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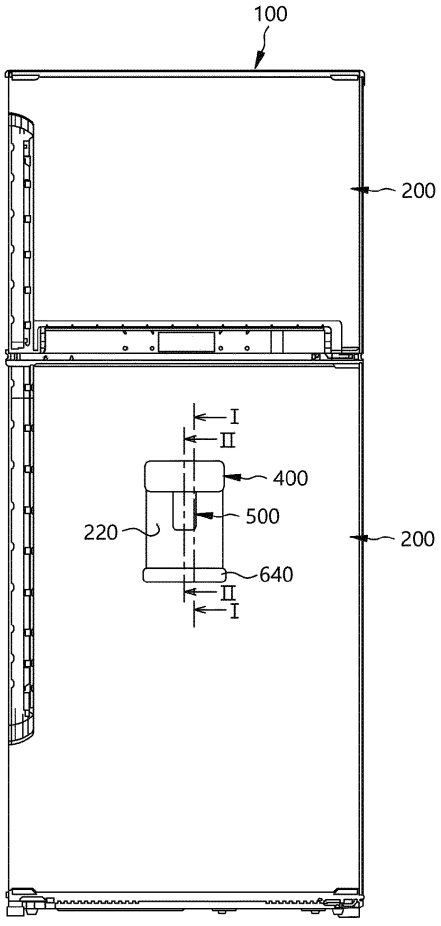
(54) REFRIGERATOR

(57) Proposed is a refrigerator in which a dispenser recessed part (220) may be formed at a portion of the front surface of a door (200) by being recessed therefrom, and a cover member (400) may be installed at the dispenser recessed part (220), and a lever assembly (500) may be installed at the cover member (400), the lever assembly (500) being configured to be pressed and operate a valve (320). Accordingly, the number of components constituting a water dispenser device may be minimized, and the valve (320) may be accurately operated.

FIG. 1



EP 3 964 775 A1

Description

CROSS REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to Korean Patent Application No. 10-2020-0112218.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present disclosure relates to refrigerator in which a water dispenser device for supplying water is provided in a door.

Description of the Related Art

[0003] Generally, the refrigerator is a household appliance that stores foods and beverages for a long time with cold air generated by the circulation of refrigerant according to a refrigeration cycle.

[0004] Such a refrigerator includes a storage compartment in which goods are stored, wherein the storage compartment is configured to be opened and closed by a door.

[0005] However, the door is required to be opened to take out the goods stored inside the storage compartment. When the door is opened, cold air present inside the storage compartment flows to the outside, and at the same time, outside air outside of the refrigerator flows into the storage compartment.

[0006] Accordingly, recently, a water dispenser device is provided at the door, so even without opening the door, water cooled with cold air present in the storage compartment and stored in a water tank located in the door is discharged by the water dispenser device.

[0007] Conventional technologies concerning this are disclosed in Korean Patent Application Publication No. 10-2010-0130649, Korean Patent Application Publication No. 10-2011-0103523, Korean Patent Application Publication No. 10-2013-0045437, and Korean Patent Application Publication No. 10-2018-0129259.

[0008] As for the water dispenser device proposed in the conventional technologies described above, after an opening part is formed through the door, the water dispenser device is configured to be installed in the opening part.

[0009] However, the water dispenser device is installed in the opening part of the door made of a steel plate, so a structure for preventing the exposure of the edges of the opening part is required. The opening part is configured to be covered by an injected object so as to prevent the exposure of the edges of the opening part, so the surface of the injected object is inevitably exposed to the outside along the circumference of the opening part of the door.

[0010] Particularly, since the injected object described above is not made of metal, it is difficult to achieve the advanced design of the door.

[0011] In addition, a lever assembly is operably installed at the injected object blocking the opening part, so the installation structure of the lever assembly is inevitably complicated and thus the maintenance of the lever assembly is difficult.

[0012] In addition, in the water dispenser device according to the conventional technology described above, a manipulation lever is a part that is frequently manipulated, so there is a high risk of damage. The manipulation lever has a complicated structure, so it is difficult to perform maintenance work when manipulation lever is damaged.

[0013] Of course, in Korean Patent Application Publication No. 10-2013-0045437 of the conventional technologies described above, the manipulation lever is configured to directly operate the valve, so the entire structure of the water dispenser device is simplified.

[0014] However, in the conventional technology, the structure of the manipulation lever operating the valve is configured to allow a pressing force thereof to be concentrated on any one circumference of the valve. Accordingly, the valve is not operated accurately and tilts to a portion on which the pressing force is concentrated, so operability of the valve is deteriorated.

[0015] Furthermore, in the conventional technology described above, the structure of the manipulation lever constituting the water dispenser device installed at a dispenser casing is complicated, so the assembly or removing work of the manipulation lever for the maintenance of the manipulation lever is inevitably difficult.

Documents of Related Art

[0016]

(Patent Document 1) Korean Patent Application Publication No. 10-2010-0130649
(Patent Document 2) Korean Patent Application Publication No. 10-2011-0103523
(Patent Document 3) Korean Patent Application Publication No. 10-2013-0045437
(Patent Document 4) Korean Patent Application Publication No. 10-2018-0129259

SUMMARY OF THE INVENTION

[0017] Accordingly, the present disclosure has been made keeping in mind the above problems occurring in the related art. Thus, it is an object of the present disclosure to propose a new type of a refrigerator in which the number of components constituting a water dispenser device may be minimized to improve the assemblability of the water dispenser device.

[0018] In addition, it is an object of the present disclosure to propose a new type of a refrigerator in which damage to a manipulation lever may be minimized and the manipulation lever may be easily replaced when dam-

aged.

[0019] Furthermore, it is an object of the present disclosure to propose a new type of a refrigerator in which despite a simple structure, a valve may be accurately operated to improve the operability of the valve.

[0020] One or more of these objects are solved by the features of the independent claim. According to one aspect, in a refrigerator of the present disclosure, a dispenser recessed part may be formed, e.g. molded, at a portion of a front surface of a door. Accordingly, the number of components of a water dispenser device may be minimized.

[0021] The dispenser recessed part may include a cover member. Accordingly, the valve of the water dispenser device may be prevented from being exposed to the outside.

[0022] A lever assembly which is installed to be pressed and operate the valve may be provided in the dispenser recessed part. Accordingly, a user may receive water present in the water tank by pressing the lever assembly.

[0023] The lever assembly may be installed at the cover member. Accordingly, the lever assembly may be provided by being coupled to the cover member, so the number of the components of the lever assembly may be minimized, and the lever assembly may be easily manufactured.

[0024] A valve assembly may be provided to communicate with the water tank and may be configured such that a flow path in the valve assembly is opened by the valve pressed upward.

[0025] According to another aspect, a refrigerator of the present disclosure may include a cabinet having a storage compartment; a door configured to open and close the storage compartment; a water tank provided in the door and storing drinking water; and a valve assembly provided to communicate with the water tank and configured to be moved upward by pressing a valve such that a flow path in the valve assembly is opened. A dispenser recessed part is formed at a portion of a front surface of the door by being recessed therefrom, an upper surface of the dispenser recessed part being open such that a lower end of the valve of the valve assembly is exposed to the dispenser recessed part. A cover member is installed at the dispenser recessed part and is configured to block a portion of the valve exposed to an outside. A lever assembly is installed at the cover member such that the lever assembly is pressed, the lever assembly being configured to press and operate the valve.

[0026] According to another aspect, a refrigerator of the present disclosure may include a cabinet having a storage compartment; a door configured to open and close the storage compartment; and a water dispenser device provided in the door. The water dispenser device includes a valve assembly having a flow path communicating with a water supply and a valve, the valve being movable to open and close the flow path in the valve assembly. A dispenser recessed part is formed at a portion of a front surface of the door, an end of the valve of the valve assembly being exposed to the dispenser recessed part. A cover member is installed at the front surface of the door to cover a portion of the valve assembly. A lever assembly is installed at or on the cover member and configured to press the valve to open the flow path, when the lever assembly is manipulated by a user. The water supply may be a water tank provided in the door for storing drinking water or a connection to an external water supply.

[0027] The refrigerator according to any one of these aspects may include one or more of the following features:

An upper installation part may be formed at a portion of the front surface of the door adjacent to the dispenser recessed part. That is, the dispenser recessed part may have an open upper side and the upper installation part may be formed at the upper side of the dispenser recessed part. At least a portion of the valve assembly may be accommodated in the upper installation part. The cover may cover the upper installation part.

[0028] The cover member may be removably installed at the front surface of the door and/or at the dispenser recessed part. Accordingly, the maintenance of the water dispenser device may be easily performed.

[0029] A holding hook may be formed at each of opposite ends of the cover member by protruding therefrom. Accordingly, the cover member may be easily coupled to or decoupled from the door.

[0030] A holding protrusion may be formed at each of opposite sides of an inside of the dispenser recessed part, the holding hook being held in the holding protrusion.

[0031] The lever assembly may include a rotating shaft. The opposite ends of rotating shaft being rotatably installed at the rear surface of the cover member. The rotating shaft may be rotatably installed at the cover member. The rotation shaft may be rotatable about a rotation axis or rotation center extending in a horizontal direction parallel to a plane of a front surface of the door, e.g. in a lateral or left-right direction of the door or of the refrigerator. Accordingly, the lever assembly may be rotated forward and rearward.

[0032] The lever assembly may include a press part formed by extending downward from the rotating shaft. The press part may have a pressing step pressing each of the opposite ends of the lower surface of the valve and formed at each of the opposite sides of the press part. The press part may have a pressing step configured to press the valve to open the flow path. The pressing step may be formed at a side or along an edge of the pressing part, e.g. at opposite sides of the pressing part. The pressing step may extend in front-rear direction of the refrigerator and/or in a direction perpendicular to a rotation axis of the rotation shaft and/or to the front surface of the door. The pressing step may be formed adjacent to a water exit opening formed in the pressing part. Accordingly, the valve may be pressed by the manipulation

of the lever assembly.

[0033] The lever assembly may include a manipulation lever extending from the press part into the dispenser recessed part to be manipulated by a user. The lever assembly may include a manipulation lever formed by extending downward from the lower end of the press part. The manipulation lever may be exposed to the dispenser recessed part. Accordingly, the manipulation of the manipulation lever may enable the press part to operate the valve.

