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(54) **WASHING MACHINE**

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(57) **ABSTRACT**

A washing machine, in which a coupling between a top cover and a control panel is enhanced, is disclosed. The washing machine includes a top cover having an opening, through which a laundry is inserted into the washing machine via the opening, a control panel provided at a rear end portion of the top cover, a fixing part provided at a portion of the top cover in a rear of the opening, and a hook provided to a lower front end of the control panel, the hook securely engaging with the fixing part for eliminating a gap between the top cover and the control panel.

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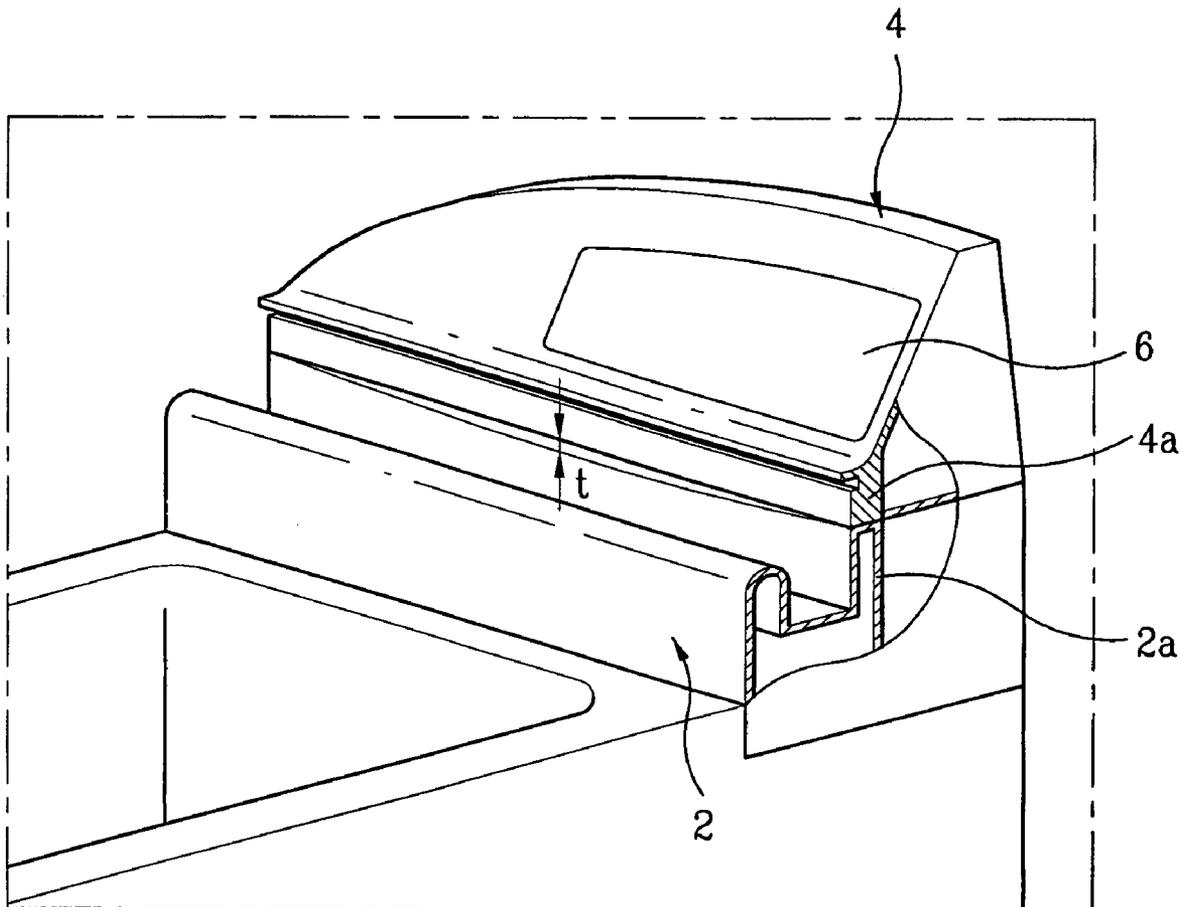


