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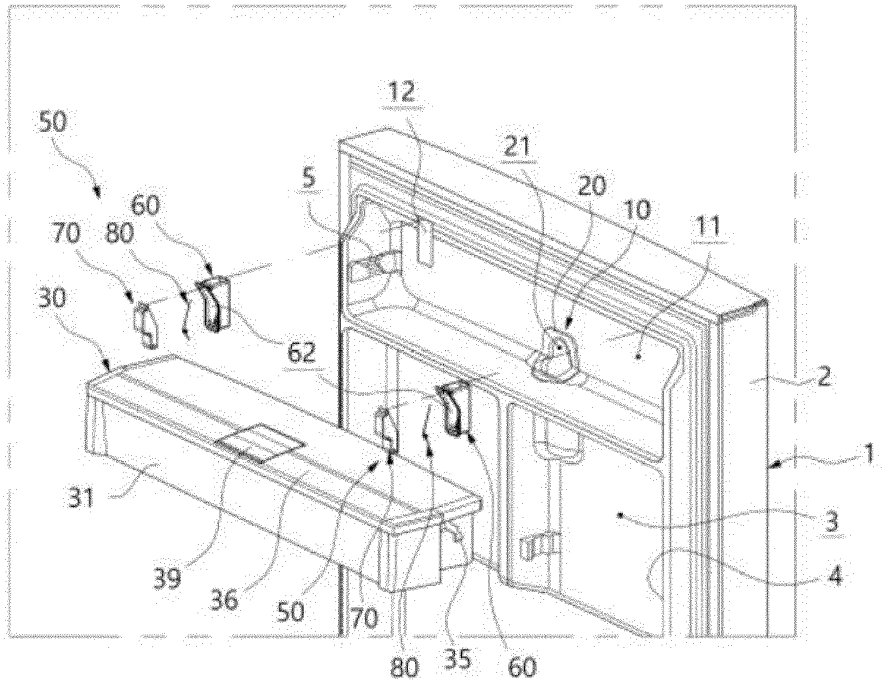
(54) **REFRIGERATOR**

(57) Refrigerator including a water tank (30) mounted to a door (1) and a detection device (50) configured to detect the correct mounting of the water tank (30). The detection device (50) is mounted to the door (1) and is rotated or moved rectilinearly by interfering with the surface of the water tank (30) in a process in which the water tank (30) is mounted to the door (1). When the mounting of the water tank (30) is completed, the detection device (50) is restored to an initial position by the elastic force of the elastic member (80). Accordingly, a user may easily perceive whether the water tank (30) is completely mounted to the refrigerator through a fastening sound or a fastening feel generated in the process in which the detection device (50) is restored after being pressed by the water tank.

Fig. 3



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Description

[0001] The present application claims priority to Korean Patent Application No. 10-2020-0142132, filed October 29, 2020.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present disclosure relates generally to a refrigerator. More particularly, the present disclosure relates to a refrigerator which is equipped with a water tank capable of supplying water stored therein.

Description of the Related Art

[0003] Generally, a refrigerator is a home appliance that can store food at low temperatures in an internal storage space that is shielded by a door. To this end, the refrigerator is configured to store the stored food in an optimal state by cooling the inside of the storage space by using cold air generated through heat exchange with refrigerant circulating in a refrigeration cycle.

[0004] Recently, a refrigerator is gradually becoming multifunctional in accordance with change in dietary life and the trend of high-end products, and a refrigerator equipped with various structures and convenient devices for user's usability and efficient use of internal space of the refrigerator has been released. For example, the door of a refrigerator is provided with a dispenser for supplying water or ice, and when a user manipulates the dispenser, water stored in a water tank or ice from an ice maker can be taken out.

[0005] Such a dispenser includes the water tank, and a user may fill the water tank with water and may mount the water tank to the refrigerator. When no water is left in the water tank, a user may remove the water tank from the refrigerator and may refill the water tank with water, and may mount the water tank to the refrigerator again. Accordingly, technology concerning the refrigerator having the function of the dispenser is disclosed in Korean Patent Application Publication No. 10-2018-0080056 and Korean Patent Application Publication No. 10-2018-0126835.

[0006] However, it is difficult for a user to perceive whether the water tank is completely mounted to the refrigerator. An outlet of the water tank is required to be completely inserted into an insertion hole formed in the refrigerator such that the insertion hole is hidden by the water tank so as not to be checked visually. When the outlet of the water tank is not inserted into the insertion hole, water may not be supplied efficiently or may leak to a surrounding area.

Documents of Related Art

[0007]

(Patent Document 1) Korean Patent Application Publication No. 10-2018-0080056

(Patent Document 2) Korean Patent Application Publication No. 10-2018-0126835

SUMMARY OF THE INVENTION

[0008] Accordingly, the present disclosure has been made keeping in mind the above problems occurring in the related art, and the present disclosure is intended to propose a refrigerator in which a user may easily perceive whether a water tank is completely mounted to the refrigerator.

[0009] In addition, the present disclosure is intended to propose a refrigerator in which a user may easily perceive whether the water tank is completely mounted to the refrigerator visually or through a mounting sound.

[0010] Furthermore, the present disclosure is intended to propose a refrigerator in which the weight of the water tank is used such that the water tank is easily mounted to the refrigerator and the mounted water tank is easily separated therefrom.

[0011] The objects are solved by the features of the independent claims. Preferred embodiments are given in the dependent claims.

[0012] In order to achieve the above objectives, according to one aspect of the present disclosure, a refrigerator of the present disclosure may include a water tank mounted to a door or cabinet of a refrigerator, and a detection device configured to detect the mounting of the water tank.

[0013] The detection device may be installed at the door or cabinet. The detection device may be installed at a mounting space of the water tank.

[0014] The detection device may rotatable or movable.

[0015] The detection device may be rotated and/or moved rectilinearly by interfering with the surface of the water tank in the mounting process of the water tank and may be restored to an initial position of the detection device by the elastic force of an elastic member when the mounting of the water tank is completed.

[0016] Accordingly, a user may easily perceive that the water tank is completely mounted to the refrigerator.

[0017] The user may perceive the correct mounting through a fastening sound and/or a fastening feel generated in the process in which the detection device is restored after being pressed.

[0018] When the detection device is restored to the initial position thereof by the elastic member, the detection device may hit the surface of the water tank.

[0019] Accordingly, the detection device may generate a hitting sound based on which the user may be informed that the water tank is completely mounted.

[0020] Alternatively or additionally, when the detection device is restored to the initial position thereof by the elastic member, at least a portion of the surface of a detection block constituting the detection device may be exposed to the front side of the detection device. Accord-

ingly, when the surface of the detection block is exposed, a user may observe the exposed state of the detection block and may visually perceive whether the water tank is mounted.

[0021] In one or more embodiments, at least a front surface of the detection block may have a color different than a color of a rear side of a mounting space in the door or the cabinet.

[0022] When the detection block constituting the detection device is rotated and is restored to the initial position thereof by the elastic member, the detection block may be in close contact with the surface of the water tank. The detection block may receive elastic force supplied by the elastic member and may press the surface of the water tank, and thus during the use of the refrigerator, vibration noise generated by the water tank may be reduced.

[0023] Alternatively or additionally, the detection device may be installed at the door, and a housing part having an operation space formed therein may constitute the frame of the detection device.

[0024] The detection block may be assembled in the operation space.

[0025] The detection block may be rotated or moved rectilinearly along a predetermined path in the operation space by interfering with the water tank.

[0026] Alternatively or additionally, the elastic member may be installed in the operation space and may be connected to the housing part and the detection block at the opposite ends thereof, respectively. Accordingly, the elastic member may supply elastic force to the detection block in the restoring direction of the detection block to the initial position thereof.

[0027] Alternatively or additionally, at least a portion of the front surface of the detection block facing the water tank may have a shape surrounding the surface of the water tank. Accordingly, the surface of the detection block may stably support the water tank.

[0028] Alternatively or additionally, an inclined guide surface may be formed along the mounting path of the water tank at the front surface of the housing part defining the operation space of the detection device. Such an inclined guide surface may naturally guide the mounting direction of the water tank.

[0029] In one or more embodiments, a stopping surface may be formed on the rear surface of the detection block.

[0030] When the detection block is rotated toward the inside of the operation space of the housing part, the stopping surface may be in surface contact with the inner surface of the operation space.

[0031] Accordingly, the concentration of load on a portion of the detection block and damage to the detection block may be prevented.

[0032] In one or more embodiments, an operation surface may be formed at the detection block.

[0033] The operation surface may be exposed toward a side opposite to the operation space and may be pressed by the water tank.

[0034] A support surface may be connected to the operation surface and may surround an edge part of the water tank.

[0035] In one or more embodiments, a hitting surface may extend in a direction opposite to the extending direction of the support surface from the operation surface and may hit the surface of the housing part when the detection block is restored to the initial position.

[0036] In one or more embodiments, the support surface may be configured to be recessed to the inside of the detection block and may extend along at least two surfaces of surfaces of the water tank. Thus, the support surface may surround and support the two surfaces of the water tank.

[0037] In one or more embodiments, the operation surface of the detection block may be the most protruding surface to the front side thereof and may have a shape of a flat surface.

[0038] In this case, when the detection block is restored to the initial position thereof, the operation surface may be an outer surface continuous to the surface of a tank mounting part to which the water tank is mounted. Accordingly, a user may more easily identify whether the detection block is located at the initial position.

