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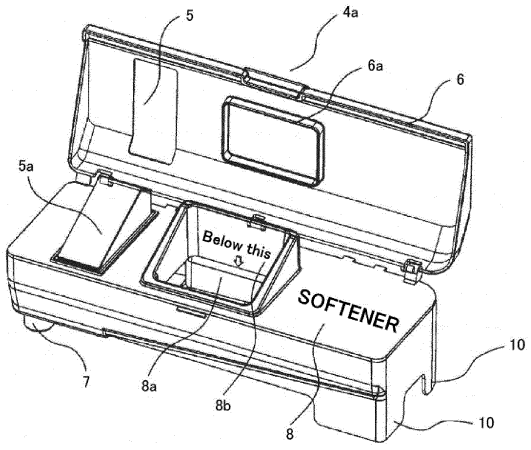
(54) TANK, AND WASHING MACHINE USING THIS

(57) An object of the present invention is to provide a tank which facilitates visual confirmation of the residual quantity in the tank while suppressing cost increase irrespective of the tank capacity. The tank 4 of the present invention, which enables supply of washing liquid, includes a tank lid 6 having an inclined upper surface for covering an inlet 8a through which the washing liquid is fed, a window 5 formed in a part of the inclined surface, which enables visual confirmation of a residual quantity of the washing liquid, and a view part 5a in the window 5, which enables visual confirmation of the residual quantity of the washing liquid. The view part 5a includes a scale section 5b formed in a vertical direction to a surface of the washing liquid, which enables visual confirmation of the residual quantity of the washing liquid.

FIG. 4



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Description

Technical Field

[0001] The present invention relates to a tank for supplying washing liquid, and a washing machine for washing laundry.

Background Art

[0002] There has been a known washing machine provided with a washing liquid supply device configured to measure the washing liquid stored in the tank such as detergent and softener (finishing agent), and automatically feed an appropriate amount of the washing liquid to a water tub (washing/dewatering tub).

[0003] The washing machine as disclosed in PTL 1 has been provided with a magnet in the float of the tank as means for detecting a residual quantity of the washing liquid stored in the tank.

Citation List

Patent Literature

[0004] PTL 1: Japanese Patent Application Laid-Open No. 2019-37356

Summary of Invention

Technical Problem

[0005] The washing machine as disclosed in PTL 1 needs such member as the float, leading to the cost increase. If the movable range for the float cannot be secured because of limited tank height, there may be the case where the residual quantity cannot be detected. Since the user is notified only of the information indicating sufficiency or insufficiency of the washing liquid, it is difficult for the user to confirm the residual quantity of the washing liquid. This makes it difficult to forecast a shortage in the supply of the washing liquid.

[0006] It is an object of the present invention to provide a tank which facilitates visual confirmation of the residual quantity in the tank while suppressing a cost increase irrespective of the tank capacity.

Solution to Problem

[0007] In order to attain the foregoing object, the tank according to the present invention enables supply of washing liquid. Then tank includes a tank lid having an inclined upper surface for covering an inlet through which the washing liquid is fed, a window formed in a part of the inclined surface, which enables visual confirmation of a residual quantity of the washing liquid, and a view part in the window, which enables visual confirmation of the residual quantity of the washing liquid. The view part includes a scale section formed in a vertical direction to a surface of the washing liquid, which enables visual confirmation of the residual quantity of the washing liquid.

[0008] The washing machine according to the present invention includes a housing, a cover for covering a laundry loading opening, a washing/dewatering tub for accommodating the loaded laundry, and a tank enabling supply of washing liquid. The tank includes a tank lid having an inclined upper surface for covering an inlet through which the washing liquid is fed, a window formed in a part of the inclined surface, which enables visual confirmation of a residual quantity of the washing liquid, and a view part in the window, which enables visual confirmation of the residual quantity of the washing liquid. The view part includes a scale section formed in a vertical direction to a surface of the washing liquid, which enables visual confirmation of the residual quantity of the washing liquid.

