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(54) AUTOMATIC WASHING MACHINE

(57) A full-automatic washing machine comprises a box body (1) and a control panel seat (2), wherein the control panel seat (2) comprises a control panel seat lower part (21) inserted into an opening at the upper end of the box body (1) and a control panel seat upper part (22) exposed above the upper end of the box body (1), and the height ratio of the control panel seat upper part (22) to the box body (1) is in a range of 0.02 to 0.07; and preferably, the height ratio of the control panel seat upper part (22) to the box body (1) is in a range of 0.03 to 0.06. Further, the control panel seat (2) is a homocentric-square-shaped structure and comprises an outer peripheral wall (23) and an inner peripheral wall (24), the outer peripheral wall (23) is matched and connected with the upper end of the box body (1), the lower end of the inner peripheral wall (24) extends into the box body (1) to form a clothes input opening (25), and the height ratio of the outer peripheral wall (23) to the inner peripheral wall (24) is in a range of 0.25 to 0.5; and preferably, the height ratio is in a range of 0.3 to 0.45. The full-automatic washing machine disclosed by the disclosure has the characteristics of simple structure, convenient installation, simple and beautiful overall machine and good visual effect.

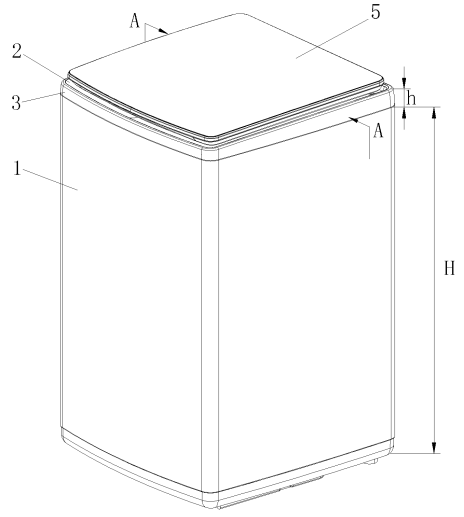

Fig. 1

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Description

TECHNICAL FIELD

[0001] The disclosure relates to the field of washing machines, and particularly relates to a full-automatic washing machine which is reduced in height.

BACKGROUND

[0002] A full-automatic washing machine generally comprises a washing machine box body, a control panel seat, an outer tub, an inner tub, an impeller and a transmission system, wherein the control panel seat is arranged at the upper part of the washing machine box body and is generally made of high-strength plastics such as PP and ABS through injection molding, and a control panel is arranged in the front or at the back of the control panel seat of the existing washing machine. The control panel seat is mainly used to fix and install control components, i.e., electrical components, such as a computer board, a water level switch, a power switch, a microswitch, a reed switch, a safety switch, a stop switch, a water inlet switch and a water inlet valve, and is also provided with a water injection nozzle for injecting water into the tubs, a disinfection box and a driver. An upper cover with an integrated structure or a split folded structure is arranged at the top of the control panel seat.

[0003] Although the composition form of the control panel seat of the existing washing machine has been used for many years until now, the following shortcomings still exist: 1, the height of the control panel seat protruded at the upper part of the box body is relatively high, the upper space is occupied, and thus the height of the washing machine is relatively high, fetching clothes from an input opening is inconvenient, and a poor aesthetic sense is caused; 2, the connecting part of the box body is a circle of annular groove protruded on the outer edge of the box body, a connecting ring table of the control panel seat is buckled in the annular groove to ensure that the control panel seat and the box body are connected to each other, this connection composition form also has the defect of poor aesthetic sense due to the protrusion on the outside of the box body, and the protruded structure occupies the surrounding space and is easy to cause collisions; and 3, the rear part of the inner peripheral wall of the control panel seat is a vertical or slightly-inclined baffle plate structure, and has a chamfer transition relationship with the left and right side parts, and thus a clothes input opening is only the front half of the upper part of the inner tub, and the input opening is not conducive to the fetch of the clothes due to a small size.

[0004] There are three fixed installation modes between the control panel seat and the washing machine box body as following. The first mode is to adopt screw fixation, the second mode is to adopt fastener fixation, and the third mode is to adopt screw fixation and fastener fixation jointly. For example, CN 96213557.7 discloses a housing structure of a micro-washing machine, the housing structure comprises a washing machine upper cover, a control panel seat and a housing which are injection-molded, wherein the housing is split into upper and lower parts, and a working upper housing at the upper part and a lower housing are both integrally injection-molded single-wall structures. The outer diameter of the junction between the control panel seat and the upper housing corresponds to the inner diameter of the upper housing, and the outer edge of the control panel seat is clamped on the inner wall of the upper housing.

[0005] The installation structure of the control panel seat and the washing machine box body in the prior art purely adopts screw fixation, the more the screws are adopted, the better the fastening degree between the control panel seat and the washing machine box body is achieved, but more troubles of installation and removal are caused, parts are also increased. And in addition, the screw installation process is complex in procedure, consumes labor hours, and is higher in cost. Although the mode of fixing the control panel seat and the washing machine box body by purely adopting the fasteners is simple in structure and simplifies the installation procedure, the fastening degree between the control panel seat and the washing machine box body is poor, and when the impeller or the inner tub rotates, a loosening phenomenon occurs between the control panel seat and the washing machine box body.

[0006] However, whether it is the screw fixation or the fastener fixation, as some tiny gaps may exist at the junction of the control panel seat and the washing machine box body, some loosening phenomena may occur between the control panel seat and the washing machine box body during long-term use, especially when the washing machine is in a working state, the rotation of the inner tub or the impeller can easily lead to the loosening of the control panel seat and the washing machine box body in a horizontal direction.