FIG. 1
Related Art

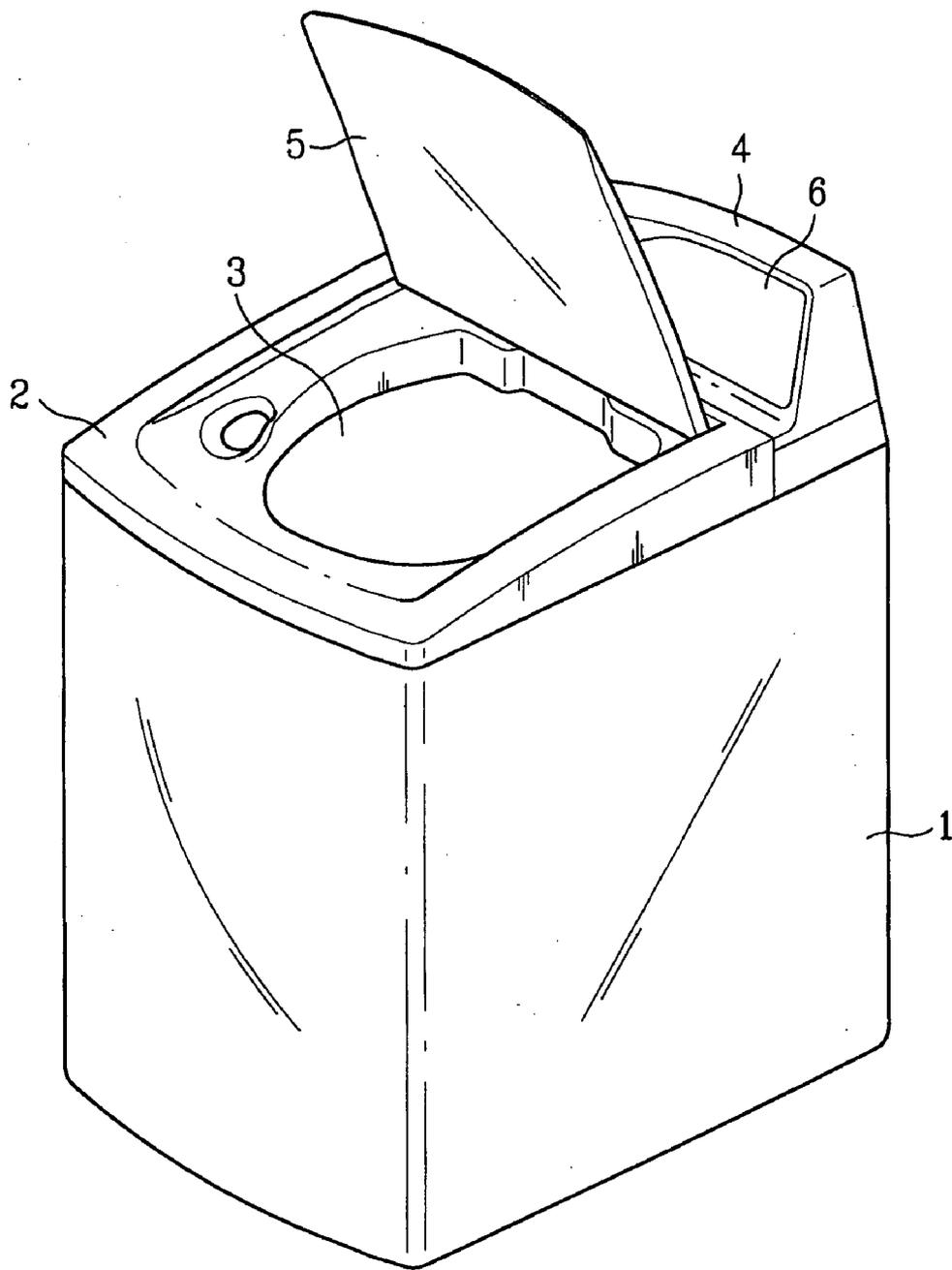


FIG. 2

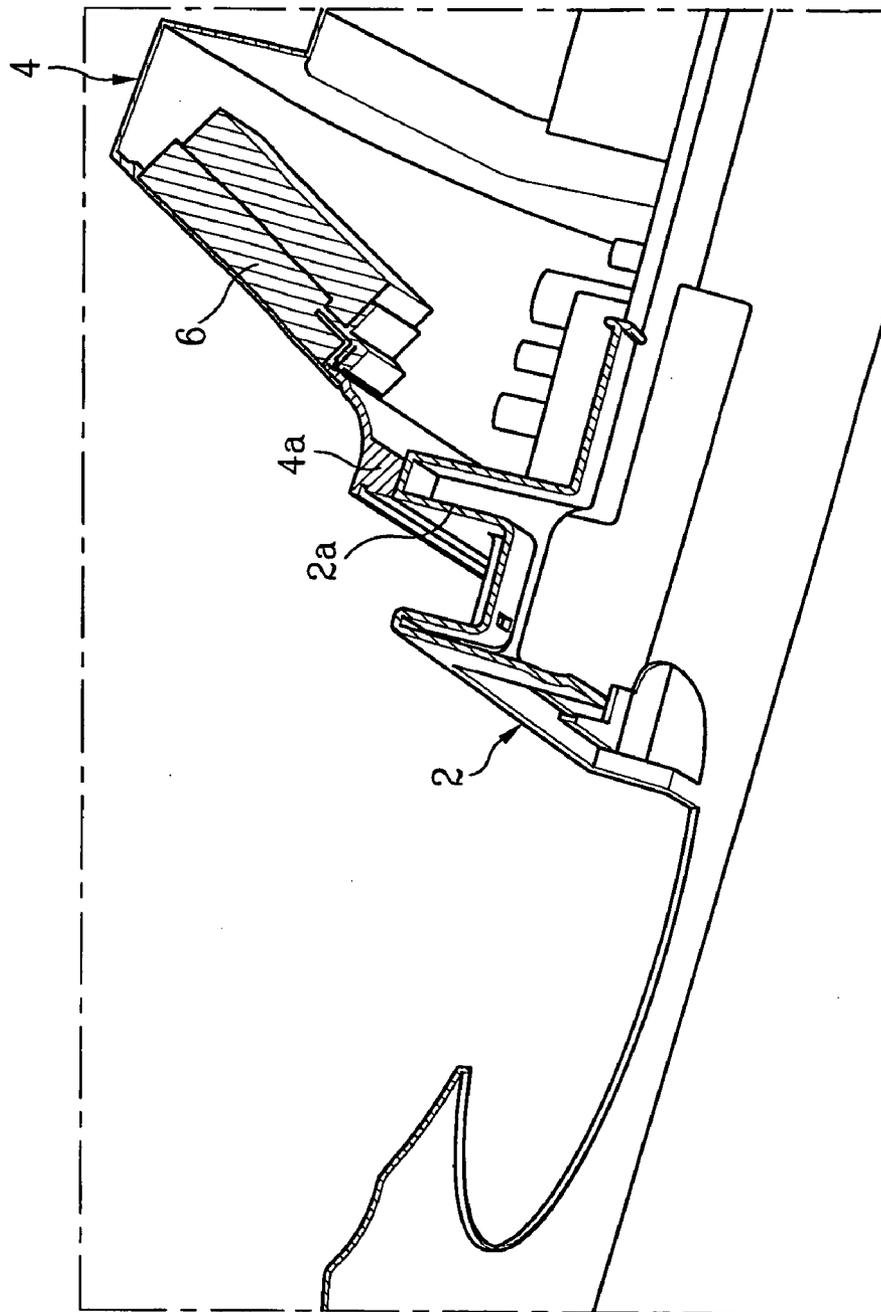


FIG. 3

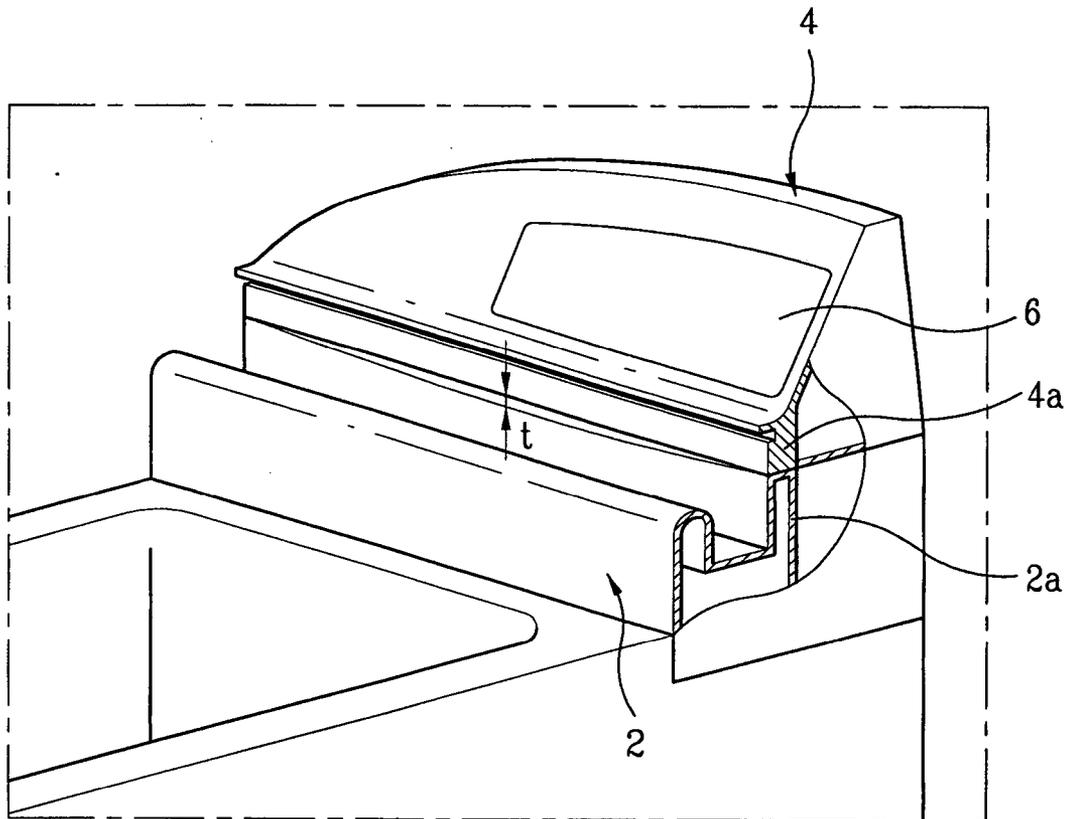