[0039] In one or more embodiments, a sounding space open toward the operation space may be defined in the detection block. Such a sounding space may amplify the fastening sound.

[0040] The refrigerator of the present disclosure described above has the following effects.

[0041] In the process in which the water tank is mounted to the refrigerator, the detection device installed at the refrigerator may be pressed by the water tank and restored to the initial position thereof. The surface of the restored detection device may protrude more than the inner surface of the door of the refrigerator, so a user may easily perceive that the water tank is completely mounted to the refrigerator by checking the protruded state of the surface of the detection device, thereby facilitating the mounting of the water tank.

[0042] Particularly, a user may easily perceive that water tank is completely mounted to the refrigerator through a fastening sound and a fastening feel generated in a process in which the detection block of the detection device is restored to the initial position thereof after being pressed, thereby enabling a user to identify, in various methods, whether the water tank is mounted and preventing the misassembly of the water tank.

[0043] During the mounting of the water tank, the detection block may be easily moved by using the weight of a heavy water tank filled with water, and during the removal of the water tank, the support surface formed at the detection block by being recessed therefrom may guide the removal of the water tank, thereby facilitating the mounting and removing of the water tank and improving the usability of the refrigerator.

[0044] In the detection block of the present disclosure,

the sounding space which is a kind of empty space may be configured to be open toward the inside of the housing part, so a mounting sound generated when the detection block hits the water tank may be amplified, thereby enabling a user to easily perceive whether the water tank is mounted.

[0045] The operation surface of the detection block of the present disclosure may be an outer surface of the detection block protruding from the surface of the tank mounting part, thereby enabling a user to identify whether the water tank is completely mounted by checking the operation surface of the detection block.

[0046] In one or more embodiments, when the detection block of the present disclosure is rotated by being pressed by the water tank, the rear surface of the detection block as the stopping surface may be in surface contact with the inside of the housing part, thereby preventing the concentration of load on a portion of the detection block and preventing damage to the detection block in the process of the rapid rotation of the detection block pressed by the water tank.

[0047] In one or more embodiments, the inclined guide surface may be formed at the housing part constituting the detection device of the present disclosure and may naturally guide the mounting direction of the water tank, thereby facilitating the mounting of the water tank by a user through the detection device.

[0048] In one or more embodiments, the detection device of the present disclosure may occupy only a predetermined space of the door of the refrigerator and may be mounted to the door from a front side of the detection device, thereby having high installation convenience, and the water tank may not require a separate structure for relative operation with the detection device, thereby enabling the application of the water tank to the refrigerator without design change.

[0049] In one or more embodiments, the detection block provided in the detection device of the present disclosure may press the water tank which is completely mounted and may prevent the water tank from vibrating. The detection block may receive elastic force from the elastic member and may press the surface of the water tank, thereby reducing vibration noise generated by the water tank during the use of the refrigerator.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050] The above and other objectives, features, and other advantages of the present disclosure will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view illustrating a door constituting a refrigerator of the present disclosure according to an embodiment;

FIG. 2 is a front view illustrating the front of the door of the refrigerator illustrated in FIG. 1;

FIG. 3 is a perspective view illustrating a state in which a water tank and a detection device constituting the refrigerator of the present disclosure are separated from the door;

FIG. 4 is a sectional view taken along line I-I' of FIG. 1;

FIGS. 5 and 6 are sectional views illustrating respective states of a detection block prior to and after the rotation of the detection block in the detection device constituting the refrigerator of the present disclosure according to the embodiment;

FIG. 7 is a perspective view illustrating the structure of a housing part constituting the refrigerator of the present disclosure according to the embodiment;

FIG. 8 is a front view illustrating the structure of the housing part constituting the refrigerator of the present disclosure according to the embodiment;

FIG. 9 is a perspective view illustrating the structure of the detection block in the detection device constituting the refrigerator of the present disclosure according to the embodiment;

FIG. 10 is a side view illustrating the structure of the detection block in the detection device constituting the refrigerator of the present disclosure according to the embodiment;

FIG. 11 is rear view illustrating the structure of the detection block in the detection device constituting the refrigerator of the present disclosure according to the embodiment; and

FIGS. 12 to 14 are operation state views sequentially illustrating a process in which the water tank constituting the refrigerator of the present disclosure according to the embodiment is mounted to the door of the refrigerator.

DETAILED DESCRIPTION OF THE INVENTION

[0051] Hereinafter, an exemplary embodiment of the present disclosure will be described in detail with reference to the accompanying drawings. In adding reference numerals to components of each drawing, it should be noted that the same components are given the same reference numerals as much as possible even though they are indicated on different drawings. Furthermore, in describing the embodiment of the present disclosure, when it is determined that a detailed description of a known related configuration or function interferes with an understanding of the embodiment of the present disclosure, a detailed description thereof will be omitted.

[0052] In addition, in describing the components of the refrigerator of the present disclosure, terms such as first, second, A, B, (a), (b), etc. may be used. These terms are only for distinguishing the components from other components, and the essence or order of each of the components is not limited by the terms. When it is described that a component is "connected" or "coupled" to another component, the component may be directly connected or coupled to the other component, but it should be un-

derstood that still another component may be connected or coupled to each component therebetween.

[0053] The present disclosure relates to a refrigerator in which a removable water tank 30 is installed. The water tank 30 may supply water into the refrigerator, and, for example, may supply drinking water to a user through a dispenser device (not shown), or may supply water to an ice maker installed in the refrigerator such that ice can be made. Of course, a user can get both water and ice through the dispenser device. Here, the water tank 30 may be considered as a part of the dispenser device, or as a part independent therefrom.

[0054] Referring to FIG. 1, the structure of a door 1 of the refrigerator is illustrated. The door 1 of the refrigerator may be coupled to a cabinet (not shown) and may function to selectively shield a storage compartment of the refrigerator. To swing the door 1, a hinge may be installed at the cabinet, and the door 1 may be connected to the hinge such that the door 1 can swing.

[0055] The door 1 may have a shape corresponding to the front surface of the cabinet and may have an approximate plate structure. Referring to the structure of the door 1, a door frame 2 may constitute the exterior of the door 1, and a foam filler for insulation may be filled inside the door 1 surrounded by the door frame 2. The door frame 2 may be composed of multiple parts. The door frame illustrated in FIG. 1 may be considered as a cover member surrounding the door frame provided therein.

[0056] FIG. 1 illustrates the inner surface of the door 1, that is, a surface facing the storage compartment of the refrigerator. The inner surface of the door 1 may have a recessed shape and may be a storage space 3. A basket (not shown) may be mounted in the storage space 3 such that a user can store foods even in the inner surface of the door 1. The storage space 3 may be surrounded by the door frame 2 constituting a side surface of the door 1. Reference numeral G is a gasket, which can increase sealability between the door 1 and the cabinet.

[0057] The water tank 30 may be mounted to the upper portion of the door 1, preferably at the inner surface of the door 1. For the mounting of the water tank 30, a mounting space 11 may be provided in the upper portion of the door 1. As illustrated in FIG. 1, the mounting space 11 may be space occupying the upper portion in the inner surface of the door 1. In order to mount the water tank 30 while moving the water tank 30 downward from the upside of the door 1, the mounting space 11 may have some free space upward after the water tank 30 is mounted.

[0058] Referring to FIGS. 3 and 4, the water tank 30 may be mounted in the mounting space 11 of the door 1 in a slanting direction from the upside of the door. A tank mounting part 10 may be located at the mounting space 11, preferably the center of the mounting space 11. The tank mounting part 10 may be a part to which the water tank 30 is mounted. More specifically, the tank mounting part 10 may be a part to which an outlet (not shown) provided in the water tank 30 is fitted.

[0059] At least one mounting hole 12 may be formed in or at the mounting space 11, preferably in each of the opposite sides of the mounting space 11.

[0060] A detection device 50 to be described later may be installed in the mounting hole 12. The mounting hole 12 may be space recessed in the upper portion of the mounting space 11 of the door 1. The inner space of the one or more mounting holes 12 may be filled with foam insulation.

[0061] In the present embodiment, a housing part 60 constituting the detection device 50 may be received in the mounting hole 12. Before the foam insulation is filled inside the door 1, the housing part 60 may be pre-assembled with the mounting hole 12, or after the foam insulation is filled in the door 1, the housing part 60 may be assembled with the mounting hole 12.

[0062] A connecting part 20 may be assembled with or provided at the center part of the tank mounting part 10. The connecting part 20 may be fitted to the center part of the tank mounting part 10 and the outlet of the water tank 30 may be fitted to the connecting part 20 by overlapping the connecting part 20. Of course, the connecting part 20 may be provided integrally with the mounting hole 12. A separate connection bracket (not shown) may be coupled to the connecting part 20. The connection bracket may be omitted or may be configured as a filter.

[0063] The connecting part 20 may be a hollow tubular structure and may be regarded as a kind of adapter. A connection hole 21 which is empty space may be formed inside the connecting part 20, and the outlet of the water tank 30 may be fitted into the connection hole 21. When the outlet of the water tank 30 is fitted to the connecting part 20, a valve assembly (not shown) mounted to the outlet may be connected to the dispenser device (not shown).

[0064] Referring to FIG.3, one or more guide grooves 5 may be formed at one or both side surfaces of the mounting space 11. The guide groove 5 is to assist the mounting of the water tank 30.