[0007] In view of the above, the disclosure has been proposed.

SUMMARY

[0008] The technical problem to be solved by the disclosure is to overcome the shortcomings of the prior art and provide a full-automatic washing machine which is reduced in height, less in occupied space, firm in connection between a control panel seat and a box body, and convenient to install.

[0009] In order to solve the above technical problems, the basic conception of the technical scheme adopted by the disclosure is that:

A full-automatic washing machine disclosed by the disclosure comprises a box body and a control panel seat, wherein the control panel seat comprises a control panel seat lower part inserted into an opening at the upper end of the box body and a control panel seat upper part exposed above the upper end of the box body, and the

height ratio of the control panel seat upper part to the box body is in a range of 0.02 to 0.07.

[0010] Further, the height ratio of the control panel seat upper part to the box body is in a range of 0.03 to 0.06.

[0011] Further, the control panel seat is a homocentric-square-shaped structure and comprises an outer peripheral wall and an inner peripheral wall. The outer peripheral wall is matched and connected with the upper end of the box body, the lower end of the inner peripheral wall extends into the box body to form a clothes input opening, and the height ratio of the outer peripheral wall to the inner peripheral wall is in a range of 0.25 to 0.5; and preferably, the height ratio is in a range of 0.3 to 0.45.

[0012] Further, the inner peripheral wall is a basin-shaped structure and smoothly transits in a circumferential direction to form the bell-mouthed clothes input opening, the clothes input opening is located right above an upper opening of an inner tub, and thus the size of the clothes input opening is increased, the input of clothes can be facilitated, and the backflow of washing splashing water can also be facilitated.

[0013] Preferably, the inner peripheral wall of the basin-shaped structure and the control panel seat are of a split structure, and the inner peripheral wall is arranged on the inner circumference of the control panel seat through fasteners or screws.

[0014] According to the disclosure, the outer peripheral wall of the control panel seat is matched and connected with the upper end of the box body to form the control panel seat upper part, and the part of the lower end of the inner peripheral wall that extends into the box body forms the control panel seat lower part.

[0015] Further, the upper end of the box body is bent inwards to form a turnup, and the lower end of the control panel seat upper part overlaps the turnup.

[0016] Further, the inner side of the turnup is raised upwards and then bent inwards to form an installation part, notches are formed in the installation part corresponding to the four corners of the box body, the installation part on the two sides of each notch is provided with screw holes for installing angle plates, and the angle plates are fixedly arranged at the notches to hang a suspender of the washing machine.

[0017] Further, the inner side of the installation part is raised upwards to form a convex rib for guiding and positioning the control panel seat, and thus the lower end of the control panel seat upper part overlaps the turnup.

[0018] Further, the control panel seat upper part is an inclined structure with a lower front part and a higher rear part, and the height ratio of the front part to the rear part is in a range of 0.3 to 0.8.

[0019] Further, the upper end of the box body is connected with the lower end of the control panel seat upper part through screws and/or fasteners.

[0020] Further, the four corners of the upper end of the box body are each provided with one angle plate, and the angle plates are connected with the lower end of the control panel seat upper part through the screws and/or the fasteners.

[0021] Further, the periphery of the control panel seat upper part is provided with a decorative covered edge, and the decorative covered edge is connected with the control panel seat through fasteners. And preferably, upper and lower clamping jaws are arranged on the inner wall of the decorative covered edge, and upper and lower clamping slots matched with the clamping jaws are formed in the periphery of the control panel seat upper part.

[0022] Further, the outer surface of the decorative covered edge and the outer wall of the upper end of the box body are in smooth transition and are located in the same vertical plane.

[0023] Further, an upper cover of the washing machine covers the entire upper end surface of the control panel seat.

[0024] Another full-automatic washing machine disclosed by the disclosure comprises a box body and a control panel seat, wherein the control panel seat comprises a control panel seat lower part inserted into an opening at the upper end of the box body and a control panel seat upper part exposed above the upper end of the box body, and the height ratio of the control panel seat upper part to the control panel seat lower part is in a range of 0.2 to 1.

[0025] Further, the height ratio of the control panel seat upper part to the control panel seat lower part is in a range of 0.4 to 0.8.

[0026] Further, the control panel seat is a homocentric-square-shaped structure and comprises an outer peripheral wall and an inner peripheral wall, the outer peripheral wall is matched and connected with the upper end of the box body, the lower end of the inner peripheral wall extends into the box body to form a clothes input opening. The height ratio of the outer peripheral wall to the inner peripheral wall is in a range of 0.25 to 0.5; and preferably, the height ratio is in a range of 0.3 to 0.45.

[0027] Further, the inner peripheral wall is a basin-shaped structure and smoothly transits in a circumferential direction to form the bell-mouthed clothes input opening, the clothes input opening is located right above an upper opening of an inner tub, and thus the size of the clothes input opening is increased, the input of clothes can be facilitated, and the backflow of washing splashing water can also be facilitated.

[0028] Preferably, the inner peripheral wall of the basin-shaped structure and the control panel seat are of a split structure, and the inner peripheral wall is arranged on the inner circumference of the control panel seat through fasteners or screws.

[0029] Further, the outer peripheral wall of the control panel seat is matched and connected with the upper end of the box body to form the control panel seat upper part, and the part of the lower end of the inner peripheral wall that extends into the box body forms the control panel seat lower part.