FIG. 4

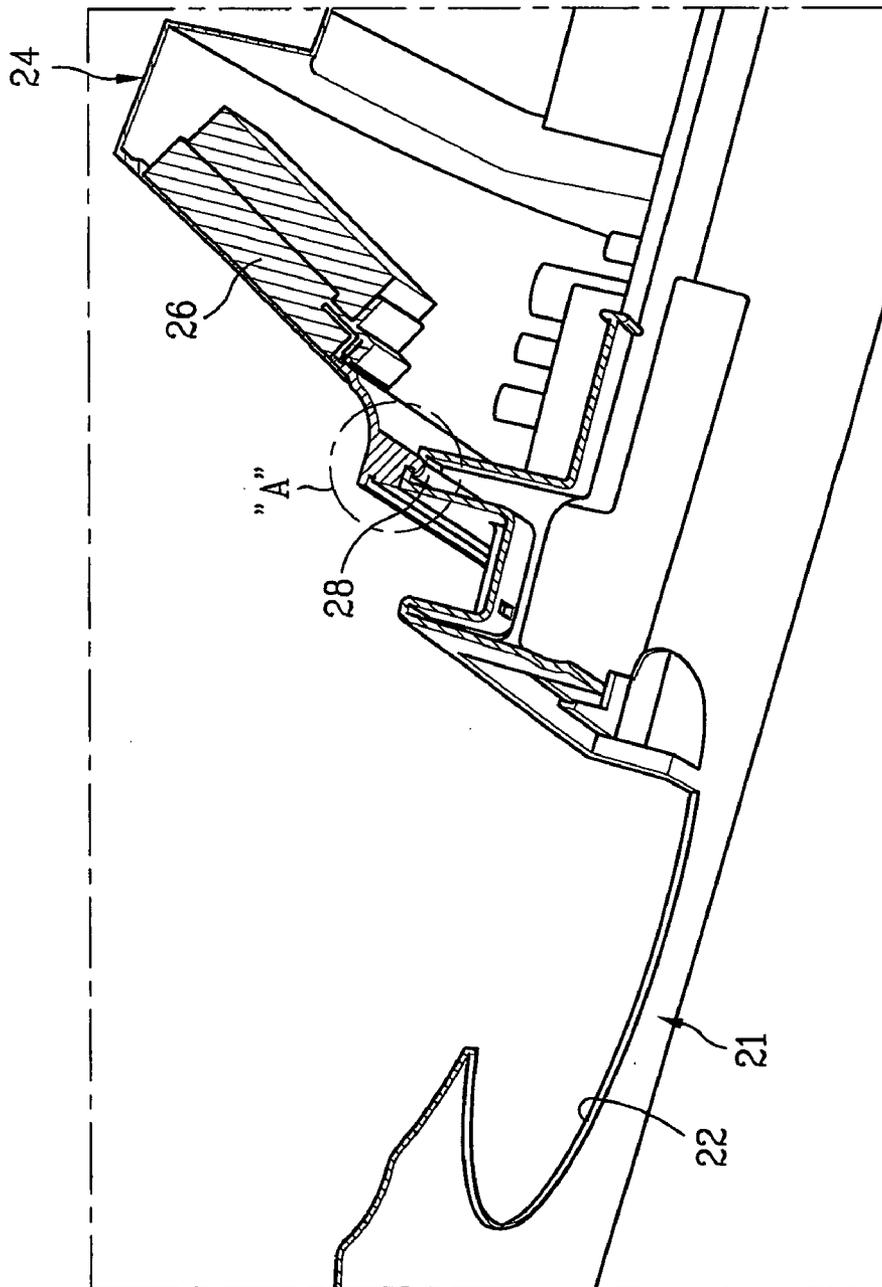


FIG. 5

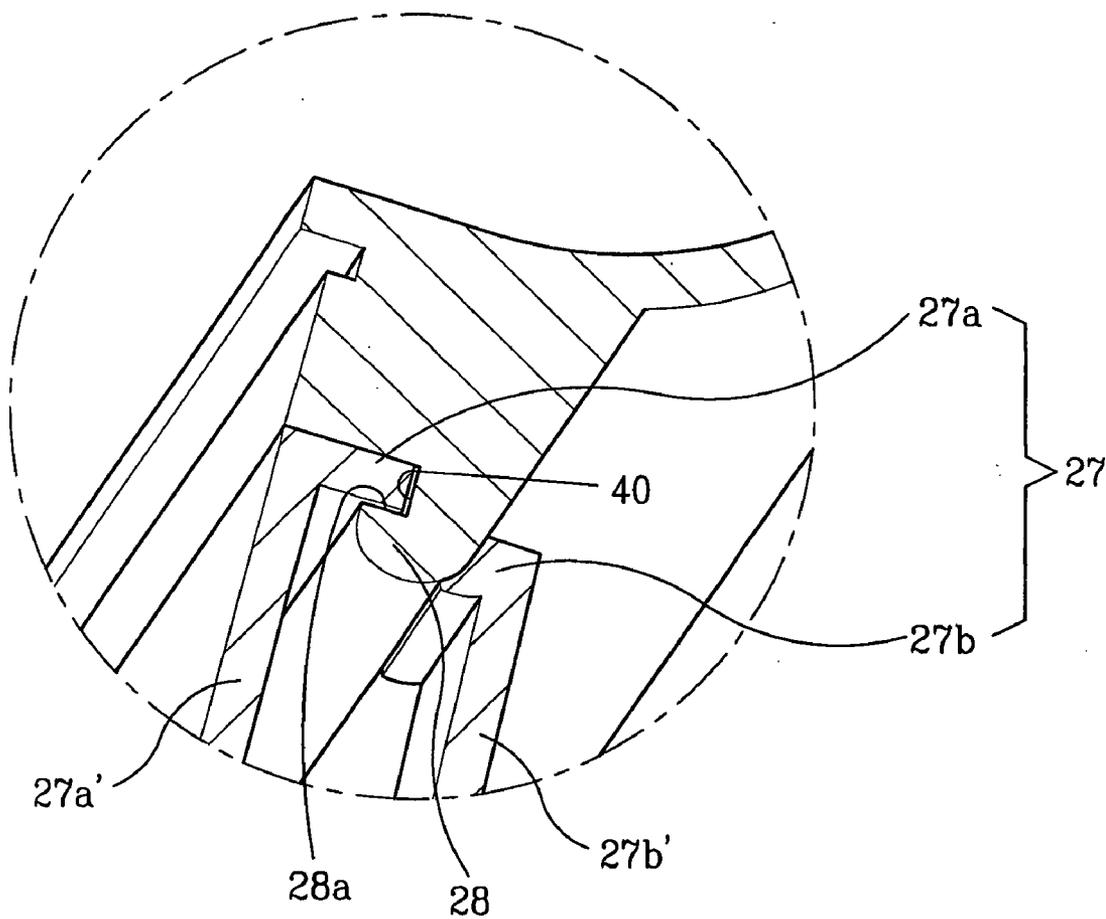


FIG. 6

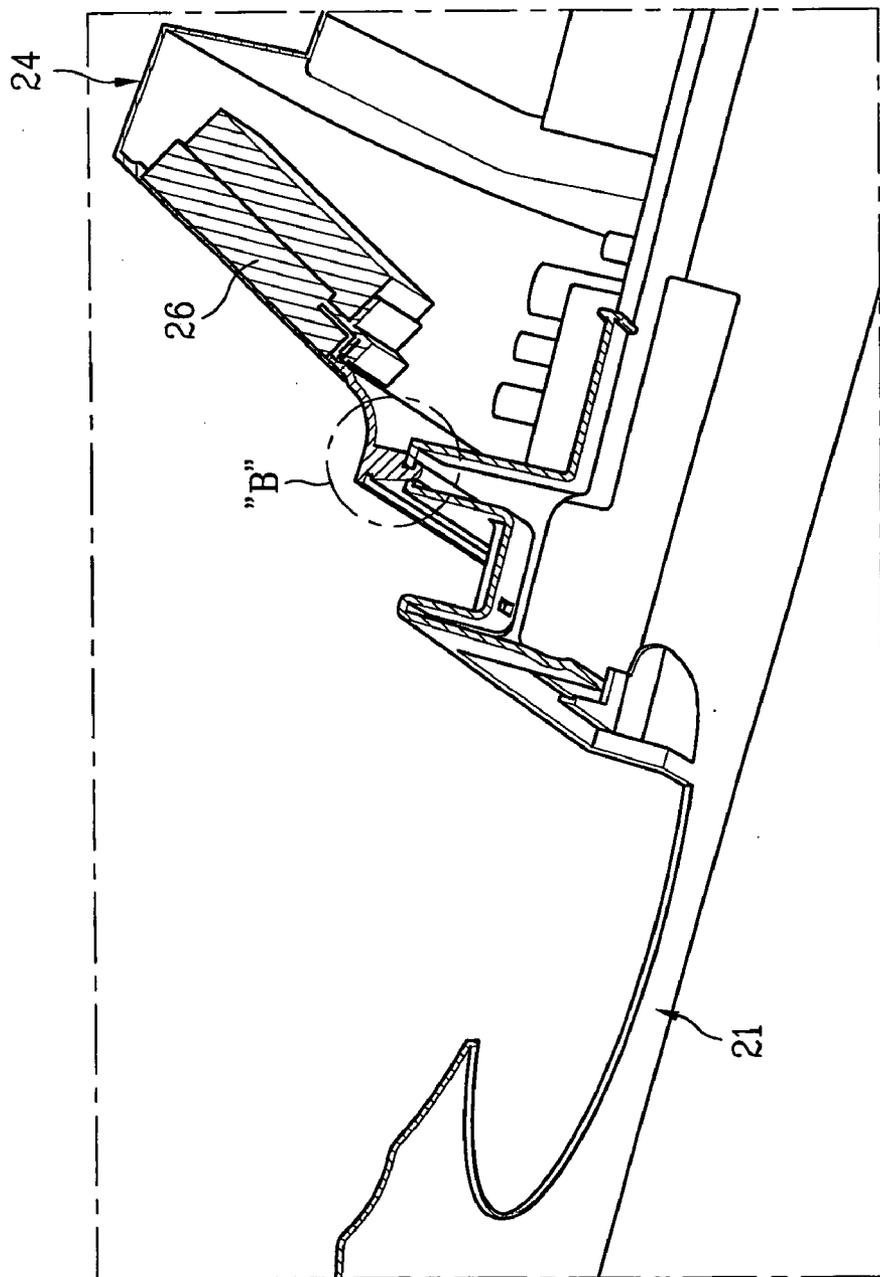