Advantageous Effects of Invention

[0009] The present invention provides the tank for washing machine, which facilitates visual confirmation of the residual quantity in the tank while suppressing the cost increase irrespective of the tank capacity.

Brief Description of Drawings

[0010]

Figure 1 is an overhead view of a washing machine according to the present invention.
Figure 2 is a vertical sectional view of the washing machine according to the present invention.
Figure 3 is an overhead view of a tank as illustrated in Figure 2.
Figure 4 is an overhead view of the tank as illustrated in Figure 2, having its tank lid opened.
Figure 5 is an overhead view of a window as illustrated in Figure 3.
Figure 6 is a schematic vertical sectional view of the tank seen from a user for visually confirming residual quantity.

Description of Embodiment

[0011] An example of the present invention will be described referring to the drawings.

[0012] Figure 1 is a perspective view of a washing machine having a tank according to the present invention. Figure 2 is a vertical sectional view of the washing machine having the tank according to the present invention.

[0013] Referring to Figures 1 and 2, a housing 1 includes a cover 2 which covers a laundry loading opening. A washing/dewatering tub 3 which accommodates the loaded laundry is located below the cover 2. A tank 4 (4a, 4b) enables supply of washing liquid. An automatic washing liquid feed unit 9 is configured to discharge (feed) the

washing liquid filled in the tank 4 to the washing/dewatering tub 3.

[0014] The tank 4 has an inclined upper surface. A tank lid 6 (see Figure 3) for covering an inlet 8a (see Figure 4) through which the washing liquid is fed is attached to the tank 4. The cover 2 has a front-downward inclined upper surface in a closed state. The two respective inclined surfaces are substantially parallel to each other so that cleaning performance and design property are improved. The tank 4 has a window 5 in a part of the inclined surface, through which a residual quantity of the washing liquid can be visually confirmed. When the washing liquid is supplied to the tank 4, the lower part of the window 5 is soaked in the washing liquid. The user can (visually) confirm the residual quantity of the washing liquid in the tank 4 through the window 5.

[0015] An explanation of the tank 4 will be made in detail. The tank 4 is composed of a tank 4a to which first washing liquid can be supplied, and a tank 4b to which second washing liquid can be supplied. It is possible to supply the first washing liquid and the second washing liquid which are different, for example, detergent and softener. Alternatively, it is possible to supply either the different or the same kinds of detergents. The tank 4b is disposed adjacently to the tank 4a in its longitudinal direction side by side. The tank 4a has the window 5 (first window) disposed at one end, and the tank 4b has the window 5 (second window) disposed at the other end so that those windows 5 (the first and the second windows) of the tanks 4a and 4b are disposed while facing with each other. The short distance between those two windows 5 allows the user to visually confirm each residual quantity of the first washing liquid and the second washing liquid instantly. The tank 4 can be detached from the housing 1 so that the washing liquid can be easily supplied to the tank 4.

[0016] Figure 3 is an overhead view of the tank 4a, and Figure 4 is an overhead view of the tank 4a when the tank lid 6 is opened.

[0017] Referring to Figure 3, the tank 4a is provided with the tank lid 6 having the window 5. Accordingly, the user can visually confirm the residual quantity of the washing liquid in the tank 4a through the window 5 even in the state where the tank lid 6 is closed. The tank 4a is provided with a nozzle portion 7 for discharging the washing liquid in the tank 4a so that the washing liquid therein can be discharged through the nozzle portion 7. The tank 4a includes at least one tank leg 10 at one end part. The leg 10 at one end part and the nozzle portion 7 at the other end part support the tank 4a to stand by itself.