[0034] A rotation center of the rotating shaft may be located at a position higher than the position of a lower surface or a lower end of the valve. Accordingly, due to the pressing of the manipulation lever, the press part may push up the lower surface of the valve.

[0035] A water exit opening may be formed in the press part, e.g. at the center of the press part. Accordingly, when the press part presses the valve and the flow path of the valve assembly is opened, water discharged through the flow path may be discharged through the water exit opening.

[0036] The pressing step may be formed at each of the opposite sides of the water exit opening. Accordingly, the two pressing steps may evenly press the opposite sides of the lower surface of the valve located to correspond to the water exit opening, so the malfunction of the valve may be prevented.

[0037] The pressing step may be located at a position lower than the rotation center of the rotating shaft. Accordingly, when the manipulation lever is rotated relative to the rotating shaft, the pressing step may upward press the lower surface of the valve.

[0038] The pressing step may be located to press the center of each of the opposite sides of the lower surface of the valve. Accordingly, the valve may accurately move upwards without tilting forward or rearward or to any one side.

[0039] The pressing step may be positioned to remain in contact with the valve. Each of the pressing steps may be configured to be in contact with the lower surface of the valve irrespective of a movement or position or inclining of the lever assembly or the manipulation lever. Accordingly, when the manipulating force to the manipulation lever is released, the manipulation lever may be returned to an initial position by the elastic restoring force of the valve.

[0040] The valve assembly may include an elastic member for providing a restoring force. The elastic member may be configured to press the valve into a position to close the flow path and/or to restore a position of the lever assembly when a user manipulation is released.

[0041] A stopper protrusion may protrude from the press part to limit a movement, e.g. forward movement, or inclining of the manipulation lever or of the lever assembly, in particular when manipulation by a user is released. A stopper protrusion may be formed at the front surface of the press part by protruding therefrom. The stopper protrusion may be configured to limit the forward inclining of the manipulation lever. Accordingly, the manipulation lever may be prevented from forward inclining excessively.

[0042] The manipulation lever may be configured to incline to such a degree that the lower end of the manipulation lever does not protrude from the front surface of the door, i.e. that the manipulation lever remains within the dispenser recessed part recessed from the front surface of the door. Accordingly, the lower end of the manipulation lever may be prevented from protruding from the front surface of the door.

[0043] A limiting jaw may be formed at the cover member. The limiting jaw may protrude towards the manipulation lever or the lever assembly such that a movement, e.g. a forward movement, thereof is limited. The limiting jaw may be configured to limit the forward inclining of the manipulation lever. Accordingly, the manipulation lever may be prevented from forward inclining excessively.

[0044] A reinforcing rib may be formed at each of the opposite sides of the upper end of the manipulation lever. The reinforcing rib may be configured to support a pressing operation performed by the manipulation lever. Accordingly, the pressing step may be prevented from being deformed or damaged when the valve is pressed by the pressing step due to the manipulating force of the manipulation lever.

[0045] The lever assembly may be configured to press the opposite sides of the lower surface of the valve when the lever assembly is pressed rearward. Accordingly, the valve may be accurately operated without tilting to any one side.

[0046] The lower surface of the dispenser recessed part may be configured to be open. A remaining water receiver may be provided at the open lower surface of the dispenser recessed part. Accordingly, some water may be received in the remaining water receiver.

[0047] The valve of the valve assembly may be elastically moved up and down by an elastic member. Accordingly, although a separate elastic member is not installed at the lever assembly, the valve may be returned to an initial position.

[0048] As described above, in the refrigerator of the present disclosure, the front surface of the door, e.g. made of a steel plate, may be recessed such that space in which the water dispenser device is installed is defined, thereby simplifying an entire structure of the door.

[0049] In addition, in the refrigerator of the present disclosure, the lever assembly may be configured to be operably installed at the cover member, and the cover member may be configured to be removably installed at the dispenser recessed part, thereby simplifying the assembly structure of the water dispenser device and facilitating the removal and assembly of the water dispenser device during maintenance thereof.

[0050] Furthermore, in the refrigerator of the present disclosure, the reinforcing rib may be formed at the manipulation lever, thereby preventing damage such as bending deformation of a connecting portion between the

manipulation lever and the press part which may be caused by the manipulation of the manipulation lever.

[0051] Additionally, in the refrigerator of the present disclosure, the pressing step constituting the lever assembly may be configured to evenly press each of the opposite sides of the lower surface of the valve, thereby preventing the tilting of the valve to any one side during the upward movement of the valve such that the malfunction of the valve is prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052] 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 front view illustrating a refrigerator according to an embodiment of the present disclosure;
FIG. 2 is a perspective view illustrating a door of the refrigerator according to the embodiment of the present disclosure;
FIG. 3 is an exploded perspective view illustrating a state of a water dispenser device to be installed at the door of the refrigerator according to the embodiment of the present disclosure;
FIG. 4 is an enlarged view illustrating the state of the water dispenser device to be installed at the door of the refrigerator according to the embodiment of the present disclosure device;
FIG. 5 is a sectional view taken along line I-I of FIG. 1;
FIG. 6 is an enlarged view of an "A" portion of FIG. 5;
FIG. 7 is an enlarged view illustrating the operation states of a lever assembly and a valve assembly in FIG. 6;
FIG. 8 is a sectional view taken along line II-II of FIG. 1;
FIG. 9 is an enlarged view of a "B" portion of FIG. 8;
FIG. 10 is an enlarged view illustrating the operation states of the lever assembly and the valve assembly in FIG. 8;
FIG. 11 is an enlarged view of a "C" portion of FIG. 10;
FIG. 12 is a front view illustrating a state in which the lever assembly is coupled to a cover member in the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 13 is a top plan view illustrating the state in which the lever assembly is coupled to the cover member in the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 14 is a bottom view illustrating the state in which the lever assembly is coupled to the cover member in the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 15 is a rear view illustrating the state in which the lever assembly is coupled to the cover member in the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 16 is a perspective view illustrating the cover member of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 17 is a front view illustrating the cover member of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 18 is a rear view illustrating the cover member of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 19 is a bottom view illustrating the cover member of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 20 is a side view illustrating the cover member of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 21 is a perspective view illustrating the lever assembly of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 22 is a front view illustrating the lever assembly of the water dispenser device of the refrigerator according to the embodiment of the present disclosure;
FIG. 23 is a rear view illustrating the lever assembly of the water dispenser device of the refrigerator according to the embodiment of the present disclosure; and
FIG. 24 is a side view illustrating the lever assembly of the water dispenser device of the refrigerator according to the embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0053] Hereinafter, an exemplary embodiment of a refrigerator of the present disclosure having a door provided with a water dispenser device will be described with reference to FIGS. 1 to 24.

[0054] FIG. 1 is a front view illustrating the refrigerator according to the embodiment of the present disclosure; FIG. 2 is a perspective view illustrating the door of the refrigerator according to the embodiment of the present disclosure; and FIG. 3 is an exploded perspective view illustrating a state of the water dispenser device to be installed at the door of the refrigerator according to the embodiment of the present disclosure.

[0055] As illustrated in these drawings, the refrigerator of the present disclosure has structure applied to a model of a refrigerator in which the water dispenser device is provided in the door 200.

[0056] Particularly, in the refrigerator of the present disclosure, a dispenser recessed part 220 may be formed at the door 200 by being recessed therefrom; a cover member 400 may be coupled to the dispenser recessed part 220; and a lever assembly 500 may be coupled to the cover member 400, so the entire structure of the water

dispenser device may be simplified, maintenance thereof may be facilitated, and assembly work thereof may be simplified.

[0057] This will be described in more detail for each component.

[0058] First, the refrigerator according to the embodiment of the present disclosure may include a cabinet 100.

[0059] The cabinet 100 may be a part constituting the exterior of the refrigerator.

[0060] A storage compartment (not shown) may be provided in such a cabinet 100. In this case, the storage compartment may be a space defined to store goods by using cold air. The cold air may be generated by a refrigeration cycle including a compressor, a condenser, and an evaporator and then may be circulated in the storage compartment by a blower fan assembly for air circulation.

[0061] The storage compartment may include only one storage compartment, or at least two storage compartments.

[0062] When at least two storage compartments are provided, temperatures in the at least two storage compartments may be set to be different from each other.

[0063] Next, the refrigerator according to the embodiment of the present disclosure may include the door 200.

[0064] The door 200 may a component which is used to open and close each storage compartment of the cabinet 100, and may be provided as a swinging door configured to open and close the storage compartment by swinging.

[0065] Such a door 200 may be provided for each storage compartment, or may include one door configured to simultaneously open and close a plurality of storage compartments.

[0066] In the embodiment of the present disclosure, as an example, the door 200 is provided for each storage compartment, and this is illustrated in FIG. 1.

[0067] In addition, as illustrated in FIG. 5, a tank mounting jaw 210 for seating a water tank 700 to be described later may be formed at an inner surface (a surface located at the storage compartment) of at least one door 200 of the doors 200, and as illustrated in FIGS. 2 to 5, the dispenser recessed part 220 may be formed at an outer surface (a surface located indoors) of the door 200.

[0068] The door 200 in which the tank mounting jaw 210 and the dispenser recessed part 220 are formed is, for example, a door located at a lower side relative to FIG. 1.

[0069] Here, the tank mounting jaw 210 may be a part formed by being recessed inward (rearward) from an inner wall surface of the door 200, and the dispenser recessed part 220 may be a part formed partially at the outer wall surface (a front wall surface) of the door 200 made of a steel plate such that the outer wall surface is recessed inward (rearward).

[0070] The recessed depth of the dispenser recessed part 220 may be configured to be deep enough to mount the lever assembly 500 thereto and to be deep enough to introduce at least a portion of a cup thereto.

[0071] Particularly, the dispenser recessed part 220 may be configured to be round by lancing among press process methods. Accordingly, upper and lower surfaces of the inside of a recessed portion defined by the dispenser recessed part 220 may be configured to be open.