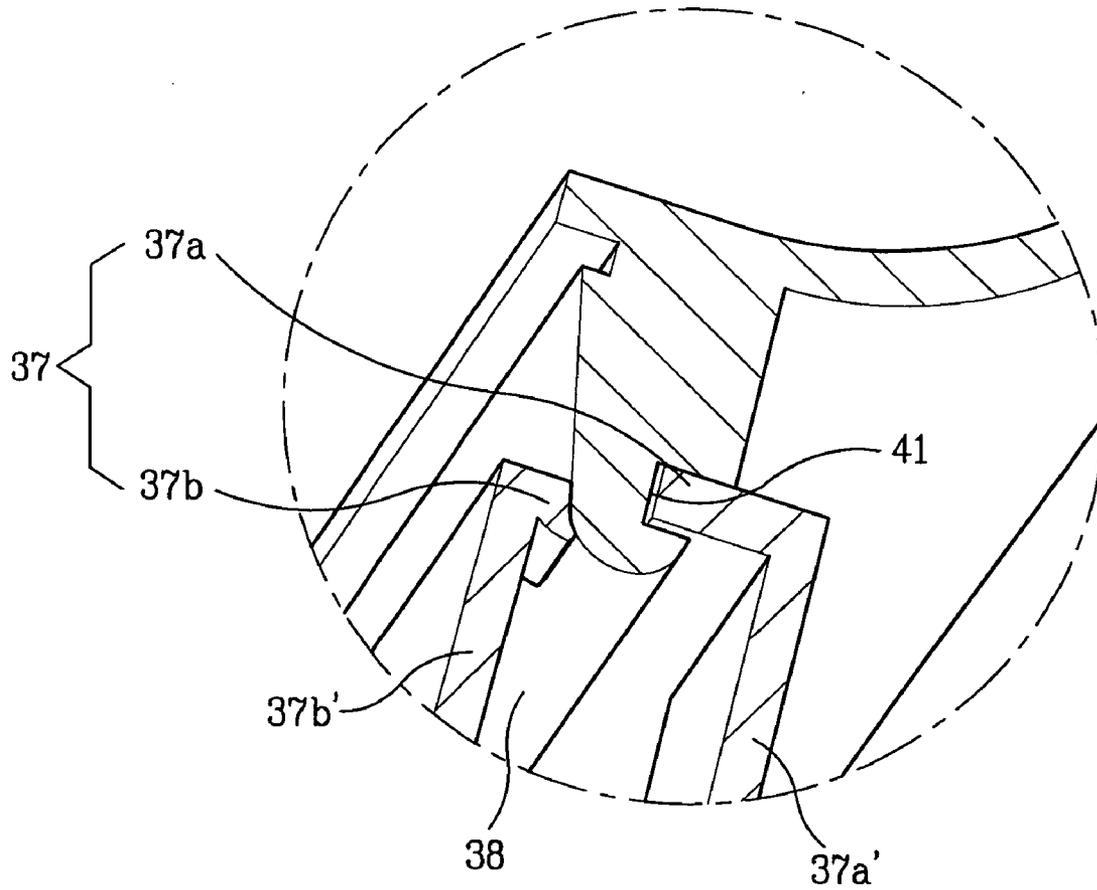


FIG. 7



WASHING MACHINE

[0001] This application claims the benefit of Korean Application No. P2003-072238, filed on Oct. 16, 2003, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a washing machine, in which the coupling between a top cover and a control panel is enhanced.