[0030] Further, the upper end of the box body is bent

inwards to form a turnup, and the lower end of the control panel seat upper part overlaps the turnup.

[0031] Further, the inner side of the turnup is raised upwards and then bent inwards to form an installation part, notches are formed in the turnup corresponding to the four corners of the box body, the installation part on the two sides of each notch is provided with screw holes for installing angle plates, and the angle plates are fixedly arranged at the notches to hang a suspender of the washing machine.

[0032] Further, the inner side of the installation part is raised upwards to form a convex rib for guiding and positioning the control panel seat, and thus the lower end of the control panel seat upper part overlaps the turnup.

[0033] Further, the control panel seat upper part is an inclined structure with a lower front part and a higher rear part, and the height ratio of the front part to the rear part is in a range of 0.3 to 0.8.

[0034] Further, the upper end of the box body is connected with the lower end of the control panel seat upper part through the screws and/or the fasteners.

[0035] Further, the four corners of the upper end of the box body are each provided with one angle plate, and the angle plates are connected with the lower end of the control panel seat upper part through the screws and/or the fasteners.

[0036] Further, the periphery of the control panel seat upper part is provided with a decorative covered edge, and the decorative covered edge is connected with the control panel seat through the fasteners. Preferably, upper and lower clamping jaws are arranged on the inner wall of the decorative covered edge, and upper and lower clamping slots matched with the clamping jaws are formed in the periphery of the control panel seat upper part.

[0037] Further, the outer surface of the decorative covered edge and the outer wall of the upper end of the box body are in smooth transition and are located in the same vertical plane.

[0038] Further, an upper cover of the washing machine covers the entire upper end surface of the control panel seat.

[0039] After adopting the above technical scheme, the disclosure has the following beneficial effects compared with the prior art.

1. As the height of the control panel seat protruded at the upper part of the box body is lower, the height of the washing machine is relatively reduced without changing the height of the box body, and users can conveniently fetch the clothes. In the case that the overall height of the washing machine is not changed, the height of the tubs is relatively increased, and the capacity of the washing machine is increased.

2. As the lower end of the inner peripheral wall of the control panel seat is inserted into the upper opening of the box body to form the clothes input opening, the outer peripheral wall of the control panel seat is supported at the upper end of the box body, the inner space of the box body occupied by the control panel seat is small, and thus the installation space can be saved, and the installation of other parts of the washing machine can be facilitated.

3. The outer peripheral wall of the control panel seat is supported and positioned through the turnup at the upper end of the box body, and the angle plates at the four corners of the box body are fixedly installed with the control panel seat, so that the advantages of reasonable design, simple structure and convenient installation can be achieved, and the cost of manufacturing and installation can be reduced;

4. The outer surface of the decorative covered edge is flush with the box body of the washing machine and does not protrude outside the box body, so a beautiful appearance is realized, and installation and placement operations of the users are facilitated;

5. Due to the design of the basin-shaped input opening, the size of the input opening is enlarged, and the input of the clothes is facilitated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040]

Fig. 1 is a schematic diagram of a full-automatic washing machine of the disclosure;

Fig. 2 is a schematic diagram of an A-A directional section of the Fig. 1;

Fig. 3 is a decomposition schematic diagram of a full-automatic washing machine of the disclosure;

Fig. 4 is a side view of a full-automatic washing machine of the disclosure;

Fig. 5 is a schematic diagram of an assembly structure of a full-automatic washing machine of the disclosure;

Fig. 6 and Fig. 7 are schematic diagrams of different installation structures of a control panel seat and angle plates of a box body.

DETAILED DESCRIPTION

[0041] A detailed description of embodiments of the disclosure is further made below with reference to accompanying drawings.

Embodiment 1

[0042] As shown in Fig. 1, a full-automatic washing machine disclosed by the embodiment comprises a box body 1 and a control panel seat 2, wherein the control panel seat 2 comprises a control panel seat lower part 21 inserted into an opening at the upper end of the box body 1 and a control panel seat upper part 22 exposed above the upper end of the box body 1. The height ratio h:H of the control panel seat upper part 22 to the box body 1 is in a range of 0.02 to 0.07, and preferably, the height ratio h:H of the control panel seat upper part to the box body is in a range of 0.03 to 0.06.

Embodiment 2

[0043] As shown in Fig. 2, another full-automatic washing machine disclosed by the embodiment comprises a box body 1 and a control panel seat 2, wherein the control panel seat 2 comprises a control panel seat lower part 21 inserted into an opening at the upper end of the box body 1 and a control panel seat upper part 22 exposed above the upper end of the box body 1, and the height ratio h:h' of the control panel seat upper part 22 to the control panel seat lower part 21 is in a range of 0.2 to 1, and preferably, the height ratio h:h' of the control panel seat upper part 22 to the control panel seat lower part 21 is in a range of 0.4 to 0.8.

Embodiment 3

[0044] As shown in Fig. 5, the control panel seat 2 disclosed by the disclosure is a homocentric-square-shaped structure and comprises an outer peripheral wall 23 and an inner peripheral wall 24. The outer peripheral wall 23 is matched and connected with the upper end of the box body to form the control panel seat upper part 22; the lower end of the inner peripheral wall 24 extends into the box body 1 to form a clothes input opening 25, and the part of the lower end of the inner peripheral wall 24 that extends into the box body 1 is the control panel seat lower part 21. The height ratio h:(h+h') of the outer peripheral wall 23 to the inner peripheral wall 24 is in a range of 0.25 to 0.5; and preferably, the height ratio h:(h+h') is in a range of 0.3 to 0.45.