[0072] That is, in a conventional technology, the front surface of the door is not molded, but a portion of the door is cut such that the front surface is open. In this state, the water dispenser device made of a material (an injected object) different from the door is installed at the open part. However, in the embodiment of the present disclosure, the front surface of the door 200 may be molded such that the installation space of the water dispenser device is defined, so such an installation space may be defined as a part of the door 200, whereby a high-quality design of the door and the simplification of the structure thereof may be realized.

[0073] Meanwhile, as illustrated in FIGS. 4 and 5, a connecting member 600 may be installed between the inner and outer walls of the door 200.

[0074] The connecting member 600 may be a part provided for the stable installation of a valve assembly 300 and for the secure coupling of the cover member 400.

[0075] Such a connecting member 600 may include a connecting tube 610, an upper installation part 620, and a lower installation part 630.

[0076] The connecting tube 610 may be a tube connecting the space in which the tank mounting jaw 210 is located to the space in which the dispenser recessed part 220 is located. In this case, the lower end of the connecting tube 610 may be located to communicate with the inside of the open upper surface of the dispenser recessed part 220.

[0077] The upper installation part 620 may be formed by extending from the lower end of the connecting tube 610 and may be configured to cover a rear side of the open upper end of the dispenser recessed part 220. In this case, a holding protrusion 621 may be formed at each of the opposite side surfaces of the upper installation part 620 by protruding therefrom, the holding protrusion 621 configured to hold the cover member 400.

[0078] The lower installation part 630 may be formed by extending from the upper installation part 620 and may be configured to cover a rear side of the open lower end of the dispenser recessed part 220. In this case, the remaining water receiver 640 may be coupled to the lower installation part 630.

[0079] The remaining water receiver 640 may be configured to block the open lower surface of the dispenser recessed part 220 and to be concave at a lower portion of the remaining water receiver 640 such that the remaining water receiver 640 receives remaining water spilling down inadvertently during the discharge of water.

[0080] Next, the refrigerator according to the embodiment of the present disclosure may include the water tank 700.

[0081] The water tank 700 may be a storage tank provided for storing water. In this case, the water may be

normal mineral water or purified water. Of course, beverages other than water may be stored in the water tank 700.

[0082] As illustrated in FIGS. 5 and 6, such a water tank 700 may be configured such that at least a portion of the water tank 700 is seated on and mounted to the tank mounting jaw 210 provided at the inner wall of the door 200.

[0083] The upper surface of the water tank 700 may be configured to be open and may be configured to be opened and closed by a water tank cover 710. Of course, a replenishing opening 711 may be formed in the water tank cover 710 to replenish water, and may be configured such that water is replenished even without completely opening the water tank cover 710 according to needs of a consumer.

[0084] In addition, the lower surface of the water tank 700 may be configured to gradually incline downward toward the front of the water tank, and a water discharge tube 720 may be formed at the lower edge of the front of the water tank 700 by protruding therefrom. In this case, the water discharge tube 720 may be configured to be inserted into the connecting tube 610 constituting the connecting member 600.

[0085] Next, the refrigerator according to the embodiment of the present disclosure may include the valve assembly 300.

[0086] The valve assembly 300 may be operated by the manipulation of the lever assembly 500. The valve assembly 300 may be configured to open and close a flow path through which water in the water tank 700 is discharged and may be located in the connecting tube 610 constituting the connecting member 600. In this case, the flow path may be a path of water flowing through the inside of the valve assembly 300.

[0087] Such a valve assembly 300 may be configured to have various shapes. In the embodiment of the present disclosure, as an example, the valve assembly 300 may be configured such that the valve 320 elastically moves at a fluid discharge side of the inside of a valve tube 310 configured as a tube body empty at the inside thereof. That is, the valve assembly 300 may be configured such that the flow path located in the valve tube 310 is opened due to the upward movement of the valve 320 while the valve 320 is pressed by the operation of the lever assembly 500.

[0088] Specifically, the upper end of the valve tube 310 may be connected to the water discharge tube 720 of the water tank 700 and the lower end of the valve tube 310 may be configured to be open, and the valve 320 may be installed at the open lower end of the valve tube 310 such that the valve 320 moves upward and downward.

[0089] In addition, a center shaft 330 may be fixed in a center portion of the inside of the valve 320, and a contacting jaw 331 may be formed on the circumferential surface of the center shaft 330 by protruding outward therefrom. The contacting jaw 331 may be configured to be spaced apart from a close contact jaw 311 located in the valve tube 310 due to the upward movement of the associated center shaft 330 such that the flow path is opened. In this case, a water discharge hole 321 may be formed at the lower end surface of the valve 320 (see FIGS. 8, 10, and 14).

[0090] Particularly, the valve 320 may be configured to be elastically moved upward and downward in the valve tube 310 by an elastic member 340. Accordingly, even without the separate installation of a spring or an elastic member, a manipulation lever 530 of the lever assembly 500 to be described later may be returned to an initial position by the restoring force of the elastic member 340 supplied to the valve 320.

[0091] In addition, the lower end (the water discharge hole) of the valve 320 may be located to be exposed to the inside of the dispenser recessed part 220 through the open upper surface of the dispenser recessed part 220.

[0092] Next, the refrigerator according to the embodiment of the present disclosure may include the cover member 400.

[0093] The cover member 400 may be a part provided to prevent the exposure of the valve 320 to the outside.

[0094] To this end, the cover member 400 may be installed to block the upper open portion of the dispenser recessed part 220, and may function to prevent the valve 320 located inside of the cover member 400 from being exposed to the outside.

[0095] Particularly, the cover member 400 may be provided as a part at which the lever assembly 500 to be described later is installed, so the cover member 400 may simplify the installation structure of the lever assembly 500 and may be integrated with the lever assembly 500.

[0096] Such a cover member 400 may be removably installed at the dispenser recessed part 220.

[0097] Specifically, as illustrated in FIGS. 4, 13, 16, and 18 to 20, a holding hook 410 may be formed at the opposite ends of the cover member 400 by protruding therefrom. In this case, the holding hook 410 may be held and locked by the holding protrusion 621 (see FIG. 4) of the upper installation part 620 located at each of the open opposite upper ends of the dispenser recessed part 220. That is, the cover member 400 may be configured to be coupled to the dispenser recessed part 220 by the hook coupling structure described above, so easy assembly of the cover member 400 may be realized.

[0098] Of course, the holding protrusions 621 may be formed at the dispenser recessed part 220 and may be configured such that the cover member 400 is coupled directly to the dispenser recessed part 220.

[0099] In addition, the front surface of the cover member 400 may be configured to be round. That is, due to the round structure of the cover member 400, the portion of the cover member 400 protruding from the front surface (an outer wall surface) of the door 200 and thickness thereof may be minimized.

[0100] In addition, as illustrated in FIG. 18, the shaft

coupling groove 420 may be formed at each of the opposite sides of the rear surface of the cover member 400 by being recessed therefrom, the shaft coupling grooves 420 facing each other. The opposite ends of a rotating shaft 510 of the lever assembly 500 to be described later may be rotatably installed in such shaft coupling grooves 420, respectively.

[0101] Next, the refrigerator according to the embodiment of the present disclosure may include the lever assembly 500.

[0102] The lever assembly 500 may be installed at the cover member 400 such that the lever assembly 500 can be pressed, and may be configured to operate the valve 320 of the valve assembly 300.

[0103] As illustrated in FIGS. 21 to 24, such a lever assembly 500 may include the rotating shaft 510, a press part 520, and the manipulation lever 530.

[0104] Here, the opposite ends of the rotating shaft 510 may be installed rotatably in the shaft coupling grooves 420, respectively, formed at the rear surface of the cover member 400.

[0105] Particularly, the rotation center of the rotating shaft 510 may be located at a position higher than the position of the lower surface of the valve 320. That is, since the position of the rotating shaft 510 is located as high as possible, during the manipulation of the manipulation lever 530, the press part 520 may rotate relative to the rotating shaft 510 and may upward press the lower surface of the valve 320.

[0106] In addition, the press part 520 may be configured to incline by extending downward from the rotating shaft 510 toward a rear side of a lower portion of the rotating shaft 510, and the pressing step 521 may be configured to be stepped at the upper surface of the rear side of the press part 520, the pressing step 521 being configured to press the lower surface of the valve 320. That is, while the press part 520 rotates relative to the rotating shaft 510 which is a rotation center of the press part, the pressing step 521 may press the lower surface of the valve 320.

[0107] In this case, the pressing step 521 may be configured such that the rear edge portion of the pressing step 521 is in contact with the lower surface of the valve 320 and is located at a position lower than the rotation center of the rotating shaft 510. Accordingly, when the manipulation lever 530 is pressed, the pressing step 521 may be rotated upward relative to the rotating shaft 510 and may accurately press the lower surface of the valve 320.

[0108] In addition, the pressing step 521 may be configured to be located at each of the opposite sides of the valve 320 such that the opposite ends of the lower surface of the valve 320 are evenly pressed. Particularly, each of the pressing steps 521 may be located to press the center of each of the opposite sides of the lower surface of the valve 320.

[0109] Accordingly, the valve 320 pressed by the two pressing steps 521 may move upward in an accurate direction without tilting forward/rearward, or horizontally.

[0110] Preferably, each of the pressing steps 521 may be configured to be in contact with the lower surface of the valve 320 irrespective of the inclining of the manipulation lever 530. That is, the upper surface of the pressing step 521 may be in constant contact with the lower surface of the valve 320, so the press part 520 may completely receive the elastic restoring force of the elastic member 340 installed at the valve 320.

[0111] Accordingly, although a separate elastic member such as a spring is not installed at the lever assembly 500, the lever assembly 500 may be restored to an initial non-pressed state during non-manipulation.

[0112] In addition, the water exit opening 522 may be formed at the center of the press part 520. In this case, the water exit opening 522 may be an opening configured such that the valve 320 passes through the opening or corresponds thereto, and water passing through the valve 320 may be discharged through the water exit opening 522.

[0113] In this case, the two pressing steps 521 of the press part 520 may be formed at the opposite sides of the water exit opening 522, respectively. That is, the pressing steps 521 may be formed relative to the water exit opening 522 and may accurately press the opposite sides of the valve 320, respectively, corresponding to the water exit opening 522.

[0114] In addition, the manipulation lever 530 may be provided as a part manipulated by a user.

[0115] Such a manipulation lever 530 may be formed by bending and extending downward from the lower end of the press part 520.