[0004] 2. Discussion of the Related Art

[0005] Generally, a washing machine is an apparatus for eliminating various filth and particles attached to the laundry such as clothes, lint, linen, etc. using chemical reaction of detergent, friction of current according to rotation of wash vanes, shocks applied to the laundry by pulsator, and so on. And, the washing machine washes a laundry by performing washing, rinsing, and dewatering sequentially or selectively.

[0006] A general washing machine is explained by referring to the attached drawing as follows.

[0007] FIG. 1 is a perspective diagram of a washing machine according to a related art. Referring to FIG. 1, a washing machine according to a related art consists of a case 1 forming an exterior, a tub (not shown) installed within the case 1, and a drum (not shown) rotatably installed within the tub. A top cover 2 is provided to a top of the case 1. And, an opening 3 is formed in the top cover 2 so that a laundry is inserted into the tub. A water supply device (not shown) turned on/off by a solenoid valve is installed in rear of the top cover 2. A lid 5 is provided to the opening 3 to close or open. And, the lid 5 is rotatably installed centering around a hinge provided to a rear rim of the opening 3.

[0008] Also, a control panel 4 is provided to an upper rear end portion of the top cover 2. Various circuit parts for controlling the washing machine are loaded in the control panel 4. Moreover, both lower ends in rear of the top cover 2 are fixed to the top cover 2 via a coupling member.

[0009] However, the related art washing machine has the following problems or disadvantages.

[0010] First of all, it is difficult to assemble the control panel to the top side of the top cover precisely. Additionally, when the top cover is bent over due to long-term use, a gap is generated between the top cover and the control panel. Water may flow through the gap to cause damage to the circuit parts loaded in the control panel. Finally, if the rear end portion of the top cover is distorted, the hinge working as a rotational center of the lid may be broken.

SUMMARY OF THE INVENTION

[0011] Accordingly, the present invention is directed to a washing machine that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

[0012] An object of the present invention is to provide a washing machine, by which a control panel is more stably assembled to a top cover.

[0013] Additional features and advantages of the invention will be set forth in the description which follows, and

in part will be apparent to those having ordinary skill in the art upon examination of the following or may be learned from a practice of the invention. The objectives and other advantages of the invention will be realized and attained by the subject matter particularly pointed out in the specification and claims hereof as well as in the appended drawings.

[0014] To achieve these objects and other advantages in accordance with the present invention, as embodied and broadly described herein, a washing machine includes a top cover having an opening, wherein a laundry is inserted into the washing machine via the opening, a control panel provided at a rear end portion of the top cover, a fixing part provided at a portion of the top cover in a rear of the opening, and a hook provided to a lower front end of the control panel, the hook securely engaging with the fixing part for eliminating a gap between the top cover and the control panel.

[0015] In an example of the present invention, the fixing part may include a fitting portion having an end extended backward that securely fits with the hook, and a support portion provided in a rear of the fitting portion to support a rear side of the hook.

[0016] Preferably, an elongated groove is formed along the hook to have the end of the fitting portion inserted therein. A sealing member is provided to an inner side of the elongated groove to prevent water inflow. The fitting portion and the support portion are provided to upper ends of extension members extending upward, respectively. And, the fitting portion has a slip-fit connection with the fixing part.

[0017] Herein, the fixing part may include a fitting portion having an end extended forward that securely fits with the hook, and a support portion provided in a rear of the fitting portion to support a front side of the hook.

[0018] Preferably, an elongated groove is formed along the hook to have the end of the fitting portion inserted therein. A sealing member is provided to an inner side of the elongated groove to prevent water inflow. The fitting portion and the support portion are provided to ends of extension members extending upward, respectively. The fitting portion has a slip-fit connection with the fixing part.

[0019] Preferably, the fixing part is formed in a lateral direction of the control panel, and the hook is formed to correspond to the fixing part. A plurality of the fixing parts is provided in a lateral direction of the control panel and is equally spaced apart, and a plurality of the hooks is provided to correspond to the plurality of fixing parts.

[0020] Preferably, the opening has a substantially circular shape, and the fixing part forms an arc along a rim of the opening.

[0021] In another aspect of the present invention, a washing machine includes a top cover having an opening, wherein a laundry is inserted into the washing machine via the opening, a control panel provided to a rear end portion of the top cover, an extension member extending upward from a portion of the top cover in a rear of the opening to have a predetermined height, a fixing part provided to an upper end of the extension member, and a hook provided to a lower front end of the control panel, the hook securely

engaging with the fixing part for eliminating a gap between the top cover and the control panel.

[0022] Herein, the fixing part may include a fitting portion having an end extending forward that securely fits with the hook, and a support portion provided in a rear of the fitting portion to support a front side of the hook.

[0023] Preferably, an elongated groove is formed along the hook to have the end of the fitting portion inserted therein, and a sealing member is provided to an inner side of the elongated groove to prevent water inflow. The extension member has a length substantially equal to a lateral length of the control panel. The opening has a substantially circular shape, and the extension member forms an arc along a rim of the opening. And, the fixing part is formed of an elastic material.

[0024] It is to be understood that both the foregoing explanation and the following detailed description of the present invention are exemplary and illustrative and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] 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 embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0026] FIG. 1 is a perspective diagram of a washing machine according to a related art;

[0027] FIG. 2 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel according to one embodiment of the present invention;

[0028] FIG. 3 is a perspective view of a top cover to which an external force is applied;

[0029] FIG. 4 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel according to another embodiment of the present invention;

[0030] FIG. 5 is a magnified view of a part 'A' indicated by a circle in FIG. 4;

[0031] FIG. 6 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel according to a further embodiment of the present invention; and

[0032] FIG. 7 is a magnified view of a part 'B' indicated by a circle in FIG. 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Throughout the drawings, like elements are indicated using the same or similar reference designations where possible.

