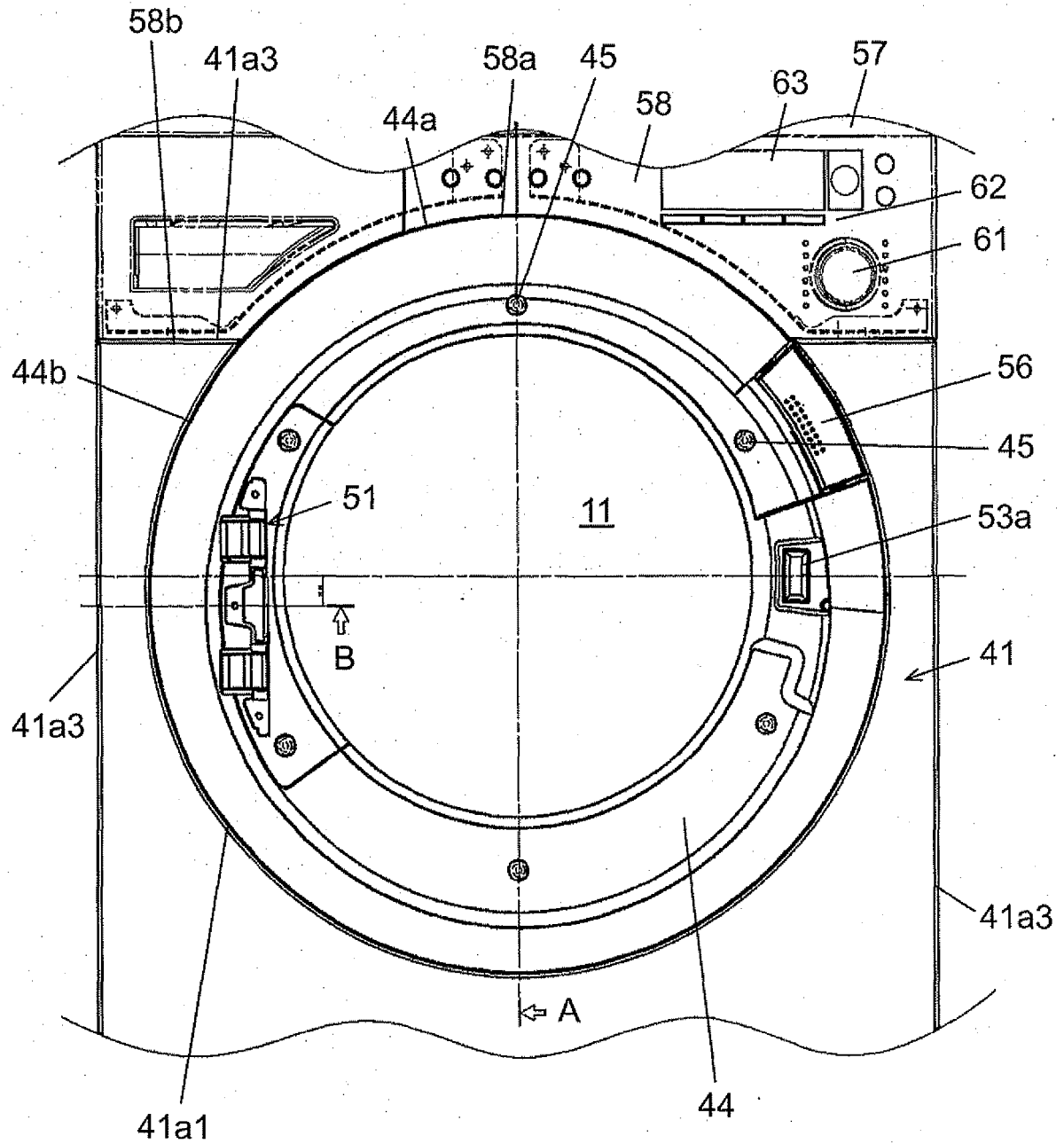


FIG. 5

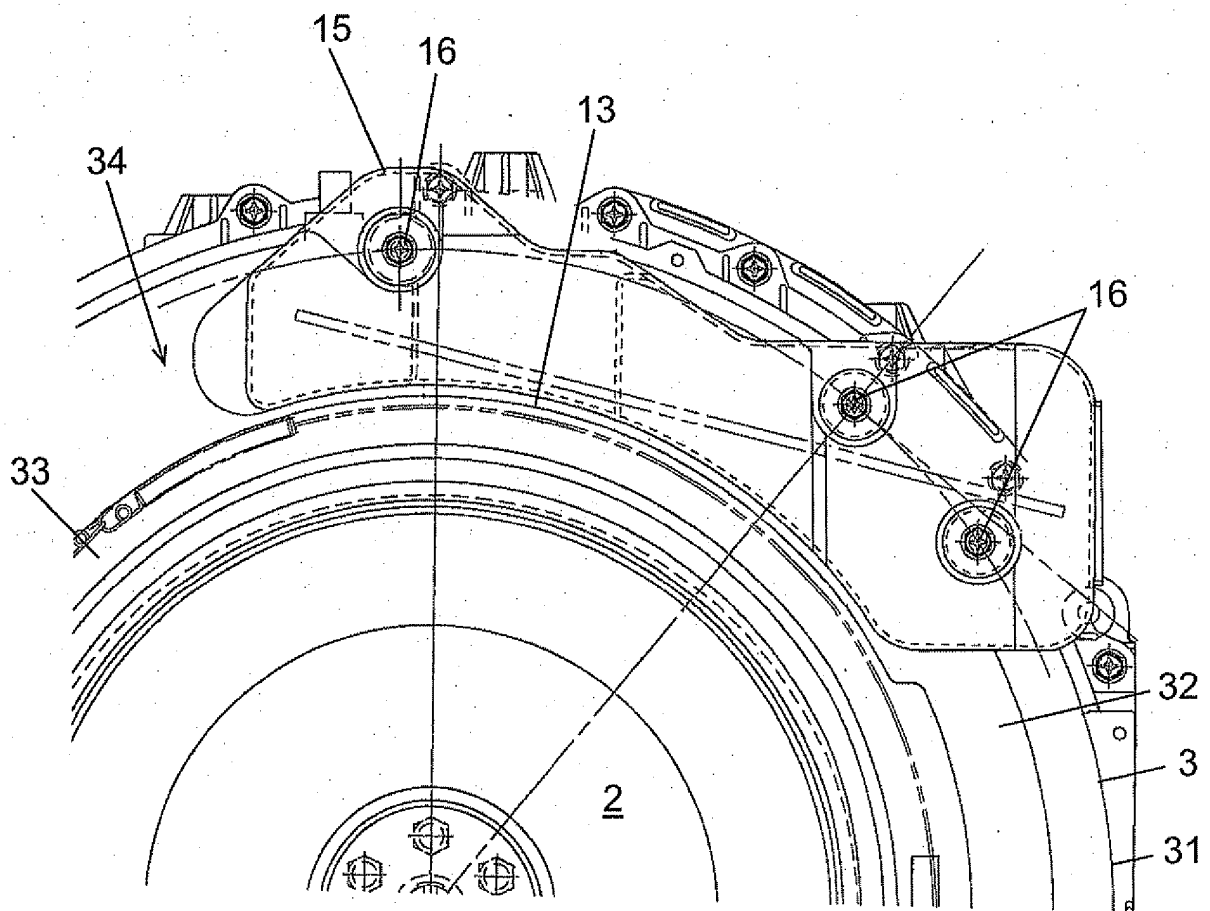


FIG. 6

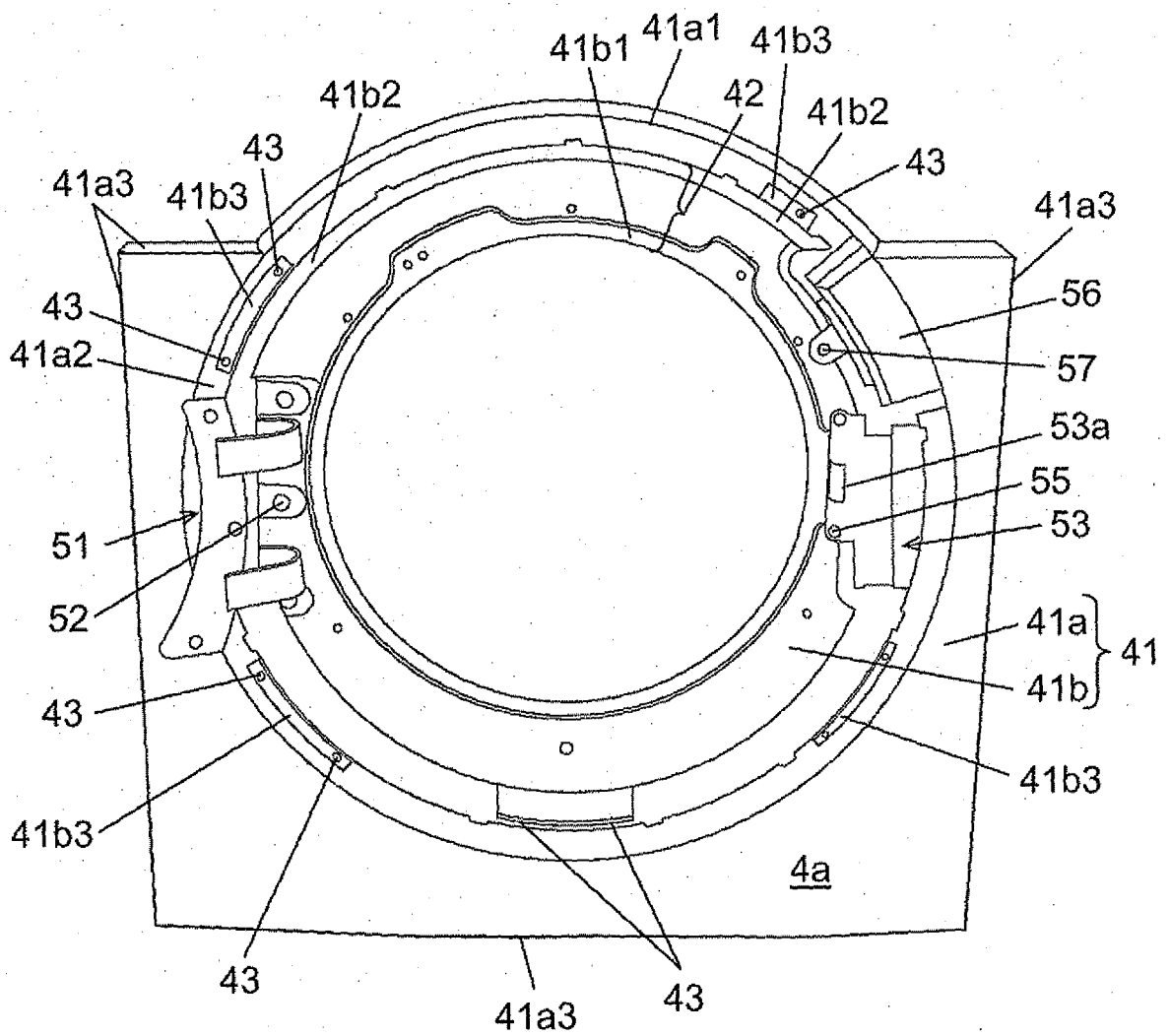
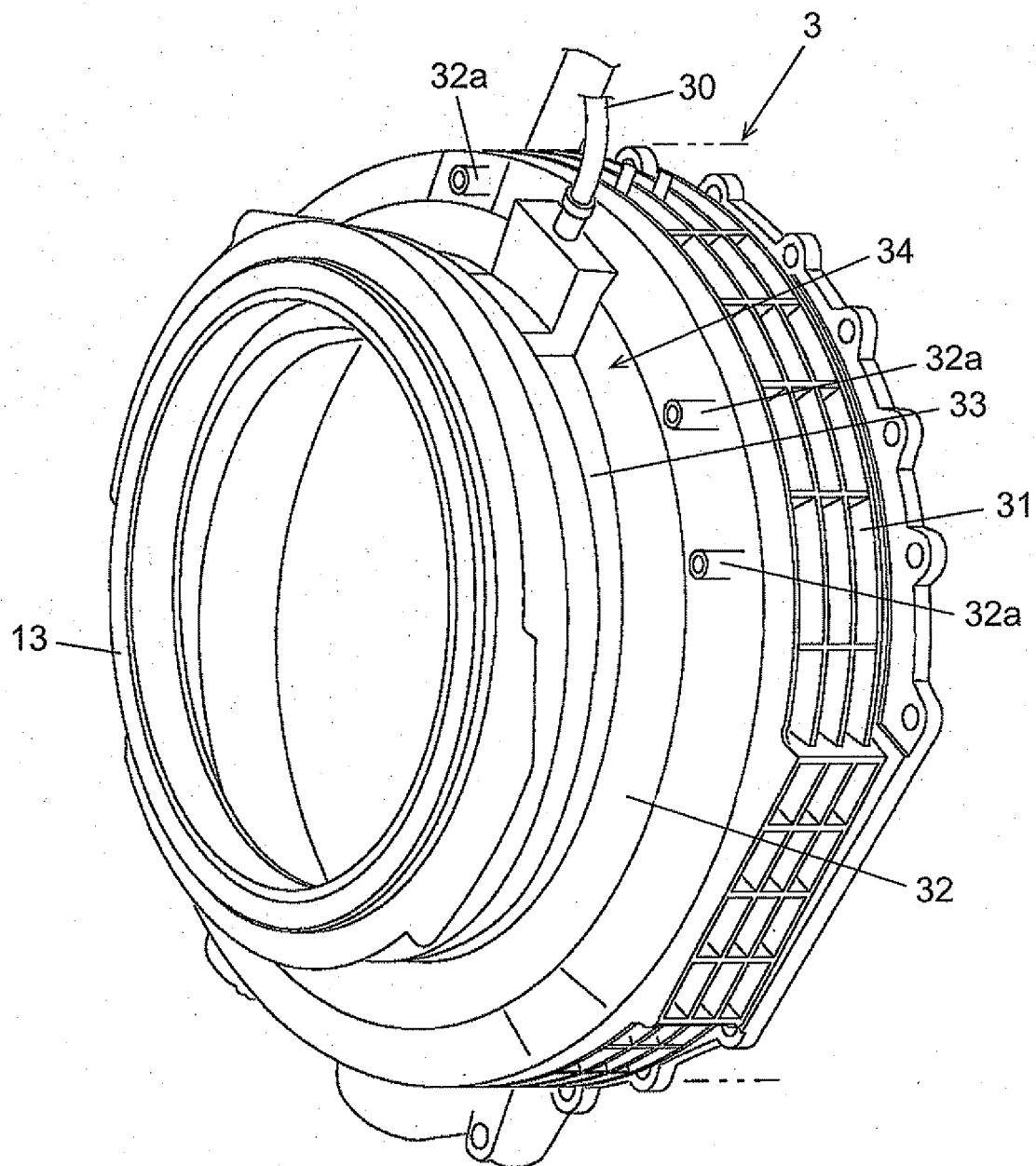


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/005014

A. CLASSIFICATION OF SUBJECT MATTER

D06F37/10(2006.01)i, D06F23/06(2006.01)i, D06F39/12(2006.01)i, D06F39/14(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F37/10, D06F23/06, D06F39/12, D06F39/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2005-514995 A (LG Electronics Inc.), 26 May 2005 (26.05.2005), entire text; all drawings & US 2004/0103691 A1 & EP 1466047 A & WO 2003/060224 A1 & KR 10-2003-0062484 A	1-7
Y	JP 2006-181019 A (Toshiba Corp.), 13 July 2006 (13.07.2006), entire text; all drawings & KR 10-2006-0074843 A & CN 1796648 A	1-7
Y	JP 2001-276481 A (Sharp Corp.), 09 October 2001 (09.10.2001), entire text; all drawings (Family: none)	5, 7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"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

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"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

Date of the actual completion of the international search
23 October, 2009 (23.10.09)Date of mailing of the international search report
02 November, 2009 (02.11.09)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2000342880 A [0005]
- JP 2005137508 A [0005]
- JP 2005143794 A [0005]