[0065] A mounting guide 35 formed at at least one side surface of the water tank 30 may be engaged with the guide groove 5 such that the water tank 30 is mounted to the door. The guide groove 5 may include at least one guide groove formed symmetrically at the opposite surfaces of the mounting space 11, respectively, but the guide groove 5 may be omitted.

[0066] First, the approximate structure of the water tank 30 will be described. As illustrated in FIG. 3, a tank body 31 of the water tank 30 may be approximately hexahedral and may have a water storage space defined therein. The water storage space may be open upward. The water tank 30 may have a shape long in a side-to-side direction to correspond to the shape of the mounting space 11, and such a shape may be changed according to the shape of the mounting space 11. Thus, the water tank 30 may be smaller than the width of the door, how-

ever it may extend at the inner surface of the door from the right to the left side and may be covered or partly surrounded by the side surface of the mounting space 11.

[0067] The water tank 30 is preferably located above the dispenser device to be described later. In this case, it is possible to supply water from the water tank 30 to the dispenser device in a free-fall method by gravity without using a separate pump.

[0068] The mounting guide 35 may be located at each of the opposite surfaces of the tank body 31. The mounting guide 35 may have a shape of a rib protruding to fit the shape of the one or more guide grooves 5. The mounting guides 35 may be formed symmetrically at the opposite sides of the tank body 31. The mounting guide 35 may extend in a diagonal direction, that is, in the fitting direction of the water tank 30 to the mounting space 11 such that the mounting guide 35 can be engaged with the guide groove 5.

[0069] A tank cover 36 may be coupled to the open upper side of the water storage space 32 of the water tank 30. The tank cover 36 may cover the upper surface of the tank body 31 and may function to shield the water storage space 32. In this case, a supply hole may be formed through the tank cover 36. The water storage space 32 may be exposed to the outside through the supply hole. When a shield cap 39 is coupled to the tank cover 36, the supply hole may be shielded. In FIG. 3, the supply hole is covered by the shield cap 39. A user may remove the shield cap 39 from the tank cover 36 and may fill water in the water storage space through the supply hole. Also the tank cover 36 may be removed from the water tank 30, e.g. for cleaning the water tank 30.

[0070] Next, the detection device 50 will be described. The detection device 50 may operate in the process of mounting the water tank 30 to the door 1. The operation of the detection device may function to supply or may output a fastening sound and/or a fastening feeling.

[0071] The detection device 50 may be installed such that at least a portion of the detection device 50 protrudes to the mounting space 11 of the door. Accordingly, during the mounting of the water tank 30, the detection device 50 may be touched by the inserted water tank 30 and/or may be operated by interfering with the surface of the water tank 30.

[0072] A part that is actually operated in the detection device 50 is a detection block 70. In the present embodiment, the detection block 70 may be rotatable. When the detection block 70 is restored to an initial state thereof after being rotated in the initial state, the water tank 30 may be regarded to be completely mounted.

[0073] In this case, "the initial state" may mean that since an external force is not applied to the detection block 70, the detection block 70 is located at an initial position and is in an initial state. Unlike the above description, the detection block 70 may not be rotated but may be moved, preferably rectilinearly.

[0074] Specifically, as illustrated in FIG. 4, most part of the detection device 50 may be located inside the mounting hole 12. The part of the detection device 50 exposed to the outside may be an operation surface 77 of the detection block 70. The operation surface 77 may be exposed toward the front side of the mounting space 11. Particularly, the operation surface 77 may be located at the exposed position, and thus may be pressed by the surface of the water tank 30. For reference, FIG. 4 illustrates that the operation surface 77 is in close contact with an edge part 36a of the upper surface of the water tank 30 in a state in which the water tank 30 is completely mounted.

[0075] The frame of the detection device 50 may be constituted by the housing part 60. The housing part 60 may be mounted to the mounting hole 12 of the door 1. The housing part 60 may have an operation space 62 formed therein, which may be provided as a space in which the detection block 70 can move and/or can be operated. The operation space 62 may be open toward a front of the housing part 60, and thus the detection block 70 may be assembled in the operation space 62 from the front of the housing part.

[0076] Referring to FIGS. 5 and 6, the housing part 60 may be fixed and only the detection block 70 installed in the operation space 62 may by moveably, preferably rotatable. An elastic member 80 to be described later may be compressed in this process and may restore the detection block 70 to the initial position thereof by using elastic energy stored in the elastic member 80 when the water tank is inserted into the mounting space 11.

[0077] Looking at the structure of the housing part 60 with reference to FIGS. 7 and 8, a housing body 61 of the housing part 60 may have an approximate shape of a hexahedron. Most of the housing body 61 may be received in the mounting hole 12. The operation space 62 of the housing part 60 may be open toward a front thereof, and the operation space 62 may be open even in an upward direction.

[0078] One or more rotation dents 63 may be formed in the operation space 62 of the housing part 60. Each of the one or more rotation dents 63 may be formed by being recessed from the inner surface of the operation space 62 or may be formed therethrough. A rotation protrusion 75 of the detection block 70 to be described later may be fitted to the rotation dent 63. Thus, the detection block 70 may rotate relative to the rotation protrusion 75 as a rotating shaft. The rotation dents 63 may be symmetrically at the opposite sides of the operation space 62, respectively.

[0079] A support means 64 may be provided in the operation space 62 of the housing part 60. The support means 64 may be for relative movement to at least any one of the detection block 70 and the elastic member 80. In the present embodiment, the detection block 70 may be selectively in contact with the support means 64. A portion of the elastic member 80 may be fixed to the support means 64.

[0080] The support means 64 may include a support jaw 64a. The support jaw 64a may be in contact with a

portion of the detection block 70 which is rotated and may protrude in the operation space 62 as illustrated in FIG. 7 The surface of the support jaw 64a may be formed slantingly. Accordingly, a portion of a lower part of the rotated detection block 70 may be in surface contact with the support jaw 64a.

[0081] A first fastening part 64b may be located at a position adjacent to the support jaw 64a. The first fastening part 64b may be depressed from the bottom part of the operation space 62 and may extend in one direction. A first fastening end 83 of the elastic member 80 may be inserted and fixed to the first fastening part 64b. In the present embodiment, the first fastening part 64b has a structure being depressed but alternatively, may have a structure protruding in the operation space 62.

[0082] Referring to FIG. 8, a gripping protrusion 65 may protrude from the inner surface of the operation space 62 and may be configured to facilitate the assembly or rework of the housing part 60. The gripping protrusion 65 may be omitted.

[0083] A flange part 66 may be formed at the front surface of the housing part 60. The flange part 66 may be a part having a width larger than the width of the housing body 61 constituting the housing part 60. The outer part 66a' of the flange part 66 may be held by the edge and/or cover the edge of the mounting hole 12. More specifically, the flange part 66 may be disposed outside of the mounting hole 12 relative to the outer part 66a', but the remaining portion of the housing part 60 may be considered to be received in the mounting hole 12.

[0084] The upper and lower parts of the flange part 66 may extend at angles different from each other. In the front surface of the flange part 66, an inclined guide surface 66a may be formed at an upper portion of the front surface. A lower flat surface 66b may be formed at a lower portion of the front surface. The inclined guide surface 66a may extend to be inclined downward in a direction in which the depth of the operation space 62 is decreased downward, and the lower flat surface 66b may extend in a vertical direction.

[0085] The inclined guide surface 66a may be considered to be formed along the mounting path of the water tank 30. In the mounting process of the water tank 30, the surface of the water tank 30 may be inserted slantingly downward along the inclined guide surface 66a which is an edge of the housing part 60.

[0086] Furthermore, since the operation surface 77 of the detection block 70 to be described later more protrudes toward the outside of the detection block 70 than the inclined guide surface 66a, the operation surface 77 may be naturally pressed by the water tank 30. The inclination angle or overall length of the inclined guide surface 66a may vary depending on the environment of the mounting space 11 of the door 1.

[0087] A contact surface 67a may be formed behind a mounting groove 67. The contact surface 67a may be a part which is a rear of the mounting groove 67 and, at the same time, an inner surface of the upper end of the operation space 62. A hitting surface 77a of the detection block 70 to be described later may be in close contact with the contact surface 67a. In a process in which the detection block 70 is restored to the initial position after being rotated, the hitting surface 77a may hit the contact surface 67a and may generate a fastening sound. Accordingly, the contact surface 67a is preferably a flat surface to be in surface contact with the hitting surface 77a.

[0088] Referring to FIG. 5, the mounting groove 67 may be formed behind the contact surface 67a. The mounting groove 67 may be configured to be depressed, and an edge portion of the mounting hole 12 may be fitted into the mounting groove 67. The mounting groove 67 may be formed continuously along a side-to-side direction of the housing part 60.

[0089] Next, referring to the detection block 70, when the detection block 70 is restored to the initial position thereof by the elastic member 80 after being pressed by the water tank 30, the detection block 70 may hit the surface of the water tank 30. In the present embodiment, the detection block 70 may rotate relative to the rotation protrusion 75 but may move rectilinearly in a manner that enters and exits the operation space 62.

[0090] Referring to FIGS. 9 to 11, the exterior of the detection block 70 may be constituted by a block body 71. The block body 71 may have a width to be received in the operation space 62 and may have an overall structure in which an upper part of the bock body 71 more protrudes toward the front side of the bock body than a lower part thereof. Furthermore, the rear surface of the block body 71 may extend in a slanting direction.