Embodiment 4

[0045] As shown in Fig. 5, the inner peripheral wall 24 of the control panel seat 2 disclosed by the embodiment is a basin-shaped structure and smoothly transits in a circumferential direction to form a bell-mouthed clothes input opening 25 and the clothes input opening is located right above an upper opening of an inner tub, and thus the size of the clothes input opening is increased, the input of clothes can be facilitated, and the backflow of washing splashing water can also be facilitated.

[0046] Preferably, the inner peripheral wall 24 with the basin-shaped structure and the control panel seat 2 are of a split structure (see Fig. 2), and the inner peripheral wall is arranged on the inner circumference of the control panel seat 2 through fasteners or screws.

Embodiment 5

[0047] As shown in Fig. 5, the outer ring of, the control panel seat upper part 22, i.e., the outer peripheral wall 23, disclosed by the embodiment is provided with a decorative covered edge 3, and the decorative covered edge 3 is connected with the control panel seat 2 through fasteners. Preferably, upper and lower clamping jaws 31 are arranged on the inner wall of the decorative covered edge 3, and upper and lower clamping slots 231 matched with the clamping jaws 31 are formed in the outer peripheral wall 23 of the control panel seat 2.

[0048] Further, the outer surface of the decorative covered edge 3 and the outer wall of the upper end of the box body 1 are in smooth transition and are located in the same vertical plane (see Fig. 2).

Embodiment 6

[0049] As shown in Fig. 2 and Fig. 5, the upper end of the box body 1 disclosed by the embodiment is bent inwards to form a turnup 11, and the lower end of the control panel seat upper part 22 overlaps the turnup 11 and is connected with the turnup 11 through screws and/or fasteners.

[0050] Further, the four corners of the upper end of the box body 1 are each provided with an angle plate 4, and the angle plates 4 are connected with the lower end of the control panel seat upper part through the screws and/or the fasteners (see Fig. 6 and Fig. 7).

Embodiment 7

[0051] As shown in Fig. 5, the inner side of the turnup 11 at the upper end of the box body 1 disclosed by the embodiment is raised upwards and then bent inwards to form an installation part 12, notches 13 are formed in the turnup 11 corresponding to the four corners of the box body 1. The installation part 12 on the two sides of each notch 13 is provided with screw holes 14 for installing the angle plates 4 (see Fig. 6), and the angle plates 4 are fixedly arranged at the notches 13 to hang a suspender of the washing machine.

[0052] Further, the inner side of the installation part 12 is raised upwards to form a convex rib 15 for guiding and positioning the control panel seat 2 (see Fig. 5), and thus the lower end of the control panel seat upper part 22 is guided and positioned to overlap the turnup 11.

Embodiment 8

[0053] As shown in Fig. 6 and Fig. 7, in the present embodiment, the outer peripheral wall 23 of the control

panel seat 2 is provided with clamping jaws 25 in correspondence to the angle plates 4 at the two sides of the front part of the box body 1, clamping grooves are correspondingly formed in the angle plates 4 at the two sides of the front part of the washing machine, and the outer peripheral wall 23 of the control panel seat 2 is connected with the angle plates 4 at the two sides of the front part of the box body 1 of the washing machine through fasteners (see Fig. 7). The angle plates 4 at the two sides of the rear part of the box body 1 of the washing machine are provided with screw installation holes 41, and the control panel seat 2 is connected with the angle plates 4 at the two sides of the rear part of the box body 1 of the washing machine through screws (see Fig. 6).

Embodiment 9

[0054] As shown in Fig. 3 and Fig. 4, the control panel seat upper part 22 disclosed by the embodiment is an inclined structure with a lower front part and a higher rear part, and the height ratio h1:h2 of the front part to the rear part is in a range of 0.3 to 0.8. Preferably, the height h1 of the front part of the control panel seat upper part 22 is equal to 25.3mm, the height h2 of the rear part is equal to 40mm, the height h' of the control panel seat lower part 21 is equal to 52.5mm, and the height H of the box body 1 is equal to 800mm.

Embodiment 10

[0055] As shown in Fig. 1 and Fig. 2, an upper cover 5 of the washing machine disclosed by the disclosure covers the entire upper end surface of the control panel seat 2. Combined with the structure of the control panel seat 2, the structure ensures that the overall structure of the washing machine is more compact and simpler. Preferably, a control unit of the washing machine is arranged on the upper cover 5.

[0056] Implementation schemes in the above embodiments can be further combined or substituted, and the embodiments are merely used for describing the preferred embodiments of the disclosure but not intended to limit the conception and scope of the disclosure, without departing from the design concept of the disclosure, various changes and improvements made by those skilled in the art to the technical scheme of the disclosure shall fall into the protection scope of the disclosure.

Claims

1. A full-automatic washing machine, comprising a box body and a control panel seat,
   the control panel seat comprising a control panel seat lower part inserted into an opening at an upper end of the box body and a control panel seat upper part exposed above the upper end of the box body, wherein a height ratio of the control panel seat upper part to the box body is in a range of 0.02 to 0.07.

2. The full-automatic washing machine according to claim 1, wherein the height ratio of the control panel seat upper part to the box body is in a range of 0.03 to 0.06.

3. A full-automatic washing machine, comprising a box body and a control panel seat,
   the control panel seat comprising a control panel seat lower part inserted into an opening at an upper end of the box body and a control panel seat upper part exposed above the upper end of the box body, wherein a height ratio of the control panel seat upper part to the control panel seat lower part is in a range of 0.2 to 1.