[0018] Referring to Figure 4, the tank 4a is provided with an inner tank lid 8. The inner tank lid 8 includes an inlet 8a through which the washing liquid is fed into the tank 4a. The inlet 8a includes a rib 8b having its height along the inclined surface of the tank lid 6. The rib 8b surrounds all sides of the inlet 8a. The rib 8b ensures to suppress scattering of the washing liquid to the outside of the inlet 8a upon supply of the washing liquid. The inner tank lid 8 has a mark on its surface, indicating a kind of the washing liquid, for example, "softener" as illustrated in Figure 4. The mark allows the user to correctly feed the appropriate washing liquid to the tank 4a. Figure 4 illustrates the mark provided on the inner tank lid 8. However, it is possible to provide the mark on the back surface of the tank lid 6. Assuming that the inner tank lid 8 has the mark indicating the kind of the washing liquid, it is possible to add color to the inner tank lid 8 corresponding to the kind of the washing liquid. For example, the inner tank lid 8 may be colored blue corresponding to the mark indicating the detergent, and colored pink corresponding to the mark indicating the softener. The mark or arrow indicating the "upper limit" is provided on the surface at the far side of the rib 8b so that the user can instantly understand the upper limit of the washing liquid to be supplied.

[0019] The tank lid 6 for covering the inlet 8a is shaped along the rib 8b, and includes a rib 6a located at a position corresponding to the rib 8a. The ribs 6a and 8b ensure to suppress scattering of the washing liquid in the tank 4a to the outside when closing the tank lid 6.

[0020] A part of the inner tank lid 8 located in the window 5 includes a view part 5a through which the residual quantity of the washing liquid can be visually confirmed. The view part 5a is disposed above the nozzle portion 7, or between the nozzle portion 7 and the inlet 8a so that the residual quantity of the washing liquid can be visually confirmed as much as possible. Compared with the case where the view part 5a is disposed at the other position, the inside of the tank 4a having the nozzle portion 7 disposed on the bottom allows visual confirmation of a smaller quantity of the residual washing liquid. The explanation made on the structure and the positional relationship of the tank 4a applies to the tank 4b.

[0021] Figure 5 is an overhead view of the view part 5a.

[0022] Referring to Figure 5, the view part 5a is made of either a colorless transparent material or a colored transparent material. The view part 5a allows the user to visually confirm the residual quantity of the washing liquid in the tank 4.

[0023] The lower part of the view part 5a is soaked in the washing liquid. A bottom surface 5c of the view part 5a is inclined to increase the capacity of the tank 4 for the washing liquid. Similar advantageous effects can be derived from the view part 5a having an arbitrary structure, for example, the hollow structure, the solid structure, or the structure having an open top part. The use of the structure having the open top part may cause the user to feed the inappropriate washing liquid mistakenly, or the dust intrusion. This interferes with the visual confirmation of the washing liquid, and accordingly, it is preferable to employ the structure with a closed top part.

[0024] The view part 5a includes a scale section 5b having a scale which allows visual confirmation of the residual quantity of the washing liquid vertically to the liquid surface. The scale section 5b allows the user to visually confirm the residual quantity of the washing liq-

uid. The scale section 5b is provided on the back surface of the view part 5a for easy visual confirmation. When the washing liquid is supplied in the tank 4, the lower part of the view part 5a is soaked in the washing liquid, on which a boundary surface between the washing liquid and air is reflected. The user can visually confirm the residual quantity of the washing liquid in the tank 4 through the view part 5a.

[0025] If a white reflector (reflective sheet) is provided or applied onto the bottom surface 5c of the view part 5a, which serves as an inclined reflective surface, the light source reflection can be intensified as well as the recursive reflection. The recursive reflection of the corner cube allows further improvement in visibility of the scale section 5b compared with the use of the transparent surface.

[0026] As described above, the view part 5a and the scale section 5b are simply structured so that the cost increase can be suppressed irrespective of the tank capacity. The effect can be derived from the scale section 5b disposed not only on the view part 5b but also at the position viewable from the window 5 for confirmation of the residual quantity of the washing liquid, for example, the wall surface of the tank 4 (not shown). The similar effect can be obtained even in the case where the back surface of the view part 5a and the scale section 5b are not positioned completely vertically to the liquid surface.

[0027] Figure 6 is a schematic vertical sectional view of the tank 4 taken along line X-X of Figure 3 in the case where the user confirms the residual quantity of the washing liquid in the tank 4 of the housing 1 through the view part 5a.