[0091] Specifically, as illustrated in FIGS. 5 and 11, the inside of the block body 71 may be configured as a kind of empty space, wherein this empty space may not be exposed to the front side thereof but may be open toward the inner surface of the operation space 62.

[0092] In addition, multiple partition plates 73 may be provided in the empty space inside the block body 71. The partition plates 73 may divide the empty space into multiple sounding spaces 73a. Each of the partition plates 73 may have a plate structure extending from the front of the block body 71 to the rear thereof. The length of the partition plate 73 may depend on the shape of the block body 71. As illustrated in FIG. 5, due to the inclined shape of the block body 71, the length of the partition plate 73 may be increased downward.

[0093] The multiple sounding spaces 73a formed by being divided by the partition plates 73 may be empty spaces, and may amplify the fastening sound generated when the detection block 70 hits the housing part 60. That is, due to each of the sounding spaces 73a, the detection block 70 may be a sounding box as a whole. The sounding space 73a may be open toward the rear side of the detection block 70 and may transfer the amplified fastening sound to the outside of the sounding space 73a.

[0094] A second fastening part 73b may be formed at the partition plate 73. The second fastening part 73b may

be intended to fasten a second fastening end 85 of the elastic member 80. The second fastening part 73b may have a structure being recessed from the partition plate 73, and the second fastening end 85 may be fitted to this recessed portion. The first fastening end 83 of the elastic member 80 may be fixed to the first fastening part 64b of the housing part 60 and the second fastening end 85 thereof may be fixed to the second fastening part 73b to maintain the stably fixed state of the elastic member 80.

[0095] The second fastening part 73b may be continuously formed at each of the multiple partition plates 73. That is, the second fastening part 73b may be formed along a continuous path at each of the multiple partition plates 73 by being recessed therefrom. As illustrated in FIG. 5, the second fastening end 85 of the elastic member 80 may be fitted to each of the multiple second fastening parts 73b while passing therethrough.

[0096] The rotation protrusion 75 may be provided at the lower portion of the detection block 70. The rotation protrusion 75 may have a protruding structure such that the rotation protrusion 75 can be fitted to the rotation dent 63 of the housing part 60. When the rotation protrusion 75 is fitted to the rotation dent 63, the detection block 70 may be rotated in the operation space 62.

[0097] Referring to FIG. 9, the operation surface 77 may be formed at the front surface of the detection block 70. The operation surface 77 may be a part directed toward a side opposite to the operation space 62 and may be pressed by the water tank 30. The operation surface 77 may be a flat surface and may be a part that the most protrudes toward the front side of the detection block 70 when the detection block 70 is located at the initial position.

[0098] The operation surface 77 may be located at a position protruding more toward the front side thereof than the rotation protrusion 75. When the detection block 70 is restored to the initial position, the operation surface 77 may protrude more than the surrounding area of the operation surface 77. Here, the surrounding area may refer to the surface of the tank mounting part 10 to which the water tank 30 is mounted, and more specifically, may be regarded to refer to the inner surface of the mounting space 11. Accordingly, a user may visually check whether the water tank 30 is properly mounted by looking at the protruded position of the operation surface 77. Referring to FIG. 5, the operation surface 77 can be seen to be exposed to the front side thereof through the upper portion of the mounting space 11.

[0099] When the operation surface 77 is located inside the surface of the tank mounting part 10 instead of protruding therefrom, it may be perceived that the water tank 30 is not properly mounted. The operation surface 77 may have a distinctive color. When the operation surface 77 has a distinctive color, the perception of the mounting of the water tank 30 may be further improved.

[0100] The hitting surface 77a may be connected to the operation surface 77. The hitting surface 77a may be located at a side upper than the operation surface 77. When the detection block 70 is located at the initial position, the hitting surface 77a may be located at a side behind the operation surface 77.

[0101] The hitting surface 77a may be in contact with the contact surface 67a of the housing part 60. When the hitting surface 77a is in contact with the contact surface 67a, the detection block 70 may not rotate toward the outside (counterclockwise relative to FIG. 5) of the operation space 62, so the hitting surface 77a may be considered as a kind of stopper.

[0102] The hitting surface 77a may be a flat surface corresponding to the contact surface 67a and may have a predetermined height in a vertical direction. When the hitting surface 77a is in contact with the contact surface 67a, a hitting sound may be generated. Such a hitting sound may be a kind of fastening sound. Accordingly, a part at which the hitting surface 77a and the contact surface 67a are in contact with each other may be considered as a hitting part K1.

[0103] A stopping surface 77a' may be formed at the rear surface of the upper end of the detection block 70 continuing from the hitting surface 77a. The stopping surface 77a' may be configured as a flat surface at the rear surface of the detection block 70. The stopping surface 77a' may be a part in contact with the inner surface of the operation space 62 when the detection block 70 is rotated.

[0104] As illustrated in FIG. 6, since the stopping surface 77a' may be in surface contact with the inner surface of the operation space 62, the detection block 70 may be stably supported by the housing part 60, and the concentration of load on a portion of the detection block 70 may be prevented. Particularly, the detection block 70 may be rapidly rotated due to the weight of the water tank 30, and in this case, the stopping surface 77a' may be in surface contact with the inner surface of the operation space 62, and thus damage to the detection block 70 or the housing part 60 may be prevented.

[0105] A support surface 77b may be located at a side opposite to the hitting surface 77a, the support surface 77b being connected to the operation surface 77. The support surface 77b may be a part constituting a portion of the front surface of the detection block 70. When the water tank 30 is completely mounted, the support surface 77b may be a part surrounding the edge part of the upper surface of the water tank 30. The support surface 77b may be formed at a side opposite to the hitting surface 77a relative to the operation surface 77 and, in other words, may be located under the operation surface 77. The support surface 77b may form the lower portion of the front surface of the detection block 70.

[0106] The support surface 77b may be configured to be recessed to the inside of the detection block 70. As illustrated in FIG. 9, a portion of the detection block 70 at which the support surface 77b is formed may be formed at a side behind the operation surface 77, that is, may be formed by being recessed toward the operation space 62. In the present embodiment, the support surface 77b

may be considered to extend along at least two surfaces of the water tank 30.

[0107] Accordingly, the edge part 36a of the water tank 30 may be inserted in the inner portion of the detection block 70 recessed by the support surface 77b. Accordingly, the support surface 77b may have a shape surrounding the edge part 36a of the water tank 30 and may maintain the more stably mounted state of the water tank 30 to the tank mounting part 10.

[0108] Contrarily, when the water tank 30 is removed from the door, the water tank 30 may be led to be easily removed therefrom along the support surface 77b. To this end, the support surface 77b is preferably made in a curved and/or inclined shape.

[0109] Meanwhile, when the detection block 70 is rotated to the initial position, the support surface 77b may hit the edge part 36a of the water tank 30. In this case, the support surface 77b may be a second hitting part K2. Of course, the support surface 77b may not hit the edge part 36a of the water tank 30, but may be spaced apart by a predetermined distance from the edge part 36a of the water tank 30.

[0110] Referring to FIG. 10, the detection block 70 may have an assembly recess 78' formed at the rear surface thereof by being partially recessed therefrom. In addition, in the assembly recess 78', a fastening boss 78 may protrude in the same direction as the protruding direction of the rotation protrusion 75.

[0111] The fastening boss 78 may have a kind of cantilever structure. An assembly step part 78a may be configured to be thin at an end of the fastening boss 78 and may facilitate the assembly of the elastic member 80. Accordingly, a body part 81 of the elastic member 80 may be fitted over the fastening boss 78 in the assembly recess 78', the fastening boss 78 protruding in a direction parallel to the direction of the rotating shaft of the detection block 70.

[0112] A fixing groove part 79 may be formed in the detection block 70. The second fastening end 85 of the elastic member 80 may be fitted to the fixing groove part 79. The starting part of the second fastening end 85 may be fitted to the fixing groove part 79, and a part of the second fastening end 85 extending further from the starting part may be fitted to the second fastening part 73b. The fixing groove part 79 may be formed at a portion protruding from the assembly recess 78' of the detection block 70.

[0113] Looking at the elastic member 80 with reference to FIG. 5, the elastic member 80 may be installed in the operation space 62, and the opposite ends of the elastic member 80 may be connected to the housing part 60 and the detection block 70, respectively. The elastic member 80 may function to supply elastic force to the detection block 70 in the restoring direction of the detection block 70 to the initial position.

[0114] In the present embodiment, the elastic member 80 may be configured as a torsion spring. The body part 81 of the torsion spring may be fitted over the fastening boss 78 of the detection block 70. In addition, the first fastening end 83 and the second fastening end 85 extending from the body part 81 may be fastened to the first fastening part 64b of the housing part 60 and the second fastening part 73b of the detection block 70, respectively. The second fastening end 85 may extend longer than the first fastening end 83. The second fastening end 85 may be stably fastened at each of multiple positions while passing through each of the multiple second fastening parts 73b formed in the detection block 70.

[0115] Accordingly, the second fastening end 85 may supply the elastic force of rotating the detection block 70 toward the outside (counterclockwise relative to FIG. 5) of the operation space 62 to the detection block 70. Alternatively, the elastic member 80 may be configured as various types of elastic parts such as a coil spring and a plate spring.