[0116] The manipulation lever 530 may be formed of a flat plate or a plate partially having curvature. Accordingly, an accurate pressing manipulation may be performed even by the use of a cup.

[0117] In addition, a reinforcing rib 531 may be formed at each of the opposite sides of the upper end of the manipulation lever 530, the reinforcing rib 531 being configured to support a pressing operation performed by the manipulation lever. That is, the manipulation lever 530 may be formed of a plate, so a connecting portion between the manipulation lever 530 and the press part 520 may be deformed due to frequent pressing manipulation, and particularly, a connecting portion between the manipulation lever 530 and a portion on which a pressing force is concentrated and the pressing step 521 is formed may be deformed.

[0118] In consideration of this, the reinforcing rib 531 may be formed so as to prevent the deformation of the manipulation lever 530. In this case, the reinforcing rib 531 may be formed at each of the opposite sides of the press part 520.

[0119] The reinforcing rib 531 described above may be formed to be thicker than other parts. Of course, the reinforcing rib 531 may be formed by overlapping a part of the manipulation lever 530.

[0120] Meanwhile, the manipulation lever 530 may be

configured to incline to such a degree that the lower end of the manipulation lever 530 does not protrude from the front surface of the door 200. This is because when the manipulation lever 530 is exposed to the outside of the door 200, the manipulation lever 530 may hit a user passing by an area adjacent to the manipulation lever 530 and may be manipulated unintentionally or may be damaged.

[0121] To this end, a limiting jaw 430 may be formed at the rear surface of the cover member 400, the limiting jaw being configured to limit the forward inclining of the manipulation lever 530. That is, due to the provision of the limiting jaw 430, the lower end of the manipulation lever 530 may be prevented from excessively protruding forward.

[0122] Of course, the stopper protrusion 523 may be formed at the front surface of the press part 520 by protruding therefrom, and may limit the forward inclining of the manipulation lever 530. That is, the stopper protrusion 523 formed at the front surface of the press part 520 may be configured to hit the rear surface of the cover member 400 and to limit the forward inclining of the manipulation lever 530 such that the manipulation lever 530 does not move out of the dispenser recessed part 220.

[0123] Hereinafter, the manipulation process of the water dispenser device of the refrigerator described above according to the embodiment of the present disclosure will be described in more detail.

[0124] First, in case of the non-manipulation of the lever assembly 500 in which the lever assembly 500 is not manipulated, the valve 320 constituting the valve assembly 300 may be maintained to protrude from the lower end of the valve tube 310 due to the elastic restoring force of the elastic member 340.

[0125] In this case, the center shaft 330 coupled to the valve 320 may maintain the state of the center shaft 330 moving downward together with the valve 320, and the contacting jaw 331 formed on the circumferential surface of the center shaft 330 by protruding therefrom may be maintained in close contact with the close contact jaw 311 located in the valve tube 310. Accordingly, the flow path formed between the center shaft 330 and the valve tube 310 may be closed.

[0126] In addition, in the state in which the flow path of the valve assembly 300 is closed, the pressing step 521 in contact with the lower surface of the valve 320 at the upper surface of the pressing step 521 may be pushed downward by the elastic restoring force of the elastic member 340 transmitted through the valve 320.

[0127] Accordingly, the press part 520 having the pressing step 521 may be rotated downward relative to the rotating shaft 510, and the lower end of the manipulation lever 530 extending from the rear side of the press part 520 may protrude forward.

[0128] Of course, the manipulation lever 530 may have the forward inclining limited by the limiting jaw 430 formed at the rear surface of the cover member 400 or the stopper protrusion 523 formed at the front surface of the press part 520, so the lower end of the manipulation lever 530 may be prevented from moving out of the dispenser recessed part 220 and protruding from the front surface of the door 200.

[0129] The non-manipulated state of the lever assembly 500 described above is illustrated in FIGS. 5, 6, 8, and 9.

[0130] In addition, in the state in which the lever assembly 500 is not manipulated as described above, when a user intends to take out water, the user may rearward press the manipulation lever 530 of the lever assembly 500.

[0131] In this case, the rotating shaft 510 connected to the manipulation lever 530 may be rotated relative to the shaft coupling grooves 420 of the cover member 400, and the press part 520 may be rotated upward relative to the rotating shaft 510 by the rotation of the rotating shaft 510, and the pressing step 521 protruding at the upper surface of the press part 520 may press the lower surface of the valve 320 in contact with the upper surface of the pressing step 521.

[0132] Particularly, the pressing steps 521 may be located at the opposite sides of the water exit opening 522, respectively, and may be configured to evenly press the opposite sides of the valve 320, so the valve 320 may accurately move in a direction in which the valve tube 310 is formed.

[0133] Accordingly, it is possible to prevent the malfunction of the valve 320 such as the tilting of the valve 320 to any one side (for example, to a front side) during the movement of the valve 320.

[0134] In addition, when the valve 320 is moved upward as described above, the center shaft 330 coupled to the associated valve 320 may also be moved upward together with the valve 320. Accordingly, the contacting jaw 331 protruding at the circumferential surface of the center shaft 330 may be spaced apart from the close contact jaw 311 located in the valve tube 310.

[0135] Accordingly, the flow path formed between the center shaft 330 and the valve tube 310 may be opened; water stored in the water tank 700 may flow into the valve tube 310 through the connecting tube 610 and may pass through a gap between the valve tube 310 and the center shaft 330 and the water discharge hole 321 of the valve 320; and then may be discharged through the water exit opening 522 of the press part 520.

[0136] Accordingly, a user may receive the discharged water in a cup and drink the water.

[0137] The manipulated state of the lever assembly 500 is illustrated in FIGS. 7, 10, and 11.

[0138] In addition, when the rearward pressing of the manipulation lever 530 is released, the valve 320 may be moved downward and returned to an initial position by the restoring force of the elastic member 340. In this process, the lever assembly 500 having the pressing step 521 in contact with the valve 320 may be rotated relative to the rotating shaft 510, and may be returned to the initial position (a state in which the lower end of the manipula-

tion lever protrudes forward).

[0139] Finally, in the refrigerator of the present disclosure, the front surface of the door 200 made of a steel plate may be configured to be recessed such that space in which the water dispenser device is installed is defined, so the entire structure of the door may be simplified.

[0140] In addition, in the refrigerator of the present disclosure, the lever assembly 500 may be configured to be operably installed at the cover member 400, and the cover member 400 may be configured to be removably installed at the dispenser recessed part 220, so the assembly structure of the water dispenser device may be simplified, and the removal and assembly of the water dispenser device may be facilitated during maintenance thereof.

[0141] Furthermore, in the refrigerator of the present disclosure, the reinforcing rib 531 may be formed at the manipulation lever 530, so damage such as bending deformation of a connecting portion between the manipulation lever 530 and the press part 520 which may be caused by the manipulation of the manipulation lever 530 may be prevented.

[0142] Additionally, in the refrigerator of the present disclosure, the pressing step 521 constituting the lever assembly 500 may be configured to evenly press each of the opposite sides of the lower surface of the valve 320, so during the upward movement of the valve 320, the tilting of the valve 320 to any one side may be prevented such that the malfunction of the valve 320 is prevented.

Claims

1. A refrigerator wherein the refrigerator comprises:

a cabinet (100) having a storage compartment;
a door (200) configured to open and close the storage compartment; and
a water dispenser device provided in the door (200), the water dispenser device including a valve assembly (300) having a flow path communicating with a water supply (700) and a valve (320), the valve (320) being movable to open and close the flow path in the valve assembly (300),
wherein a dispenser recessed part (220) is formed at a portion of a front surface of the door (200), an end of the valve (320) being exposed to the dispenser recessed part (220),
wherein a cover member (400) is installed at the front surface of the door (200) to cover a portion of the valve assembly (300), and
a lever assembly (500) is installed at the cover member (400) and configured to press the valve (320) to open the flow path, when the lever assembly (500) is manipulated by a user.

2. The refrigerator of claim 1, wherein the cover member (400) is removably installed at the front surface of the door (200).

3. The refrigerator of claim 1 or 2, wherein a holding hook (410) protrudes from at least one end of the cover member (400), and
a holding protrusion (621) is formed correspondingly at an inside of the dispenser recessed part (220), the holding hook (410) being held in the holding protrusion (621).

4. The refrigerator according to any one of the preceding claims, wherein the lever assembly (500) comprises:

a rotating shaft (510) rotatably installed at the cover member (400);
a press part (520) extending from the rotating shaft (510) and having at least one pressing step (521), the pressing step (521) being configured to press the valve (320) to open the flow path; and
a manipulation lever (530) extending from the press part (520) into the dispenser recessed part (220) to be manipulated by a user.

5. The refrigerator of claim 4, wherein a rotation axis of the rotating shaft (510) is located at a vertical position higher than a lower end of the valve (320).

6. The refrigerator of claim 4 or 5, wherein a water exit opening (522) is formed in the press part (520).

7. The refrigerator of claim 6, wherein the water exit opening (522) is formed at a center of the press part (520) and the pressing steps (521) is formed at opposite sides of the water exit opening (522).

8. The refrigerator according to any one of the claims 4 to 7, wherein the pressing step (521) is located at a vertical position lower than a rotation axis of the rotating shaft (510).

9. The refrigerator according to any one of the claims 4 to 8, wherein the pressing step (521) remains in contact with a lower surface of the valve (320) irrespective of a position of the manipulation lever (530).

10. The refrigerator according to any one of the claims 4 to 9, wherein a stopper protrusion (523) protrudes from the press part (520) and is configured to limit a movement of the manipulation lever (530).

11. The refrigerator according to any one of the claims 4 to 10, wherein a reinforcing rib (531) is formed at an upper end of the manipulation lever (530), the reinforcing rib (531) being configured to support a

pressing operation performed by the manipulation lever (530).

12. The refrigerator according to any one of the preceding claims 4 to 11, wherein the manipulation lever (530) is configured to be moved such that a lower end of the manipulation lever (530) remains within the dispenser recessed part (220) and/or that a lower end of the manipulation lever (530) does not protrude from the front surface of the door (200), and/or wherein a limiting jaw (430) is formed at the cover member (400) to protrude towards the manipulation lever (530), the limiting jaw (430) being configured to limit a forward movement of the manipulation lever (530).