[0028] Referring to Figure 6, an arrow represents a line of sight of a general adult woman who sees the scale section 5b. The line of sight reaches the scale section 5b without being obstructed. Accordingly, a general adult can visually confirm the residual quantity of liquid in the tank 4 without any inconveniences.

[0029] In the foregoing embodiment of the present invention, the explanation has been made with respect to the vertical type washing machine. The present invention is also applicable to the drum-type washing machine. In the case of omitting some of elements, or combining the elements of the embodiment, the effects each corresponding to the respective elements can be obtained.

Reference Signs List

[0030]

1 housing,
2 cover,
3 washing/dewatering tub,
4 tank,
5 window,
5a view part,
5b scale section,
5c bottom surface,
6 tank lid,
7 nozzle portion,
8 inner tank lid,
8a inlet,
9 automatic washing liquid feed unit,
10 tank leg

Claims

1. A tank enabling supply of washing liquid, comprising:

a tank lid having an inclined upper surface for covering an inlet through which the washing liquid is fed;
a window formed in a part of the inclined surface, which enables visual confirmation of a residual quantity of the washing liquid; and
a view part in the window, which enables visual confirmation of the residual quantity of the washing liquid,
wherein the view part includes a scale section formed in a vertical direction to a surface of the washing liquid, which enables visual confirmation of the residual quantity of the washing liquid.

2. The tank according to claim 1, further comprising a nozzle portion for discharging the washing liquid in the tank,
wherein the view part is disposed above the nozzle portion, or between the nozzle portion and the inlet.

3. The tank according to claim 1 or 2,
wherein the view part has an inclined bottom surface serving as a reflective surface.

4. A washing machine comprising:

a housing;
a cover for covering a laundry loading opening;
a washing/dewatering tub for accommodating the loaded laundry; and
a tank enabling supply of washing liquid,
wherein the tank includes a tank lid having an inclined upper surface for covering an inlet through which the washing liquid is fed, a window formed in a part of the inclined surface, which enables visual confirmation of a residual quantity of the washing liquid, and a view part in the window, which enables visual confirmation of the residual quantity of the washing liquid; and
the view part includes a scale section formed in a vertical direction to a surface of the washing liquid, which enables visual confirmation of the residual quantity of the washing liquid.

5. The washing machine according to claim 4,

wherein the tank includes a first tank enabling supply of first washing liquid, and a second tank which is disposed adjacently to the first tank in its longitudinal direction and enables supply of second washing liquid which is different from the first washing liquid;
the first tank includes a first window at one end;
the second tank includes a second window at the other end; and
the first window and the second window are disposed to face each other.

6. The washing machine according to claim 4 or 5,

wherein the tank is disposed at a far side of the cover;
the cover includes a front-downward inclined upper surface in a closed state; and
the inclined surface of the tank lid and the inclined surface of the cover are parallel to each other.