[0116] In the embodiment described above, the detection device 50 may include a separate housing part 60. However, the housing part 60 may be omitted. When the housing part 60 is omitted, the detection block 70 and the elastic member 80 may be mounted directly in the mounting hole 12. In this case, the detection block 70 may be regarded as the detection device 50.

[0117] In addition, although the detection device 50 is illustrated to be mounted to the door 1, both the detection device 50 and the water tank 30 may be alternatively mounted to the cabinet of the refrigerator.. In such case the mounting space 11 is provided in the cabinet.

[0118] Next, the mounting process of the water tank according to the embodiment of the present disclosure will be described. In FIGS. 12 to 14, the mounting process of the water tank 30 to the tank mounting part 10 is sequentially illustrated.

[0119] First, in order to mount the water tank 30 to the door 1, a user is required to move the water tank 30 to a position close to the mounting space 11. In this case, a surface of the water tank 30 may face the tank mounting part 10 of the mounting space 11.

[0120] In this case, the detection block 70 of the detection device 50 may be in a standing state, that is, in the initial state. This is because the elastic member 80 is supplying elastic force to the detection block 70. The operation surface 77 of the detection block 70 may be configured as a surface protruding from the inner surface of the mounting space 11, and at the same time, may stand by in a state in which the operation surface 77 protrudes from the housing part 60/ mounting hole 12.

[0121] When the water tank 30 is moved further to the inside of the mounting space 11, the surface of the water tank 30 may come in contact with the operation surface 77 of the detection block 70. At the same time, the surface of the water tank 30 may be in contact with the inclined guide surface 66a constituting the flange part 66 of the housing part 60.

[0122] In this state, when a user pushes the water tank 30 toward the inside of the operation space, the surface of the water tank 30 may naturally move in a diagonal or

inclined direction (in a direction of an arrow 1 of FIG. 12) along the inclined guide surface 66a. That is, the water tank 30 may be moved along a mounting path thereof by being guided by the inclined guide surface 66a. Accordingly, a user may push the water tank 30 only in the inward direction and thus the mounting of the water tank 30 may be easily performed.

[0123] Accordingly, in the process in which the water tank 30 moves, the surface of the water tank 30 may push the operation surface 77 of the detection block 70, and the detection block 70 may be rotated. That is, the detection block 70 may be rotated clockwise by using the rotation protrusion 75 as a rotating shaft and may be introduced or pushed to the inside of the operation space 62. Such a state is illustrated in FIG. 13.

[0124] Although the elastic force of the elastic member 80 is required to be overcome to introduce the detection block 70 to the inside of the operation space 62, a user may easily rotate the detection block 70 by using the weight of the water tank 30 since the water tank 30 is filled with water.

[0125] In this case, when the detection block 70 is rotated, the stopping surface 77a' of the detection block 70 may be in contact with the inner surface of the operation space 62. As illustrated in FIG. 13, the stopping surface 77a' may be in surface contact with the inner surface of the operation space 62, so the detection block 70 may be stably supported by the housing part 60, and the concentration of load on a portion of the detection block 70 may be prevented.

[0126] Next, when the water tank 30 is further inserted inward, the water tank 30 may be in contact with the inner surface of the mounting space 11 and may be completely mounted. Simultaneously, the edge part 36a of the water tank 30 may move to the support surface 77b of the detection block 70 from the operation surface 77 thereof, and the state in which the water tank 30 pushes the operation surface 77 may be released.

[0127] Accordingly, the detection block 70 may be restored in a standing direction thereof, that is, to the initial position by the elastic force of the elastic member 80. In this case, while the detection block 70 is rotated by the elastic force of the elastic member 80, the hitting surface 77a of the detection block 70 may move anticlockwise until it hits the contact surface 67a of the housing part 60. Accordingly, the hitting surface 77a may generate the fastening sound by hitting the contact surface 67a.

[0128] A user may check, in various methods, whether the water tank 30 is mounted through the detection block 70.

[0129] The user may perceive whether the water tank 30 is mounted through (i) the fastening sound (the hitting sound) which the detection block 70 rotating to the initial position generates by coming into contact with the housing part 60, (ii) a fastening feel due to vibration generated when the detection block 70 is restored to the initial position by rotating, and (iii) a state in which the operation surface 77 of the detection block 70 is directed to the front side of the detection block 70 and protrudes from the inner surface of the mounting space 11.

[0130] Such a state is illustrated in FIG. 14. The support surface 77b of the detection block 70 may surround the edge part 36a of the water tank 30, and thus the detection block 70 may maintain the stably mounted state of the water tank 30 by surrounding two surfaces of the edge part 36a.

[0131] That is, the detection block 70 may have tendency of being located at the initial position due to the elastic force of the elastic member 80, whereby the support surface 77b may press the edge part 36a of the water tank 30 and may prevent the vibration of the water tank 30. Accordingly, during the use of the refrigerator, vibration noise generated by the water tank 30 may be reduced.

[0132] In addition, the support surface 77b may have a shape of a curved surface, so during the removal of the water tank 30, the water tank 30 may be easily removed along the curved surface.

[0133] In the above description, even though all components constituting the refrigerator of the present disclosure according to the embodiment are described as being integrated with each other or being combined to operate, the present disclosure is not necessarily limited to the embodiment. That is, as long as it is within the scope of the purpose of the present disclosure, one or more of all of the components may operate by being selectively combined with each other. Furthermore, terms such as "include", "compose", or "have" described above mean that a corresponding component may be inherent unless otherwise stated, and thus it should be construed that the terms do not exclude but further include other components. Unless otherwise defined, all terms, including technical or scientific terms, have the same meanings as commonly understood by those skilled in the art to which the present disclosure belongs. Commonly used terms, such as those defined in the dictionary, should be interpreted as being consistent with the contextual meaning of the relevant art, and should not be interpreted as an ideal or overly formal meaning unless explicitly defined in the present disclosure.

Claims

1. A refrigerator comprises:

a cabinet having a storage compartment formed therein;
a door (1) configured to open and close the storage compartment;
a water tank (30) mounted to the door (1) or the cabinet; and
a detection device (50) installed at the door (1) or the cabinet,
wherein during mounting the water tank (30), the detection device (50) is rotatable and/or is

rectilinearly movable by interfering with surfaces of the water tank (30), wherein when the water tank (30) is correctly mounted, the detection device (50) is restored to an initial position thereof by an elastic force of an elastic member (80).

2. The refrigerator of claim 1, wherein the detection device (50) comprises:

a detection block (70) being rotatable and/or movable rectilinearly along a predetermined path by interfering with the water tank (30); and the elastic member (80) is connected to the door (1) or cabinet and the detection block (70) at opposite ends of the elastic member (80), respectively, wherein the elastic member (80) is configured to supply the elastic force to the detection block (70) in a restoring direction of the detection block (70) to an initial position thereof.

3. The refrigerator of claim 2, wherein the detection device (50) further comprises:

a housing part (60) installed at the door (1) or cabinet and having an operation space (62) formed therein;
wherein the detection block (70) is rotated or moved rectilinearly along a predetermined path in the operation space (62) by interfering with the water tank (30); and
the elastic member (80) is installed in the operation space (62) and connected to the housing part (60) and the detection block (70) at opposite ends of the elastic member (80), respectively, the elastic member (80) being configured to supply the elastic force to the detection block (70) in a restoring direction of the detection block (70) to an initial position thereof.

4. The refrigerator of any one of the preceding claims, wherein when the detection device (50) is restored to the initial position by the elastic member (80), at least a portion of a detection block (70) constituting the detection device (50) protrudes more toward a front side of the detection block (70) than a surface of a surrounding area of the detection block (70) and/or when the detection device (50) is restored to the initial position by the elastic member (80), a surface of the detection device (50) hits the surface of the water tank (30).

5. The refrigerator of any one of the preceding claims, wherein at least a front surface of the detection block (70) has a color different than a color of a rear side of a mounting space (11) in the door (1) or the cabinet.

6. The refrigerator of any one of the preceding claims, wherein when a detection block (70) constituting the detection device (50) is rotated and is restored to an initial position thereof by the elastic member (80), at least a portion of a surface of the detection block (70) is in close contact with the surface of the water tank (30).

7. The refrigerator of any one of the preceding claims, wherein at least a portion of a front surface of the detection block (70) facing the water tank (30) has a shape surrounding the surface of the water tank (30) and/or the detection block (70) is hinged rotatably to the housing part (60) or door (1) or cabinet.

8. The refrigerator of any one of the preceding claims 4-6, wherein an assembly recess (78') is formed at a rear surface of the detection block (70) by being recessed therefrom, wherein the elastic member (80) is fitted over a fastening boss (78) in the assembly recess (78'), the fastening boss (78) protruding in a direction parallel to a direction of a rotating shaft of the detection block (70).

9. The refrigerator of any one of the preceding claims, wherein the housing part (60) includes an inclined guide surface (66a) formed along a mounting path of the water tank (30) at a front surface of the housing part (60) defining an operation space (62) of the detection device (50).

10. The refrigerator of any one of the preceding claims, wherein a stopping surface (77a') is formed at a rear surface of the detection block (70), and when the detection block (70) is rotated toward an inside of the operation space (62) of the housing part (60), the stopping surface (77a') is in surface contact with an inner surface of the operation space (62).