13. The refrigerator according to any one of the preceding claims, wherein the valve assembly (300) includes an elastic member (340) configured to press the valve (320) into a position to close the flow path and/or to restore a position of the lever assembly (500) when a user manipulation is released.

14. The refrigerator according to any one of the preceding claims, wherein an upper surface of the dispenser recessed part (220) is open and an upper installation part (620) is formed at the upper surface of the dispenser recessed part (220) accommodating at least a portion of the valve assembly (300) and/or being covered by the cover member (400).

15. The refrigerator according to any one of the preceding claims, wherein a lower surface of the dispenser recessed part (220) is open and a remaining water receiver (640) is provided at the lower surface of the dispenser recessed part (220).

FIG. 1

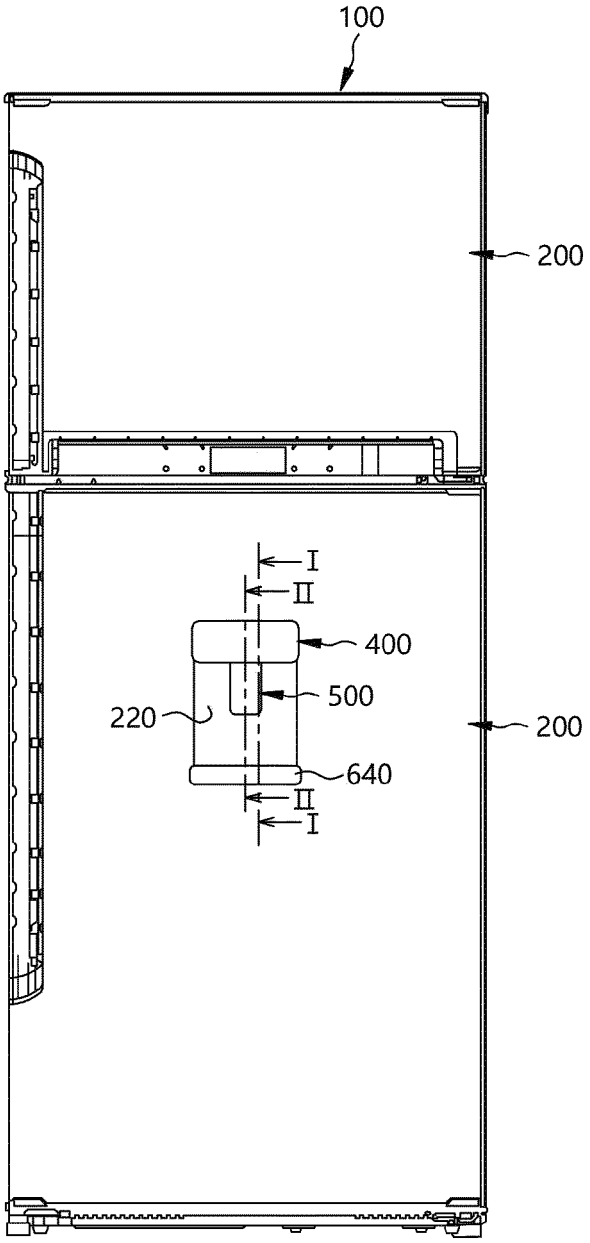


FIG. 2

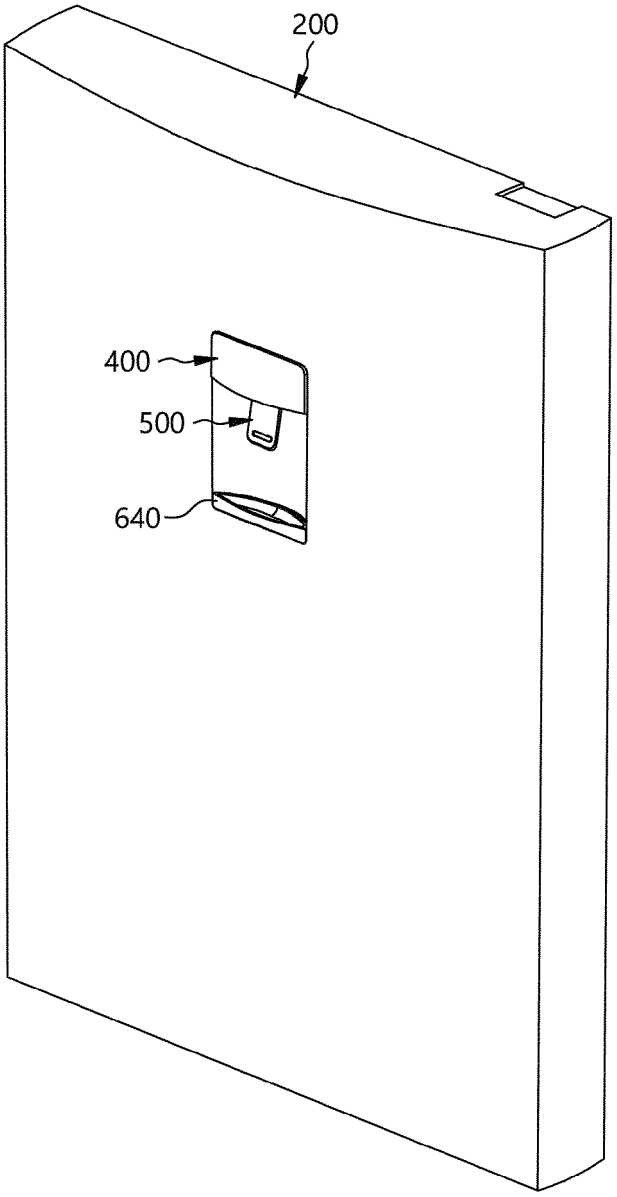