4. The full-automatic washing machine according to claim 3, wherein the height ratio of the control panel seat upper part to the control panel seat lower part is in a range of 0.4 to 0.8.

5. The full-automatic washing machine according to any one of claims 1 to 4, wherein the control panel seat is a homocentric-square-shaped structure and comprises an outer peripheral wall and an inner peripheral wall,
   the outer peripheral wall is matched and connected with the upper end of the box body, a lower end of the inner peripheral wall extends into the box body to form a clothes input opening,
   a height ratio of the outer peripheral wall to the inner peripheral wall is in a range of 0.25 to 0.5;
   preferably, the height ratio is in a range of 0.3 to 0.45.

6. The full-automatic washing machine according to any one of claims 1 to 4, wherein the upper end of the box body is bent inwards to form a turnup, and a lower end of the control panel seat upper part overlaps the turnup.

7. The full-automatic washing machine according to any one of claims 1 to 4, wherein the upper end of the box body is connected with the lower end of the control panel seat upper part through screws and/or snap-fit.

8. The full-automatic washing machine according to claim 7, wherein four corners of the upper end of the box body are each provided with an angle plate, and angle plates are connected with the lower end of the control panel seat upper part through screws and/or snap-fit.

9. The full-automatic washing machine according to any one of claims 1 to 4, wherein a periphery of the control panel seat upper part is provided with a decorative covered edge, and the decorative covered

edge is connected with the control panel seat through snap-fit;
preferably, upper and lower clamping jaws are arranged on an inner wall of the decorative covered edge, and upper and lower clamping slots matched with the clamping jaws are formed in a periphery of the control panel seat upper part.

10. The full-automatic washing machine according to any one of claims 1 to 4, wherein an upper cover of the washing machine covers entirely an upper end surface of the control panel seat.