11. The refrigerator of any one of the preceding claims 4-10, wherein the detection block (70) comprises at least one of

an operation surface (77) configured to be exposed toward a front side of the detection block (70) and pressed by the water tank (30);
a support surface (77b) connected to the operation surface (77) and configured to surround an edge part of the mounted water tank (30); and
a hitting surface (77a) extending in a direction opposite to an extending direction of the support surface (77b) from the operation surface (77) and configured to hit a surface of the housing part (60) when the detection block (70) is restored to the initial position.

12. The refrigerator of claim 11, wherein the support surface (77b) is configured to have a structure recessed toward an inside of the detection block (70), the sup-

port surface (77b) extending along at least two surfaces of the surfaces of the water tank (30).

13. The refrigerator of any one of the preceding claims, wherein when the detection block (70) is located at the initial position, an operation surface (77) of the detection block (70) is a surface protruding most toward the front side of the detection block (70), preferably the operation surface (77) has a shape of a flat surface.

14. The refrigerator of any one of the preceding claims 11-13, wherein when the water tank (30) is mounted to the door (1) or cabinet, the operation surface (77) of the detection block (70) is located at above an upper surface of the water tank (30), and the support surface (77b) having a shape of a curved surface surrounds the edge part of the upper surface of the water tank (30).

15. The refrigerator of any one of the preceding claims, wherein a sounding space (73a) is defined in the detection block (70), the sounding space (73a) being open toward an inside of the operation space (62).

Fig. 1

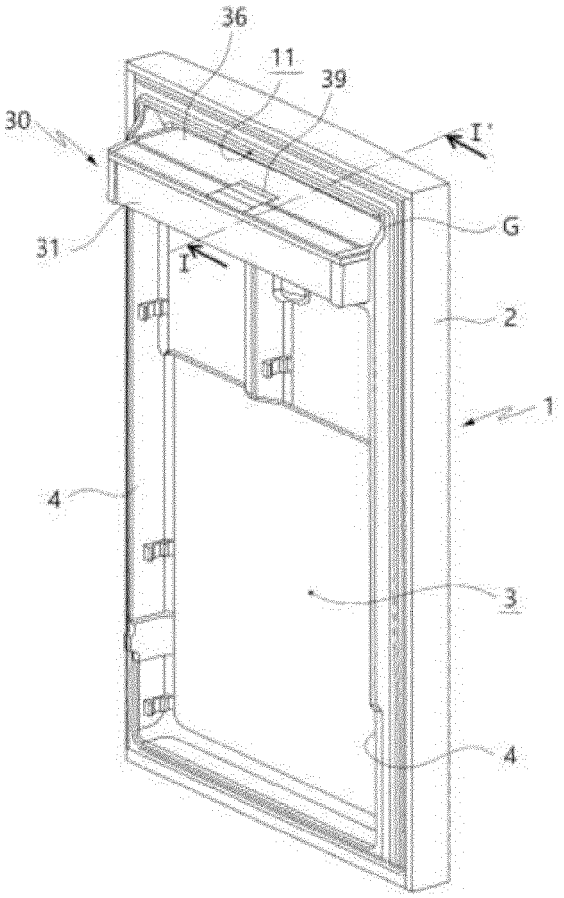


Fig. 2

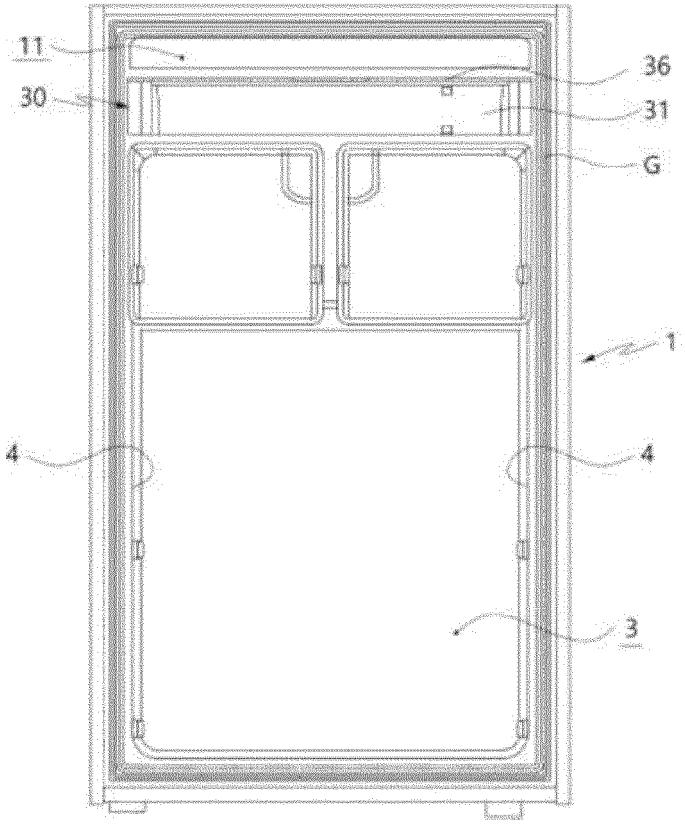


Fig. 3

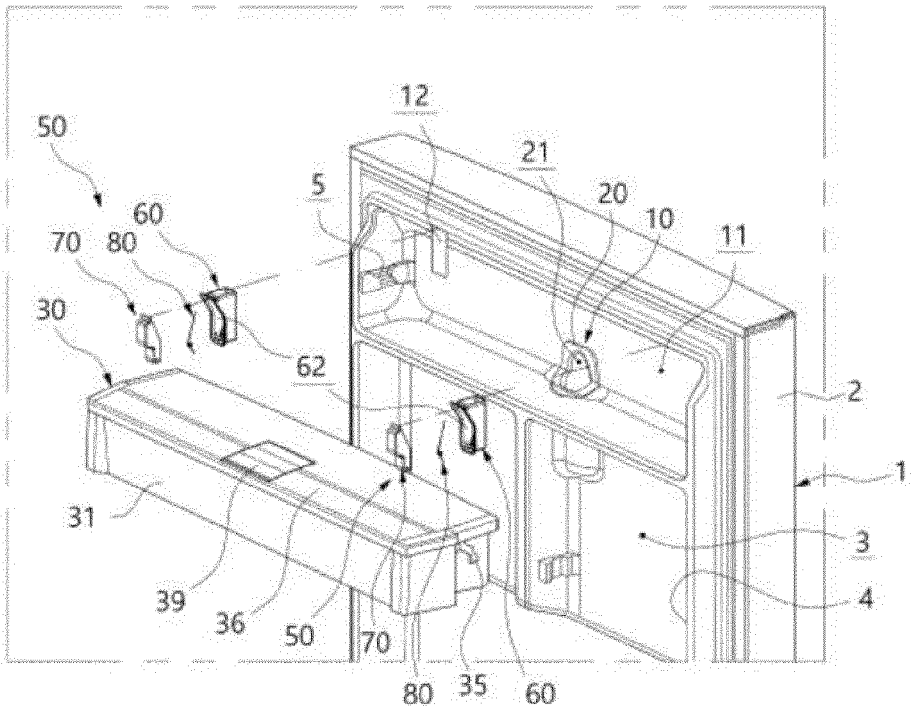
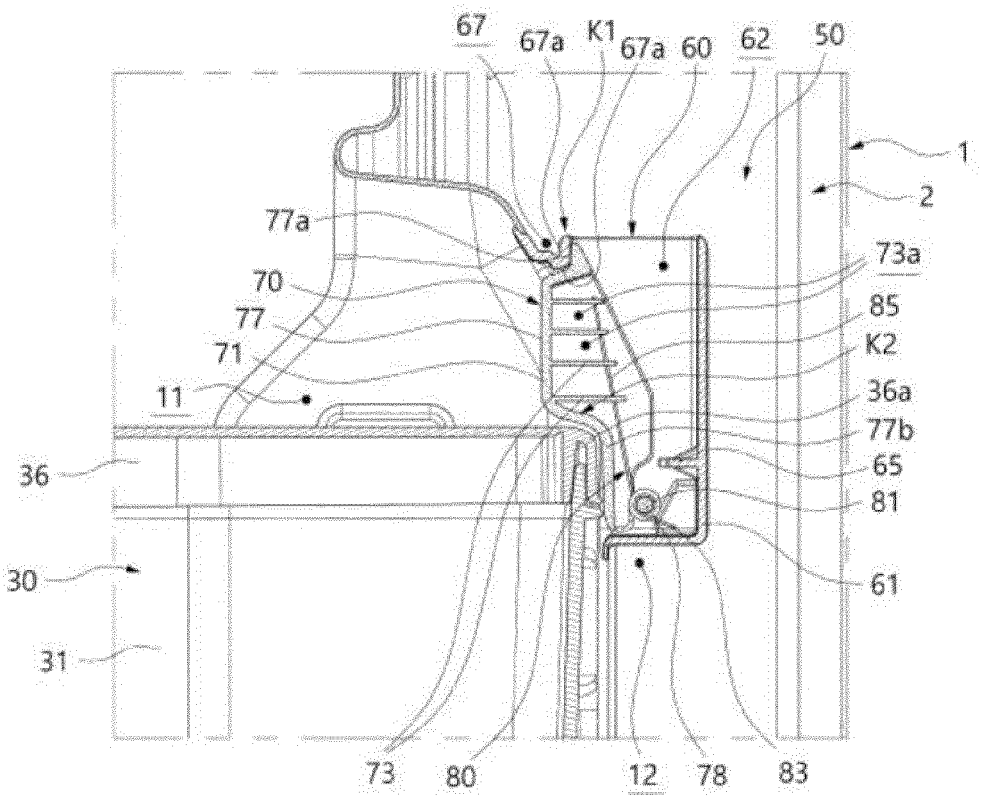