FIG. 1

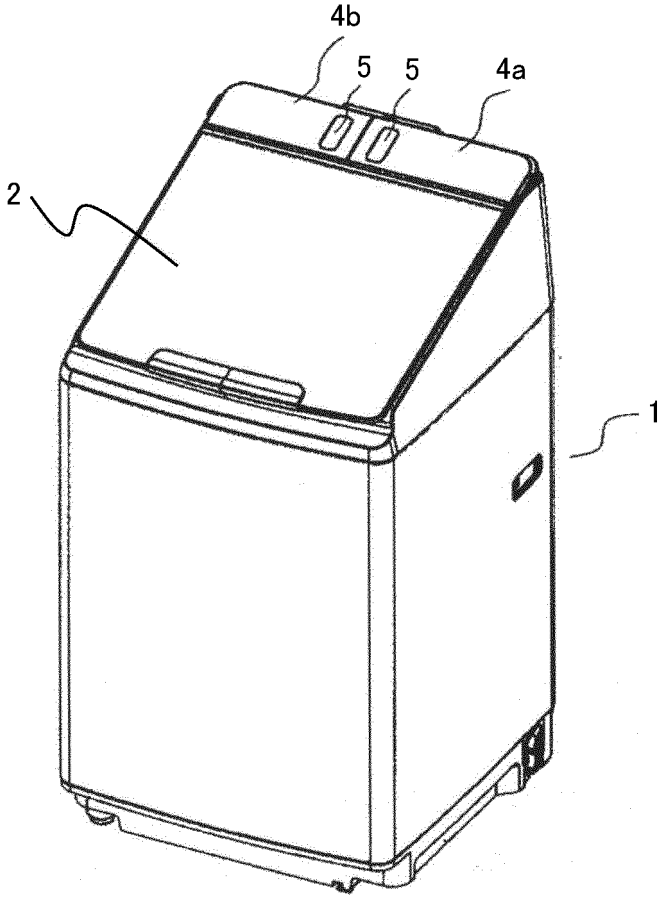


FIG. 2

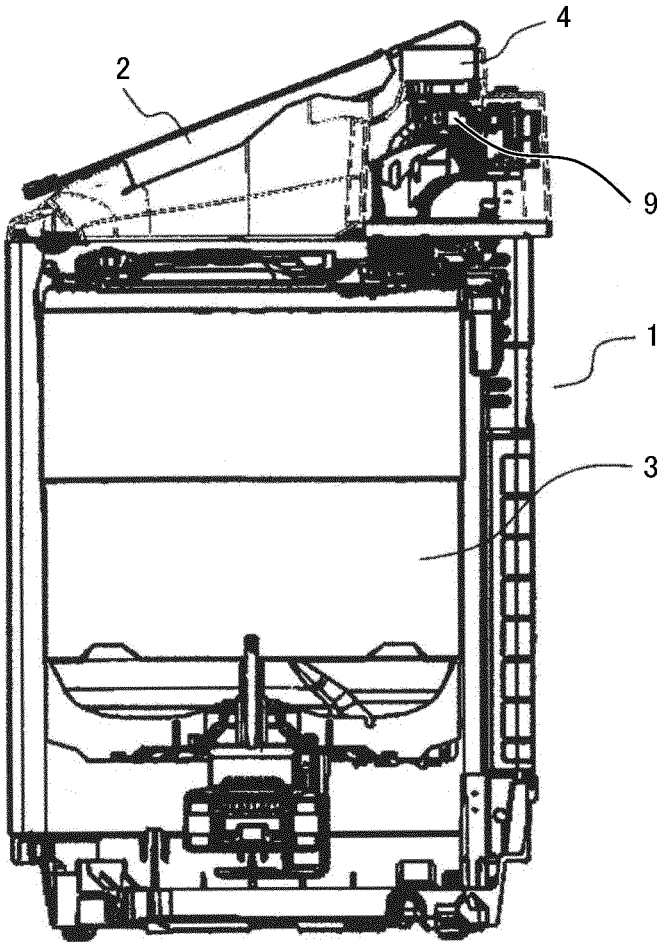


FIG. 3

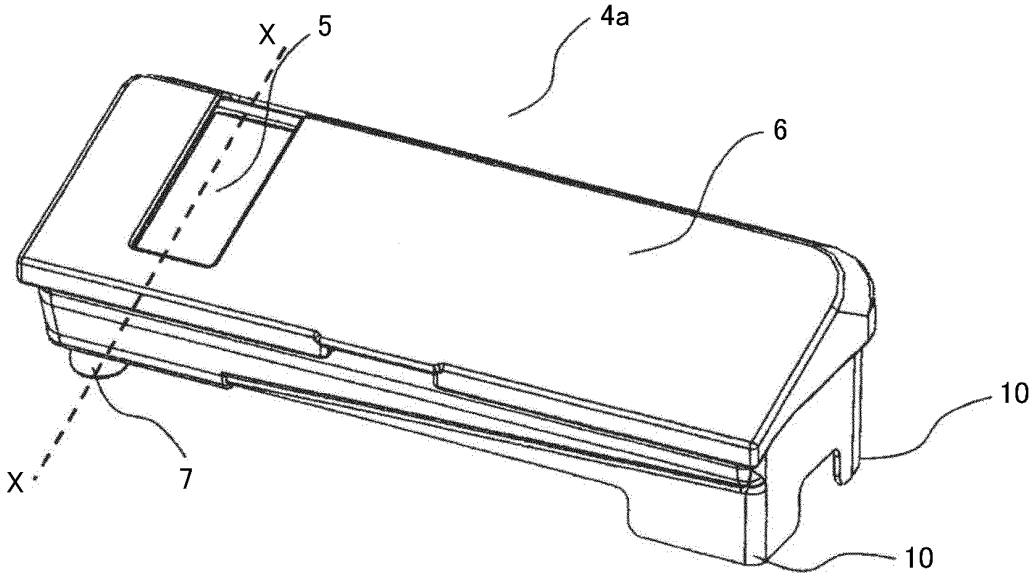


FIG. 4

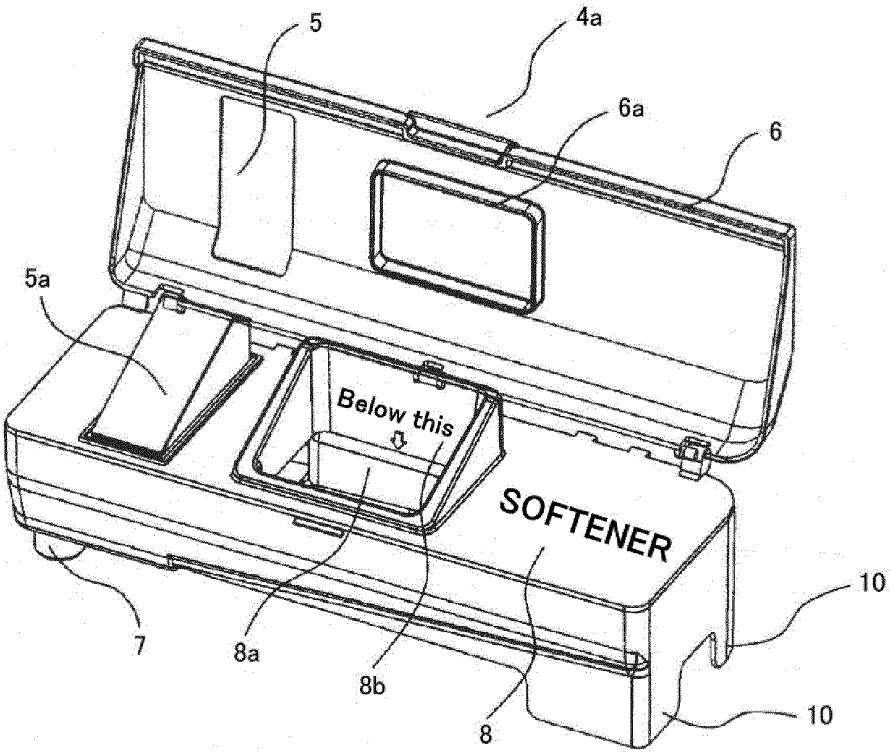


FIG. 5

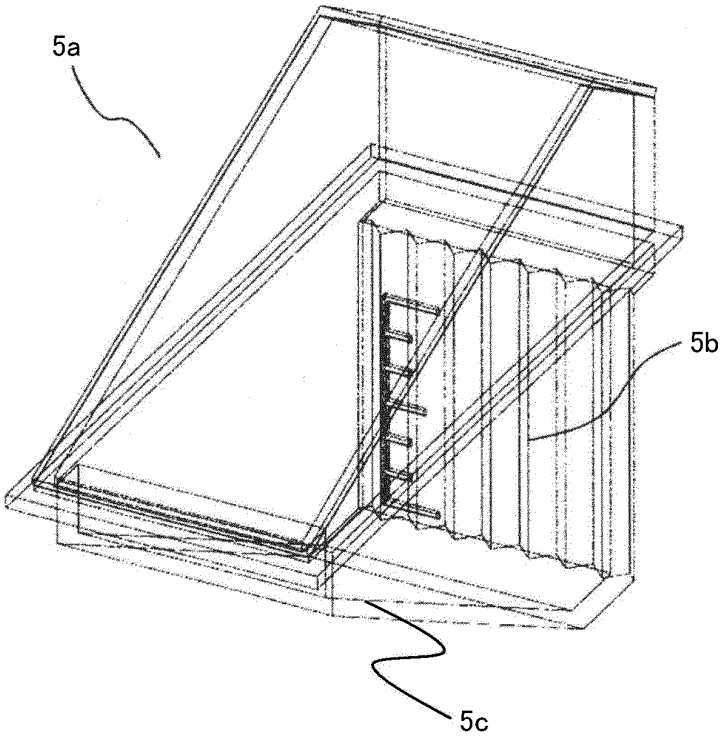
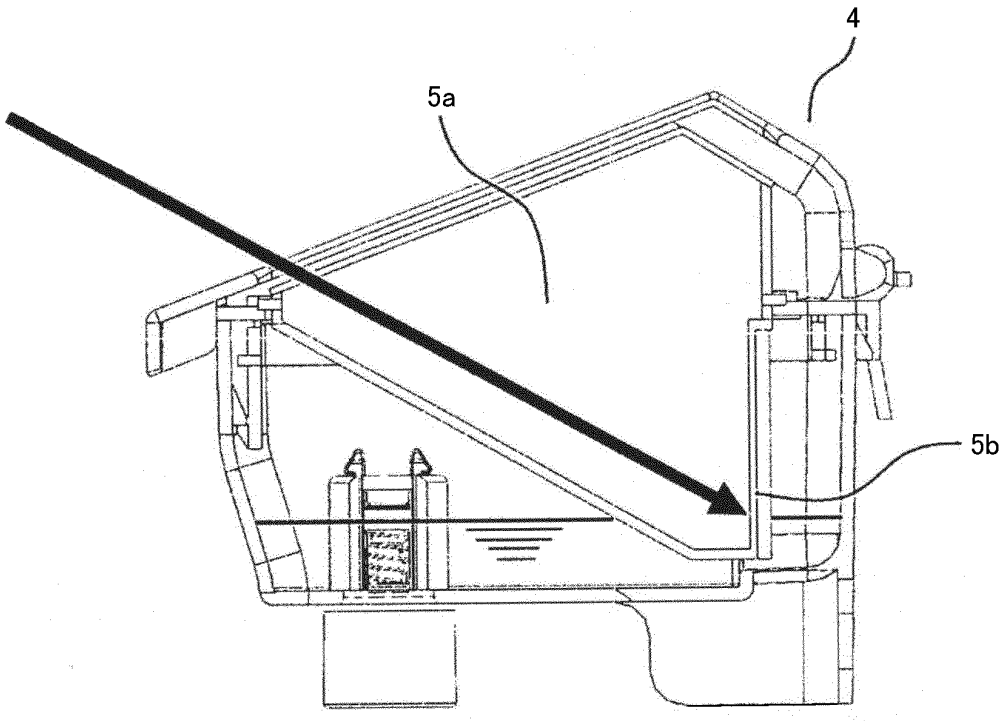


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. D06F39/02(2006.01)i
FI: D06F39/02A

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)
Int.Cl. D06F39/02

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2020
Registered utility model specifications of Japan	1996-2020
Published registered utility model applications of Japan	1994-2020

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 A	US 2019/0345661 A1 (SAMSUNG ELECTRONICS CO., LTD.) 14.11.2019 (2019-11-14), paragraphs [0044]-[0167], fig. 1a-9	1-2, 4-6 3
Y	JP 2019-107309 A (PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.) 04.07.2019 (2019-07-04), paragraphs [0083]-[0086], fig. 18-20	1-2, 4-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
17.09.2020	13.10.2020

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/033036

US 2019/0345661 A1	14.11.2019	KR 10-2018-0080013 A		
JP 2019-107309 A	04.07.2019	(Family: none)		

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2019037356 A **[0004]**