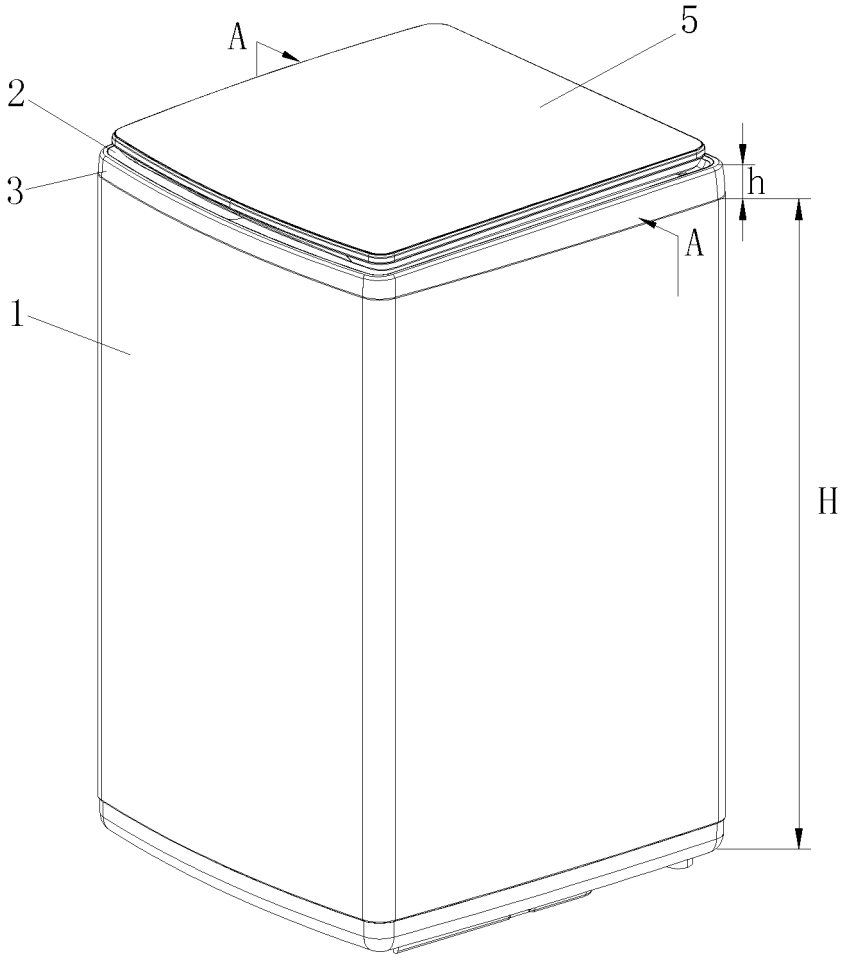

Fig. 1

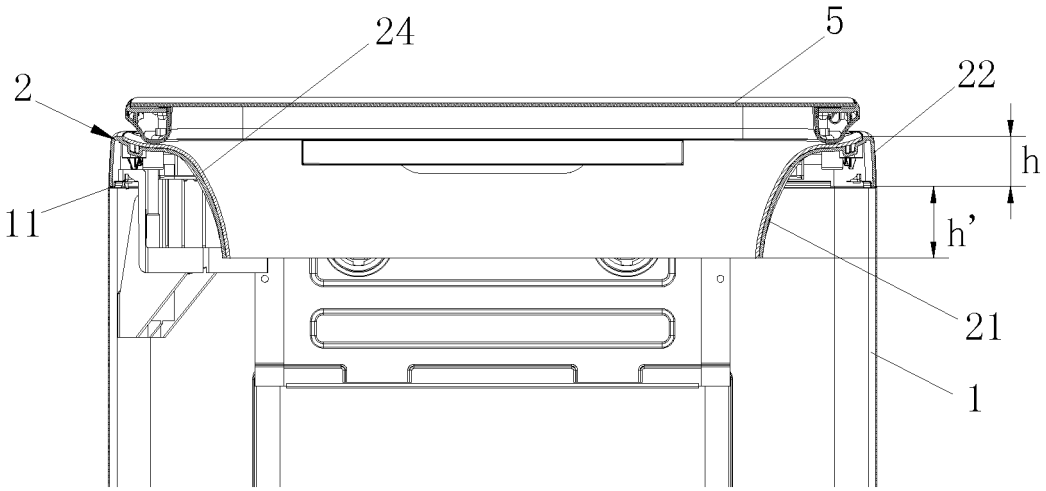

Fig. 2

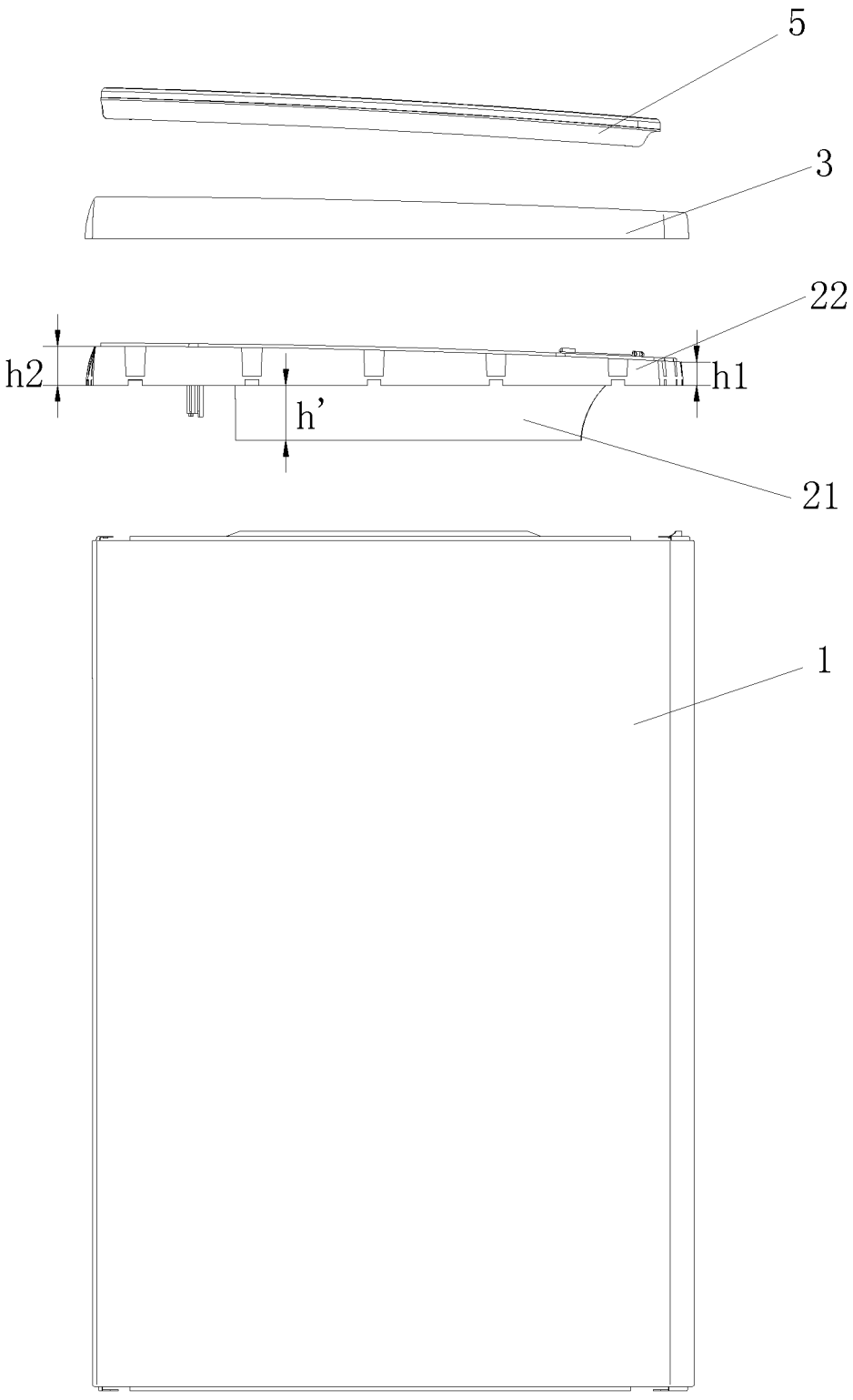

Fig. 3

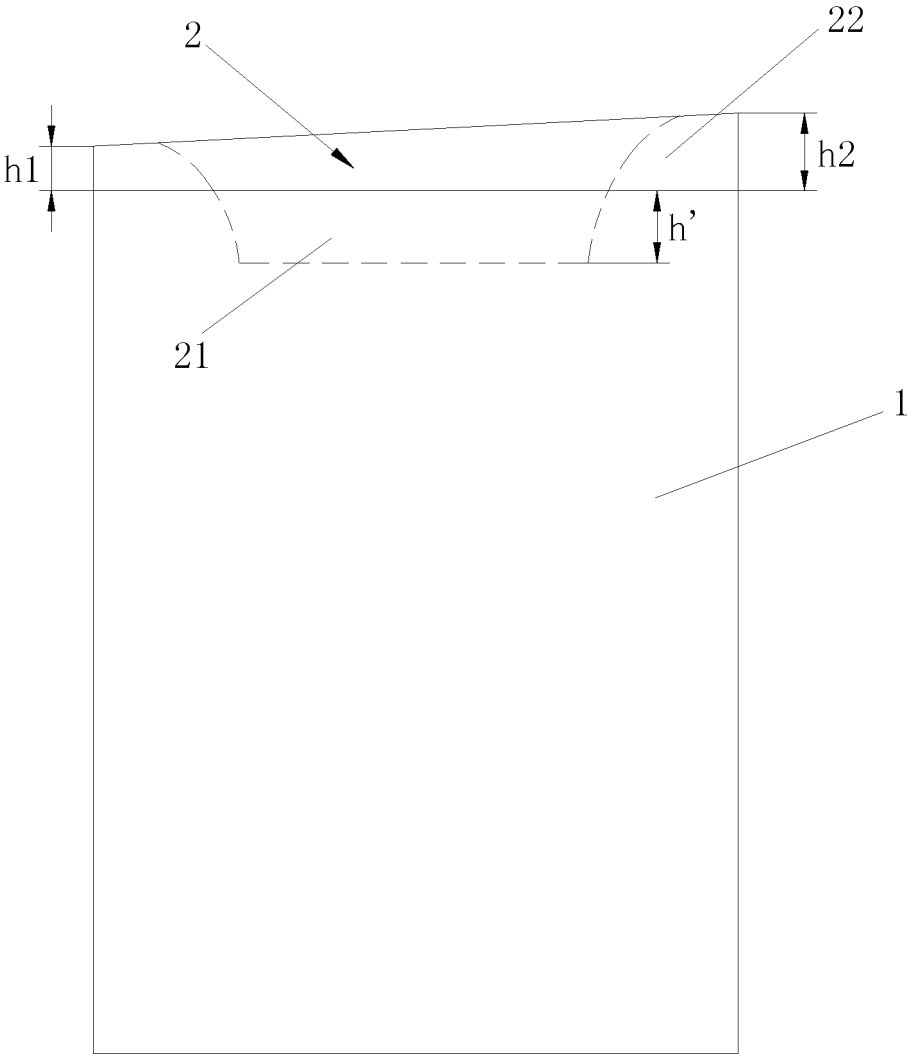

Fig. 4

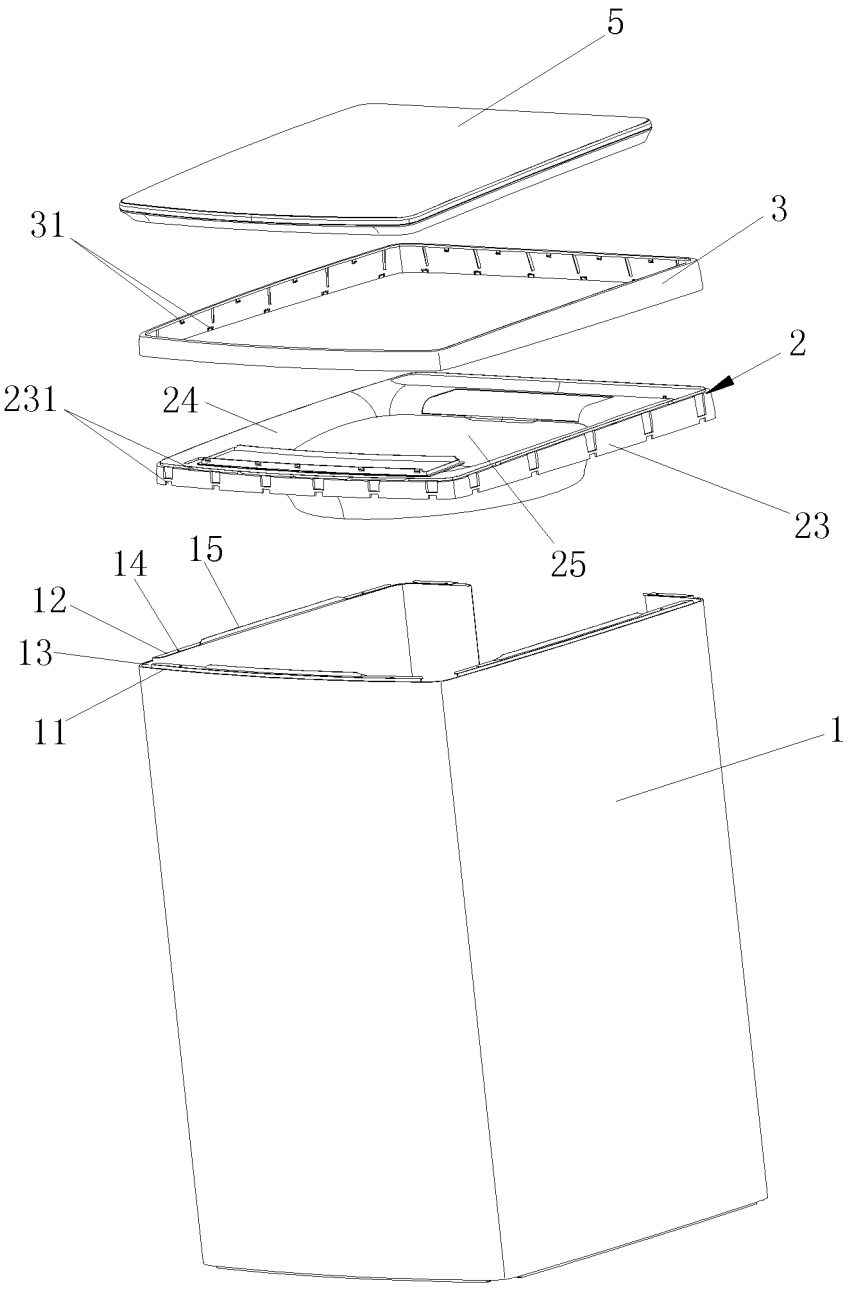

Fig. 5

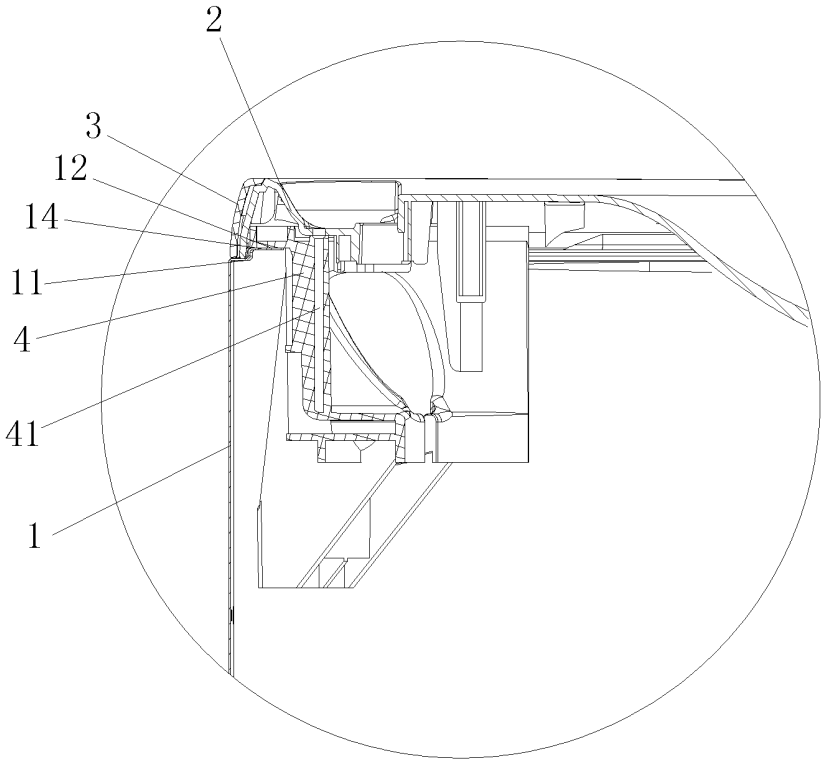

Fig. 6

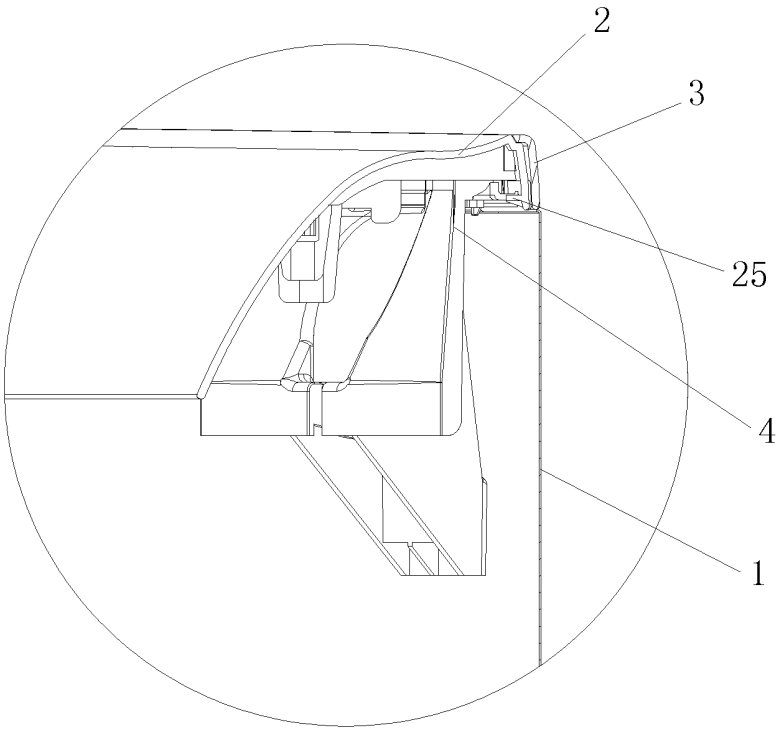

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/099031

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/00 (2006.01) i; D06F 39/12 (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)

D06F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CNPAT, CNKI, WPI, EPODOC: HAIER; control panel, disc seat, install, height, easy, ratio, wash+, box, control+, panel, support+, frame+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 2486583 Y (HAIER ELECTRONICS GROUP CO., LTD. et al.), 17 April 2002 (17.04.2002), description, page 1, and figures 1-2	1-10
A	US 4771615 A (HITACHI LTD.), 20 September 1988 (20.09.1988), the whole document	1-10
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 November 2016 (16.11.2016)	**30 November 2016 (30.11.2016)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **MA, Lin** Telephone No.: (86-10) **62413141**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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REFERENCES CITED IN THE DESCRIPTION

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