12
50
21
5
20
10
11
60
70
80
30
62
2
1
31
3
4
39
36
50
70
80
35
60

Fig. 4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67a
K1
67a
60
62
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2
77a
73a
70
85
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K2
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36a
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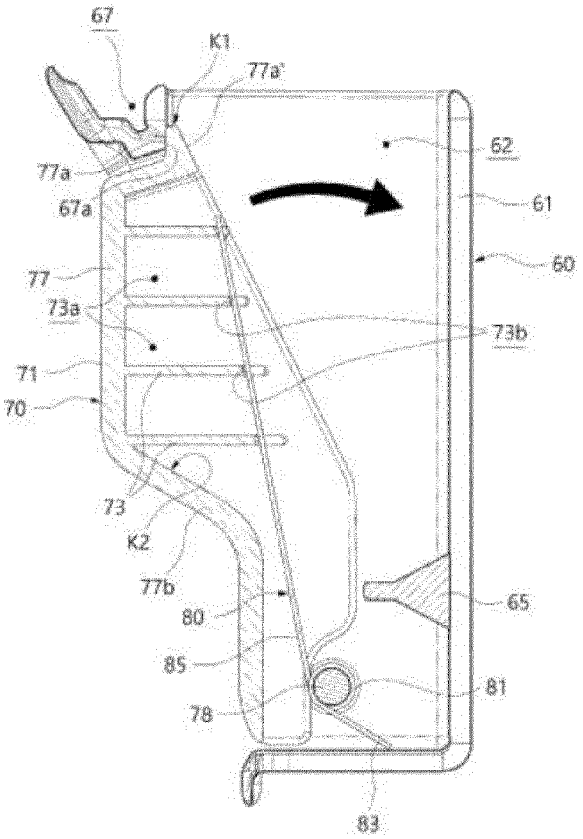
30
61
31
73
80
12
78
83

Fig. 5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K2
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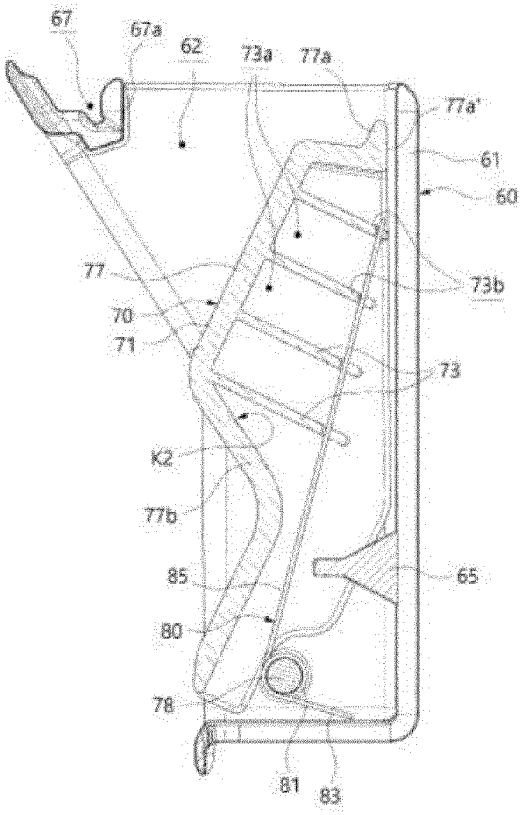
78
83

Fig. 6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K2
77b
65
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80
78
81
83

Fig. 7

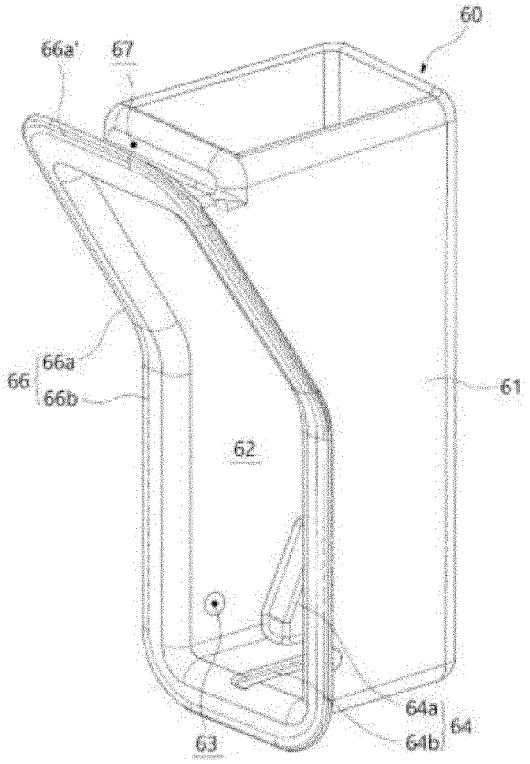
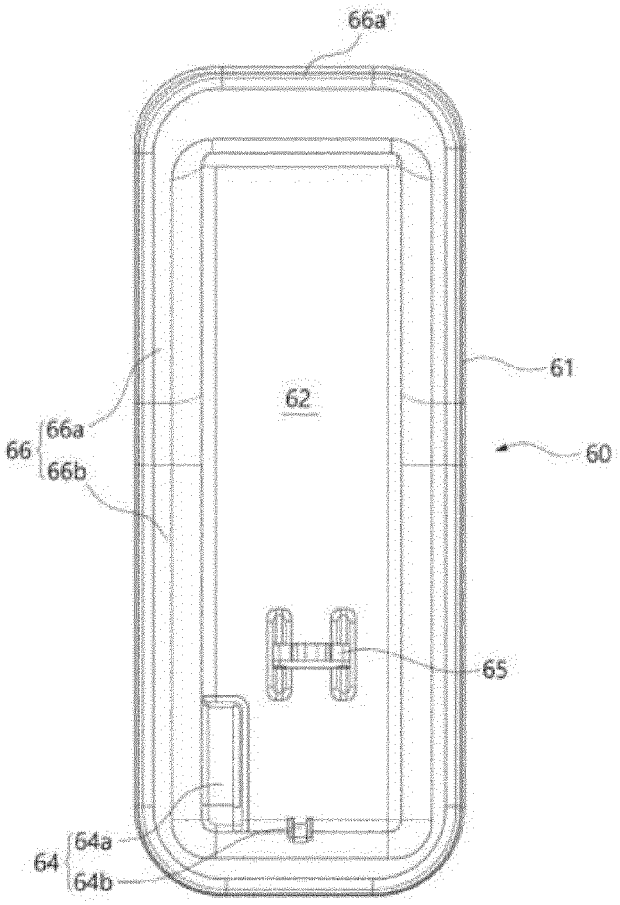

60
66a'
67
66
66a
66b
61
62
64a
64
64b
63

Fig. 8


66a'
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62
66
66a
66b
60
65
64
64a
64b