FIG. 3

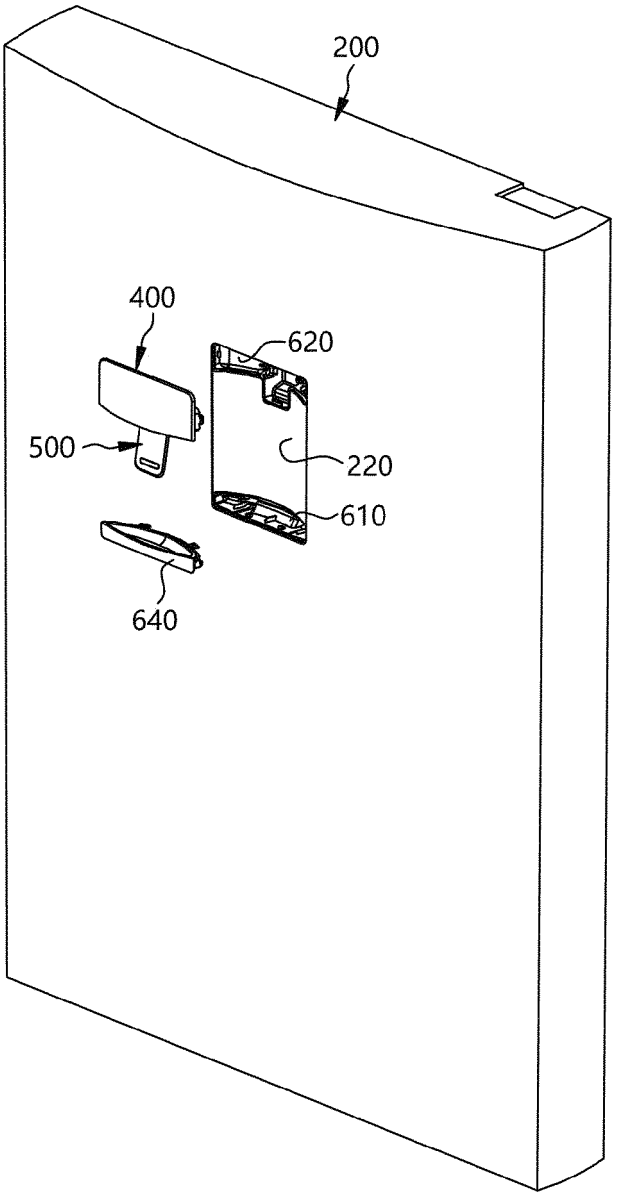


FIG. 4

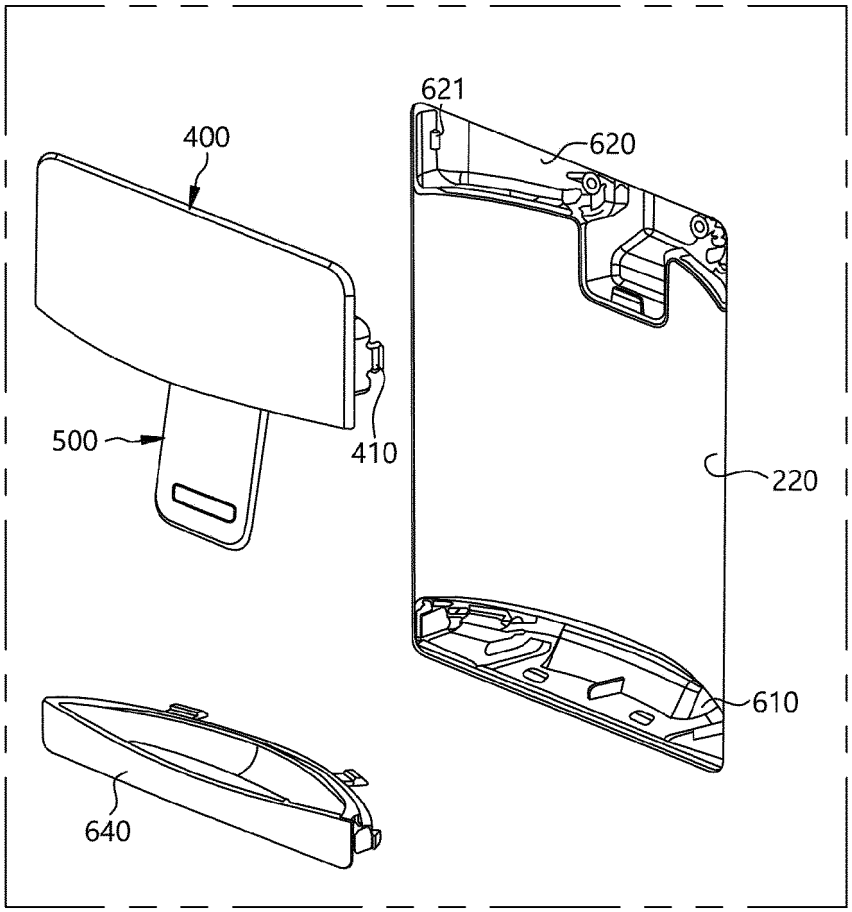


FIG. 5

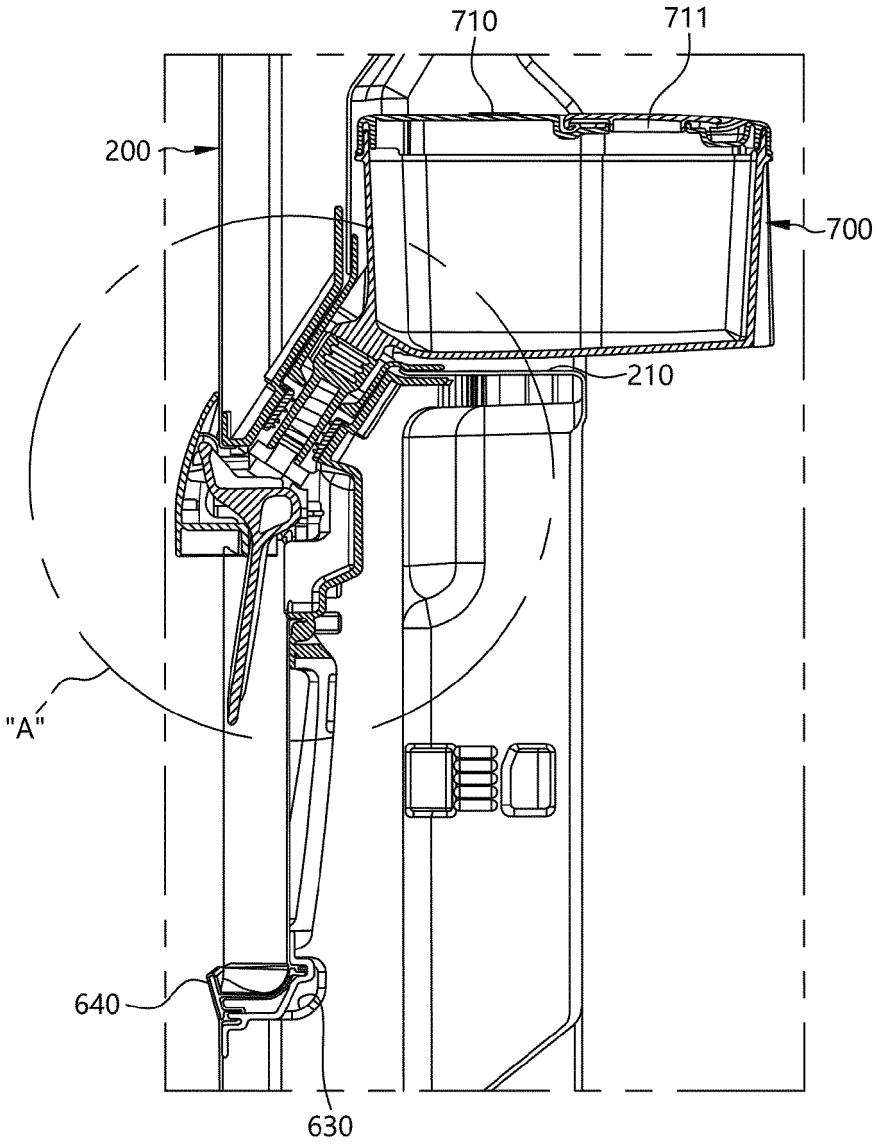


FIG. 6

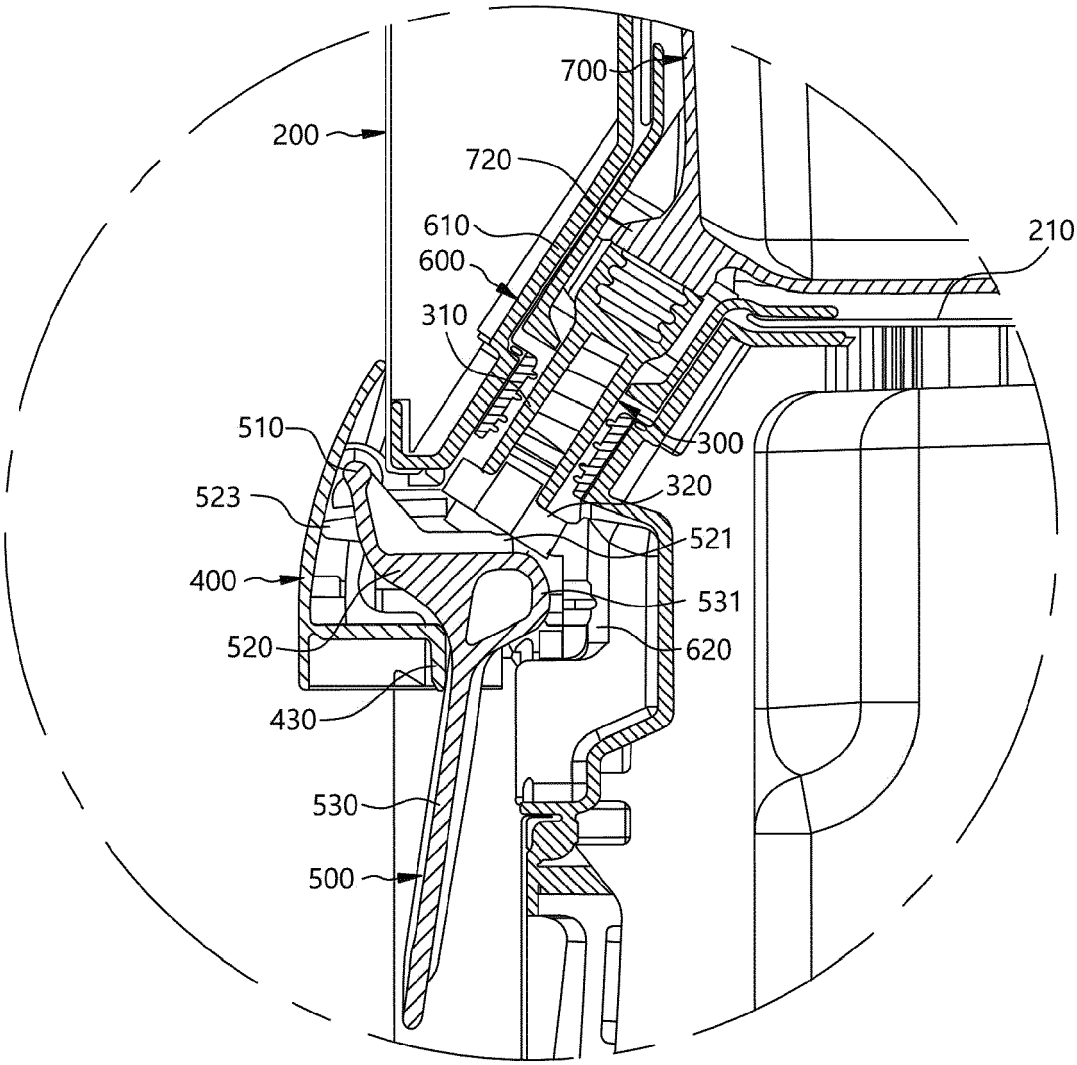

700
200
720
610
210
600
310
510
300
523
320
521
400
531
520
620
430
530
500

FIG. 7

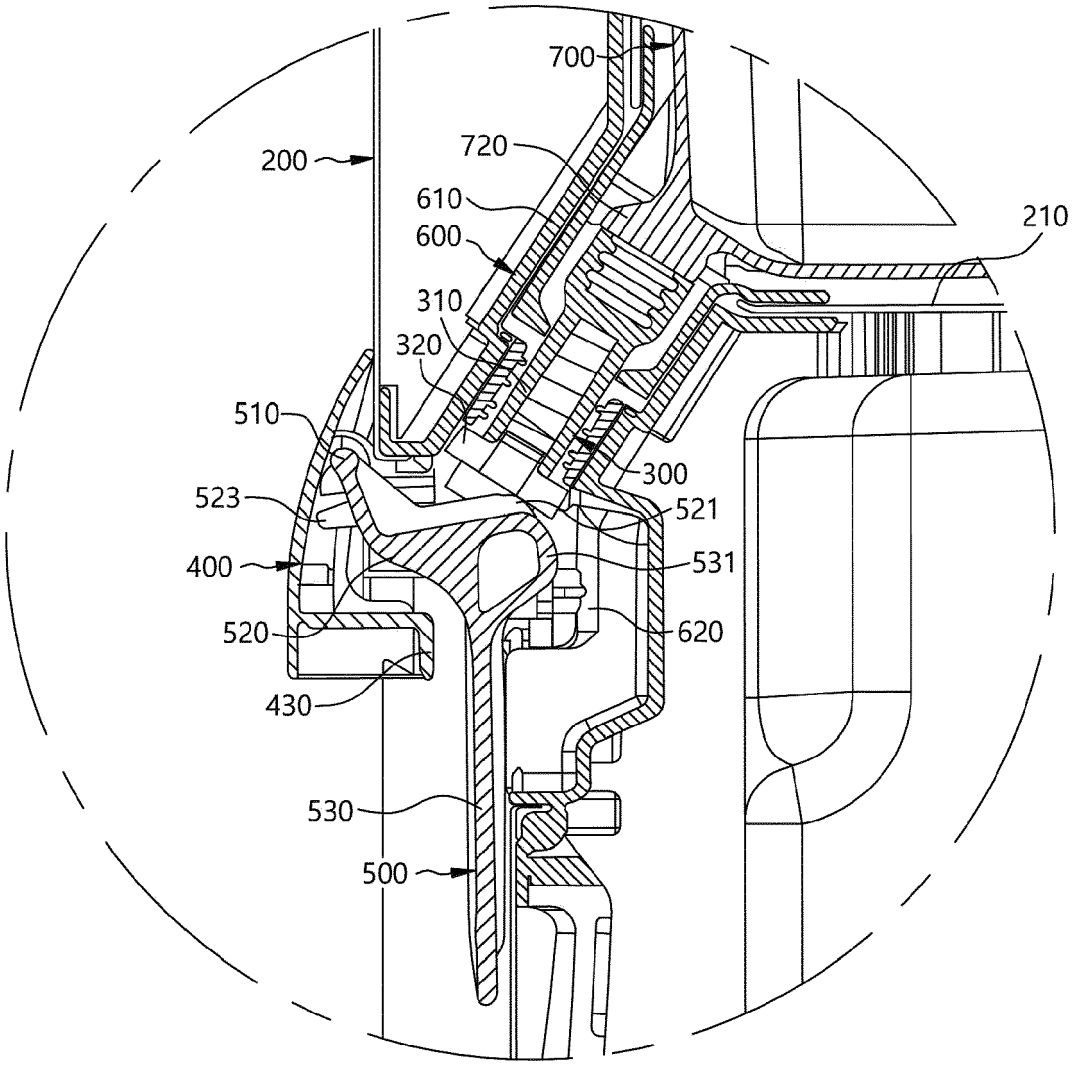

700
720
200
610
600
210
310
320
510
300
523
521
400
531
520
620
430
530
500

FIG. 8

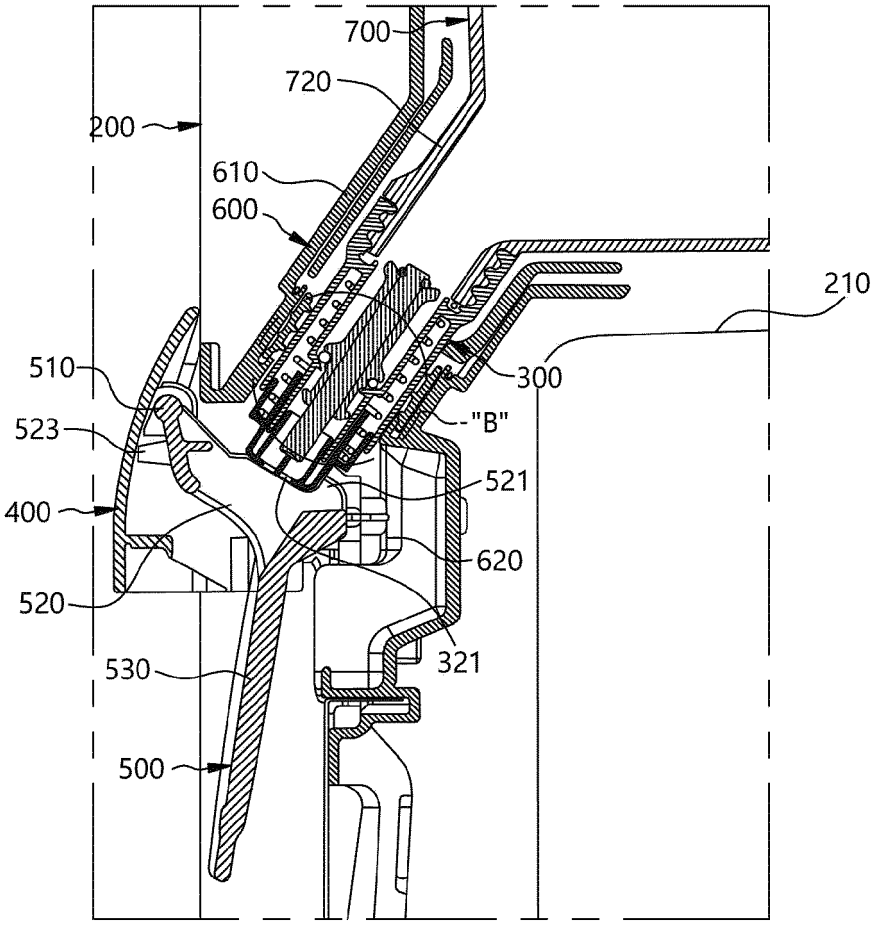


FIG. 9