[0034] FIG. 2 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel

according to one embodiment of the present invention, and FIG. 3 is a perspective view of a top cover to which an external force is applied.

[0035] Referring to FIG. 2, an extension member 2a is formed at an upper rear side of a top cover 2 to prevent water from flowing toward a rear side of a control panel 4. And, the extension member 2a is contacted with a lower front end 4a of the control panel 4. And, a user interface unit 6 enabling a user to select a predetermined function arbitrarily is provided to a front side of the control panel 4.

[0036] Referring to FIG. 3, once an external force is applied to the top cover 2 on moving the washing machine, the top cover 2 is distorted and bent downward. In doing so, a gap 't' is generated between the top cover 2 and the control panel 4 so that water may flow in the gap 't'. In order to solve such a problem, one embodiment according to the present invention is provided as follows.

[0037] FIG. 4 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel according to another embodiment of the present invention, and FIG. 5 is a magnified view of a part 'A' indicated by a circle in FIG. 4.

[0038] Referring to FIG. 4, a top cover 21 having an opening 22, through which a laundry is inserted, is provided to a top side of a washing machine. A control panel 24 is provided to a rear end portion of the top cover 21 and various user interface units 26 enabling a user to control an operation of the washing machine are loaded in the control panel 24.

[0039] A fixing part 27 is provided to a rear end portion of the top cover 21 and a hook 28 is formed at a lower front end of the control panel 24. Once the hook 28 is coupled to the fixing part 27, it is able to eliminate a gap between the coupled portion between the top cover 21 and the control panel 24. And, it is also able to prevent the top cover 21 and control panel 24 from being distorted by an external force applied thereto while the washing machine is carried or moved.

[0040] A lower rear end of the control panel 24 is coupled to a rear end portion of the top cover 21 by a coupling member such as a bolt and the like, and a lower front end of the control panel 24 is coupled to the top cover 21 by a coupling of a hook 28.

[0041] Meanwhile, a fixing part 27 of the top cover 21 has a length extending in a lateral direction of the control panel 24, while the hook 28 has a length corresponding to the fixing part 27. In this case, a plurality of fixing parts 27 can be provided along a lower front side of the control panel 24 to leave a predetermined interval from each other and the hook 28 can be formed at a location corresponding to each of a plurality of the fixing parts 27.

[0042] In case that the opening 22 provided to the top cover 21 is formed to have a circular shape, it is preferable that the fixing part 27 is provided to form an arc shape along a rim of the opening 22. Hence, the lower front end of the control panel 24 is formed to have an arc shape as well as the hook 28.

[0043] Referring to FIG. 5, the fixing part 27 includes a fitting portion 27a and a support portion 27b. An end of the fitting portion 27a is extended backward so as to lock (or securely fit with) the hook 28. And, the support portion 27b

is provided in a rear of the fitting portion **27a** so as to support a rear side of the hook **28**. Hence, the support portion **27b** prevents the hook from being released from the fitting portion **27a**.

[0044] Preferably, the fitting portion **27a** and the support portion **27b** are provided to upper ends of extension members **27a'** and **27b'** extending upward from the top cover **21**, respectively. Namely, water is primarily prevented from flowing in a rear end portion of the top cover by the extension members **27a'** and **27b'** and is secondarily prevented from flowing in the control panel **24** by the locking between the fixing part **27** and the hook **28**.

[0045] Meanwhile, the fitting portion **27a** and the support portion **27b** are formed to confront each other so that a space in which the hook **28** is inserted is provided between them. Thus, the hook **28** slides in a lower side of the fitting portion **27a** to be locked by the fitting portion **27a**.

[0046] Moreover, an elongated groove **28a** in which an end of the fitting portion **27a** is inserted is formed at the hook **28**. Hence, the fitting portion **27a** is firstly fitted into the elongated groove **28a** to be locked by the hook **28**. Preferably, the fitting and support portions **27a** and **27b** are formed of an elastic member.

[0047] Besides, a sealing member **40** is provided within the elongated groove **28a** to prevent water inflow. And, the sealing member **40** is preferably formed of rubber and the like. Therefore, even if an external force is applied to the top cover **21**, the top cover **21** is locked by the hook **28** of the control panel **24** to be prevented from being distorted.

[0048] A coupling structure between a top cover and control panel according to another embodiment of the present invention is explained as follows.

[0049] FIG. 6 is a perspective cross-sectional view of a coupling structure between a top cover and a control panel according to a further embodiment of the present invention, and FIG. 7 is a magnified view of a part 'B' indicated by a circle in FIG. 6.

[0050] Referring to FIGS. 6 and 7, a fixing part **37** includes a fitting portion **37a** and a support portion **37b**. An end of the fitting portion **37a** extends forward to lock a hook **38**. And, the support portion **37b** is provided in front of the fitting portion **37a** to leave a predetermined distance and supports a front side of the hook **38**. Hence, the support portion **37b** prevents the hook, which is pushed forward, from being released from the fitting portion **37a**. As the hook **38** is locked by the fitting portion **37a** to prevent a top cover **21** from being detached from a control panel **24** despite an external force applied thereto.

[0051] And, the fitting portion **37a** and the support portion **37b** are provided to upper ends of extension members **37a'** and **37b'** extending upward from the top cover **21**, respectively. Hence, water is primarily prevented from flowing in a rear side of the control panel **24** by the extension members **37a'** and **37b'**.