Fig. 9

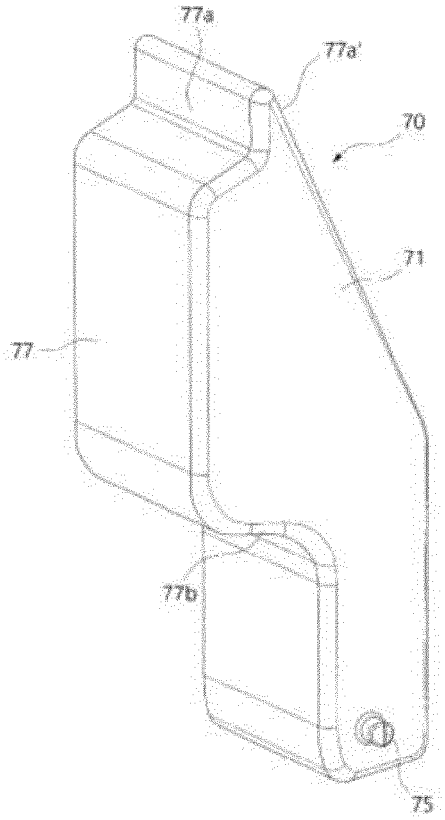


Fig. 10

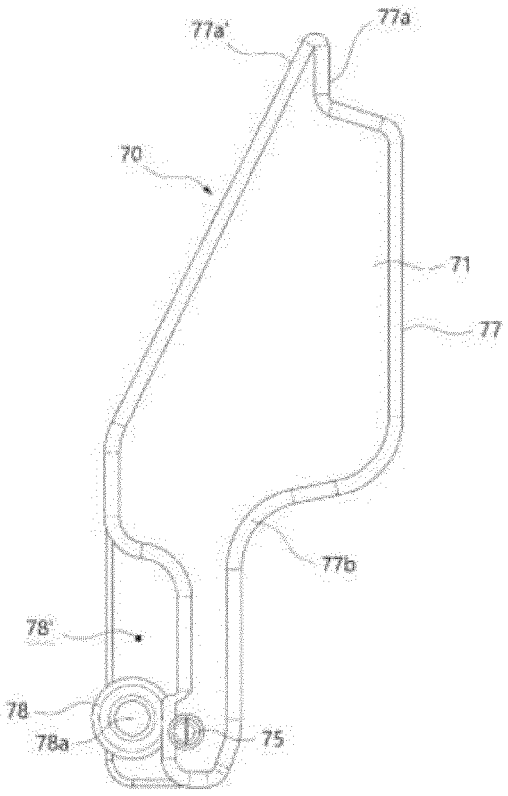


Fig. 11

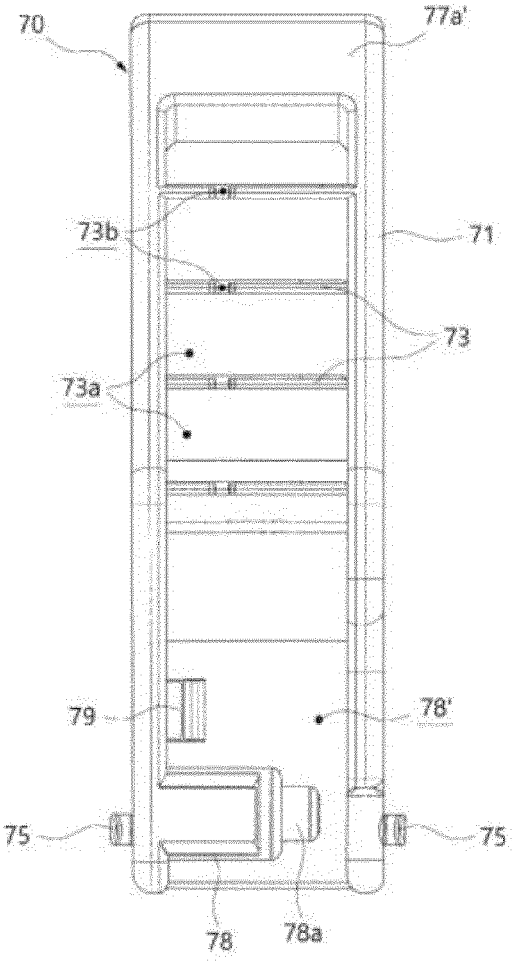
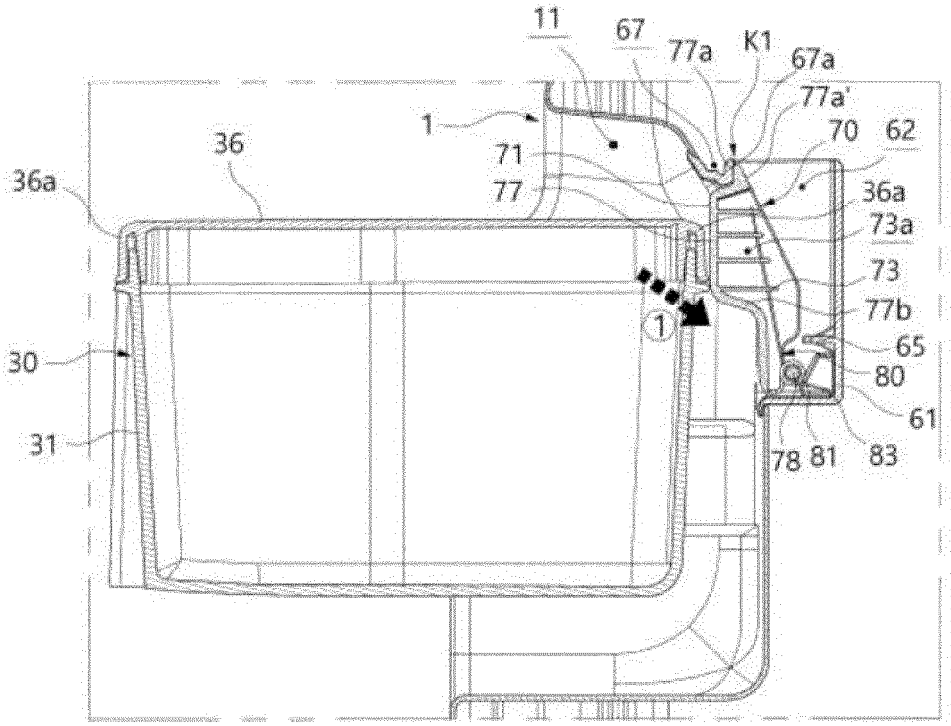

70
77a'
73b
71
73
73a
79
78'
75
75
78
78a

Fig. 12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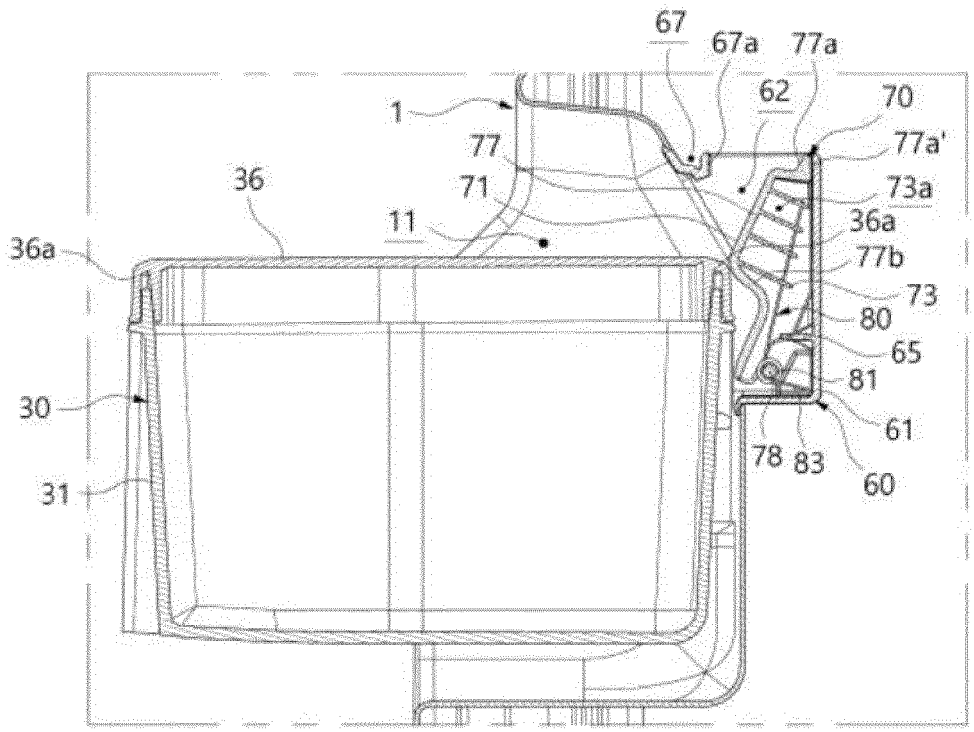
81
83

Fig. 13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77a'
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77b
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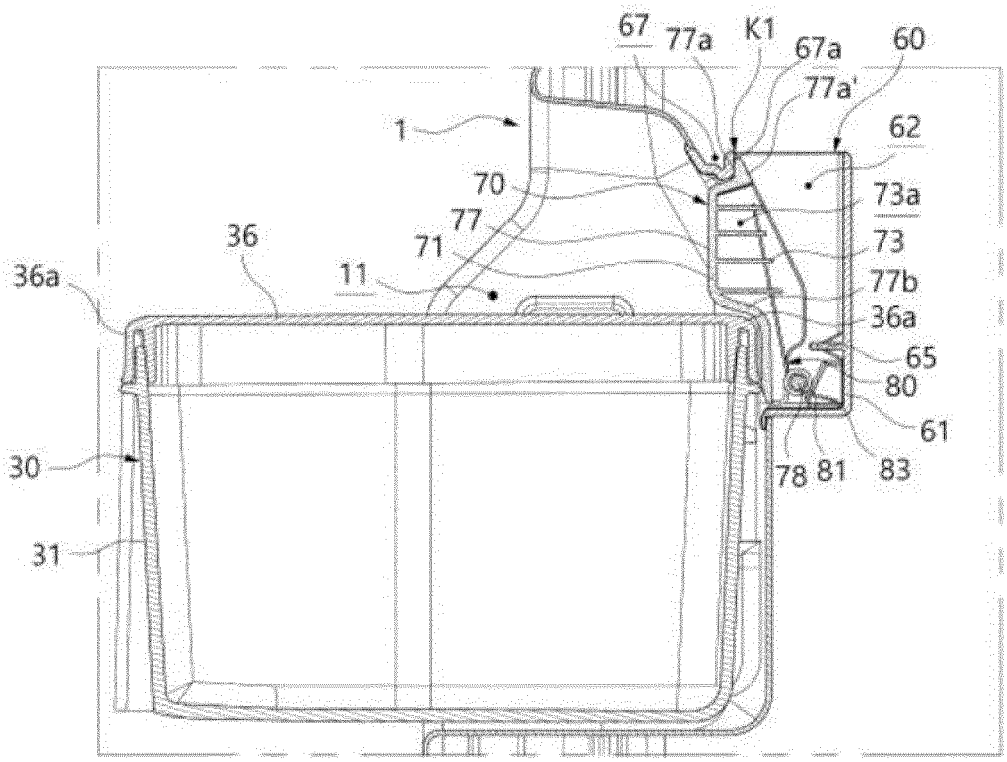
30
81
61
78
83
60
31

Fig. 14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83
31

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 20 4748

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 645 029 A2 (INDESIT CO SPA [IT]) 2 October 2013 (2013-10-02) * paragraph [0034] - paragraph [0039] * * figures 3a,3b *	1-15	INV. F25D23/02 F25D23/12
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Place of search	Date of completion of the search	Examiner
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