[0052] Moreover, an elongated groove **38a** in which an end of the fitting portion **37a** is inserted is formed at the hook **38**. And, a sealing member **41** is provided to the elongated groove **38a** to prevent water inflow.

[0053] Besides, a plurality of fixing parts **37** can be provided along a lower front side of the control panel **24** to

leave a predetermined interval from each other and the hook **38** can be formed at a location corresponding to each of a plurality of the fixing parts **37**.

[0054] The coupling structure according to another embodiment of the present invention has the same constitution of the one embodiment of the present invention except that the coupling direction between the fixing part **37** and the hook **38** is reversed.

[0055] Meanwhile, in the above-described embodiments according to the present invention, it is apparent that the hook can be provided to an upper rear end portion of the top cover and that the fixing part is provided to a lower end of the control panel.

[0056] An operation between the top cover and the control panel is explained as follows.

[0057] Referring to FIGS. 4 and 5, after the top cover **21** has been fixed to an upper part of the case, the hook **28** of the control panel **24** is inserted in the fixing part **27**. The lower rear end of the control panel **24** is then fixed to the top cover **21** by the locking member, such as a bolt and the like.

[0058] In doing so, the hook **28** of the control panel **24** is locked by the fixing part **27** of the top cover **21**. Hence, the top cover **21** fails to be bent downward even if a heavy stud is put on the lid ('25' in FIG. 2) or an external force works on the washing machine that is being carried. Namely, the hook **28** and the fixing part **27** reinforce rigidity of the rear end portion of the top cover **21**.

[0059] Hence, the gap fails to occur between the top cover **21** and the control panel **24**. Moreover, the control panel **24** has a box shape to reinforce the rigidity of the rear end portion of the top cover **21** as well.

[0060] Accordingly, the top cover and control panel of the washing machine according to the present invention provide the following advantages of effects.

[0061] First of all, the top cover is prevented from being bent, whereby the gap fails to occur between the top side of the top cover and the lower end of the control panel. Therefore, the present invention improves an exterior of the washing machine as well as prevents water from flowing in the control panel.

[0062] Furthermore, the top cover is prevented from being bent, whereby it is able to prevent the hinge part of the lid provided to the top cover from being broken.

[0063] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover such modifications and variations, provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A washing machine comprising:

- a top cover having an opening, wherein a laundry is inserted into the washing machine via the opening;
- a control panel provided at a rear end portion of the top cover;

- a fixing part provided at a portion of the top cover in a rear of the opening; and
- a hook provided to a lower front end of the control panel, the hook securely engaging with the fixing part for eliminating a gap between the top cover and the control panel.
- 2.** The washing machine of claim 1, wherein the fixing part comprises:
 - a fitting portion having an end extended backward that securely fits with the hook; and
 - a support portion provided in a rear of the fitting portion to support a rear side of the hook.
- 3.** The washing machine of claim 2, wherein an elongated groove is formed along the hook to have the end of the fitting portion inserted therein.
- 4.** The washing machine of claim 3, wherein a sealing member is provided to an inner side of the elongated groove to prevent water inflow.
- 5.** The washing machine of claim 2, wherein the fitting portion and the support portion are provided to upper ends of extension members extending upward, respectively.
- 6.** The washing machine of claim 2, wherein the fitting portion has a slip-fit connection with the fixing part.
- 7.** The washing machine of claim 1, wherein the fixing part comprises:
 - a fitting portion having an end extended forward that securely fits with the hook; and
 - a support portion provided in a rear of the fitting portion to support a front side of the hook.
- 8.** The washing machine of claim 7, wherein an elongated groove is formed along the hook to have the end of the fitting portion inserted therein.
- 9.** The washing machine of claim 8, wherein a sealing member is provided to an inner side of the elongated groove to prevent water inflow.
- 10.** The washing machine of claim 7, wherein the fitting portion and the support portion are provided to upper ends of extension members extending upward, respectively.
- 11.** The washing machine of claim 7, wherein the fitting portion has a slip-fit connection with the fixing part.
- 12.** The washing machine of claim 1, wherein the fixing part is formed in a lateral direction of the control panel, and wherein the hook is formed to correspond to the fixing part.

- 13.** The washing machine of claim 1, wherein a plurality of the fixing parts is provided in a lateral direction of the control panel and is equally spaced apart, and wherein a plurality of the hooks is provided to correspond to the plurality of fixing parts.
- 14.** The washing machine of claim 1, wherein the opening has a substantially circular shape, and wherein the fixing part forms an arc along a rim of the opening.
- 15.** A washing machine comprising:
 - a top cover having an opening, wherein a laundry is inserted into the washing machine via the opening;
 - a control panel provided to a rear end portion of the top cover;
 - an extension member extending upward from a portion of the top cover in a rear of the opening to have a predetermined height;
 - a fixing part provided to an upper end of the extension member; and
 - a hook provided to a lower front end of the control panel, the hook securely engaging with the fixing part for eliminating a gap between the top cover and the control panel.
- 16.** The washing machine of claim 15, wherein the fixing part comprises:
 - a fitting portion having an end extending forward that securely fits with the hook; and
 - a support portion provided in a rear of the fitting portion to support a front side of the hook.
- 17.** The washing machine of claim 16, wherein an elongated groove is formed along the hook to have the end of the fitting portion inserted therein, and wherein a sealing member is provided to an inner side of the elongated groove to prevent water inflow.
- 18.** The washing machine of claim 15, wherein the extension member has a length substantially equal to a lateral length of the control panel.
- 19.** The washing machine of claim 15, wherein the opening has a substantially circular shape, and wherein the extension member forms an arc along a rim of the opening.
- 20.** The washing machine of claim 15, wherein the fixing part is formed of an elastic material.

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