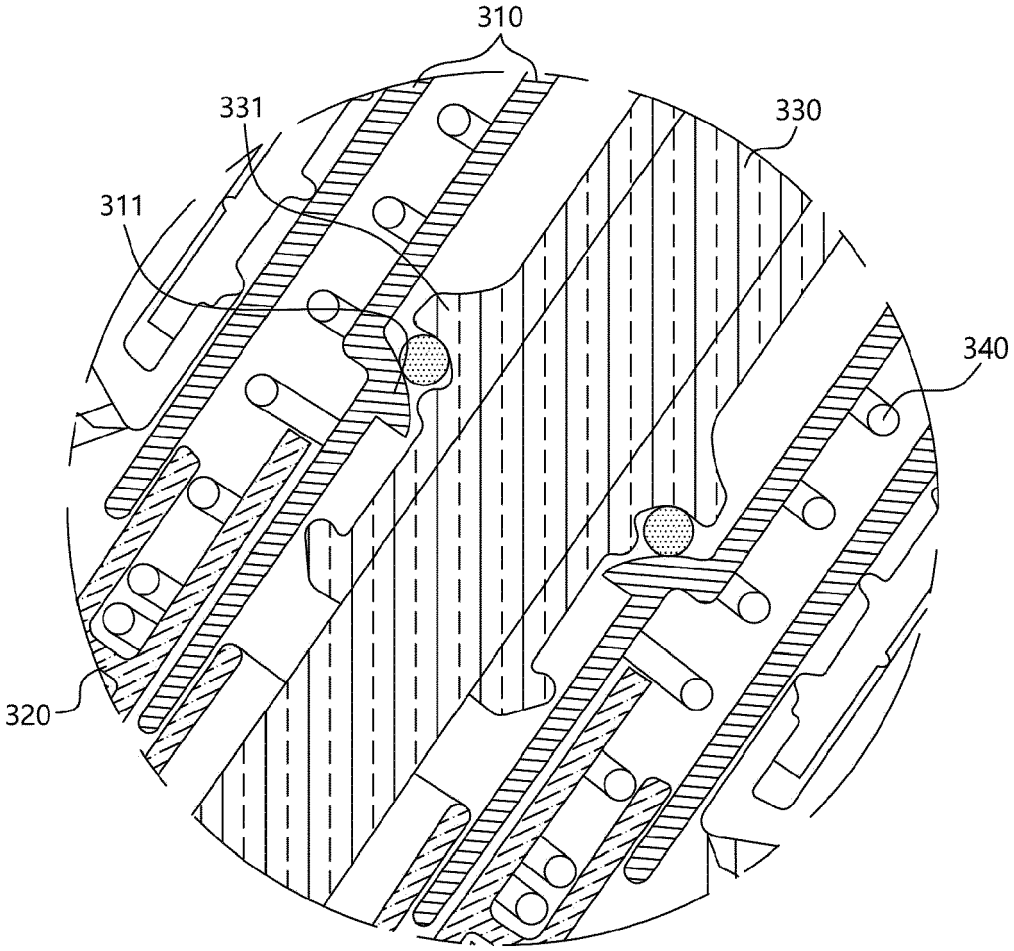


FIG. 10

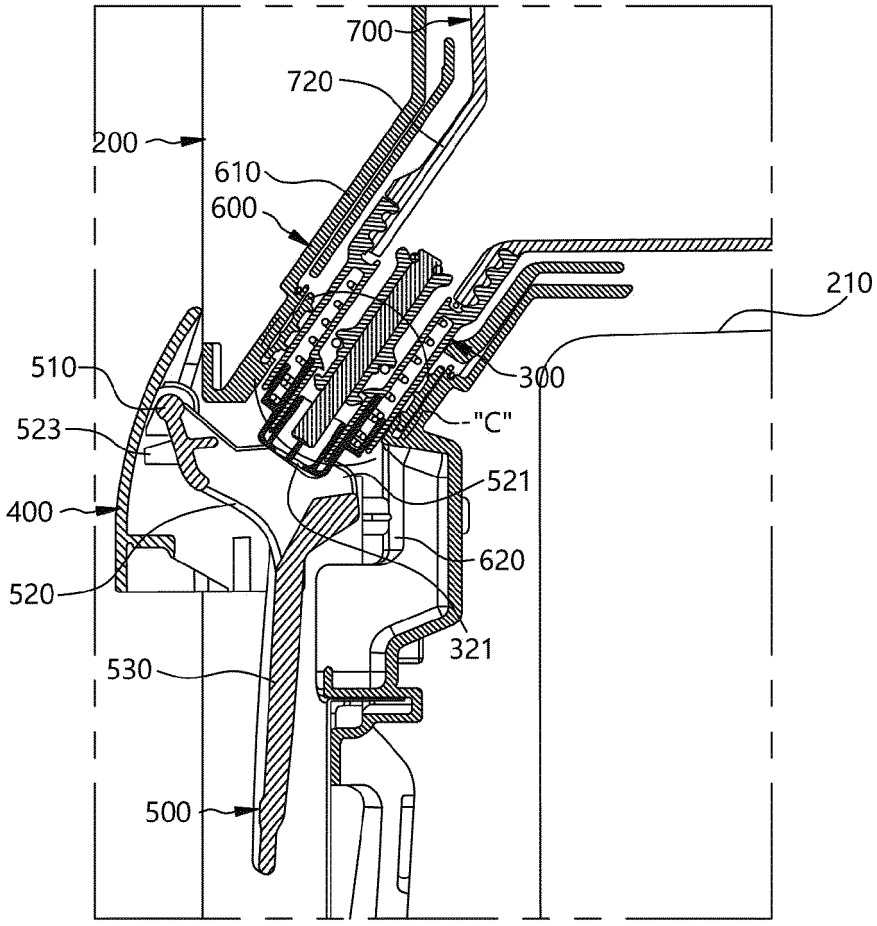


FIG. 11

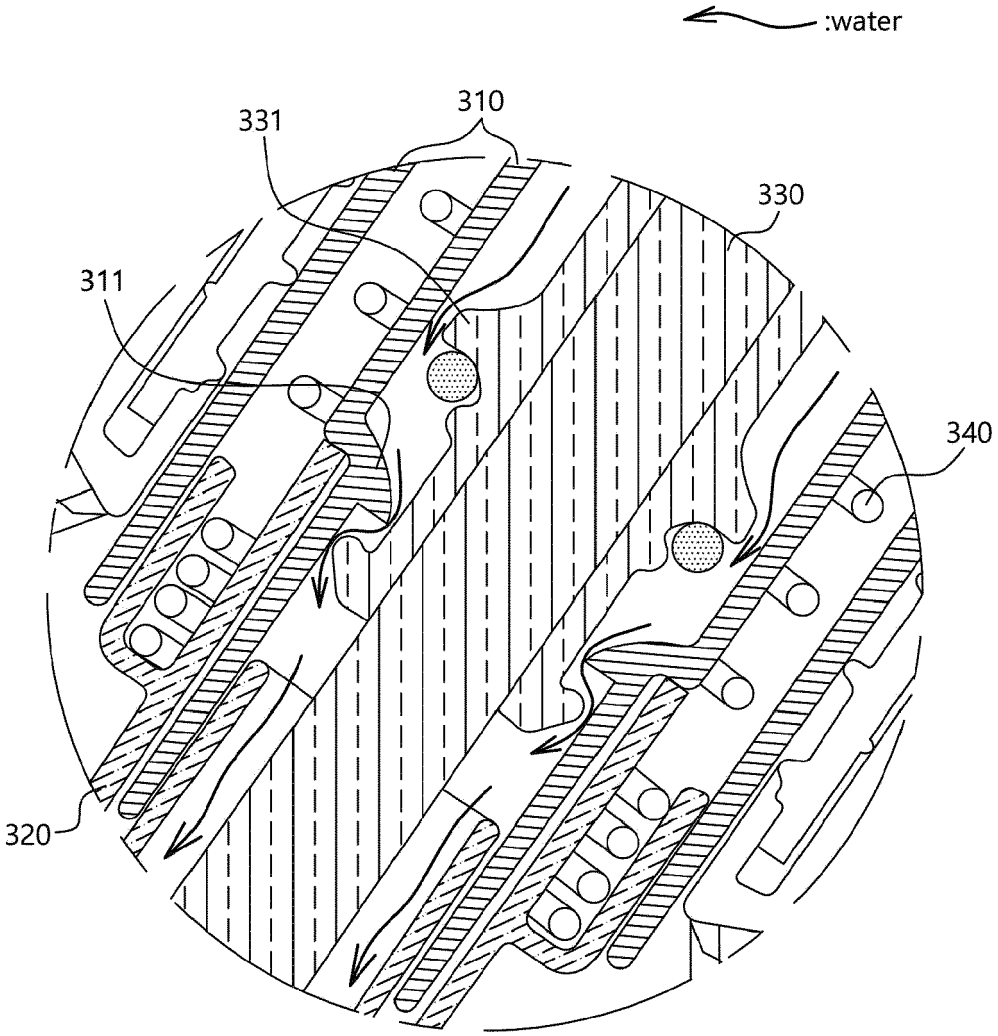


FIG. 12

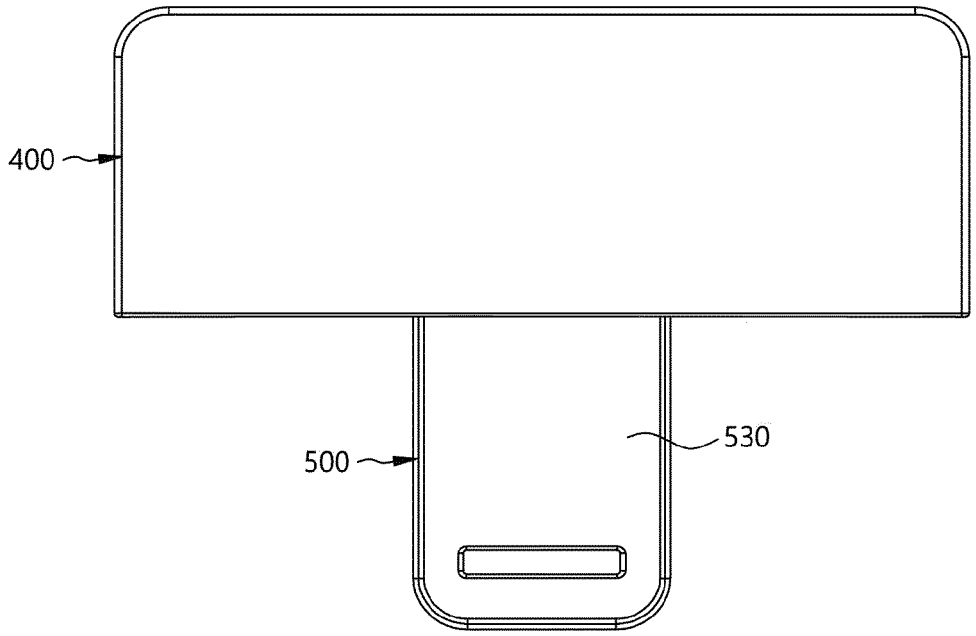

400
500
530

FIG. 13

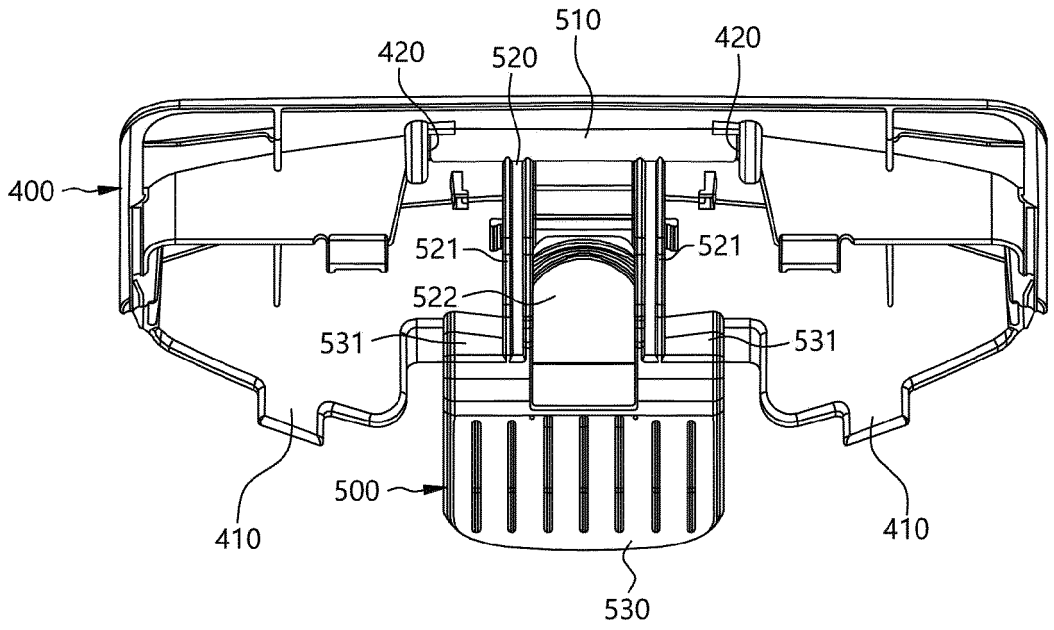

510
420
520
420
400
521
521
522
531
531
500
410
410
530

FIG. 14

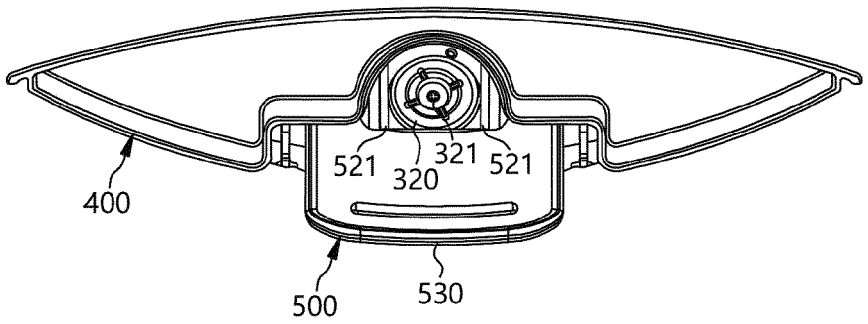

400
521
320
321
521
500
530

FIG. 15

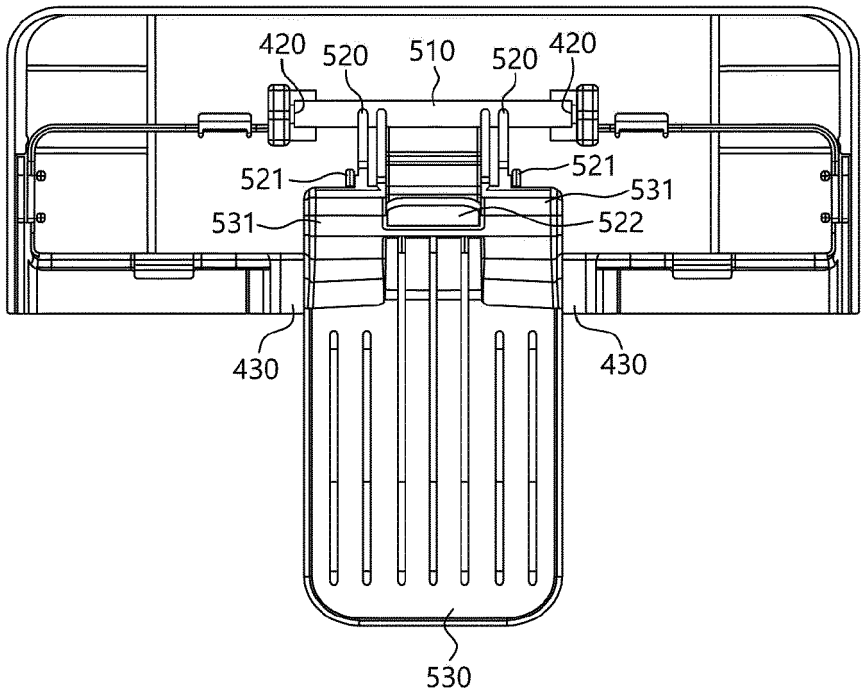

420
520
510
520
420
521
521
531
531
522
430
430
530

FIG. 16

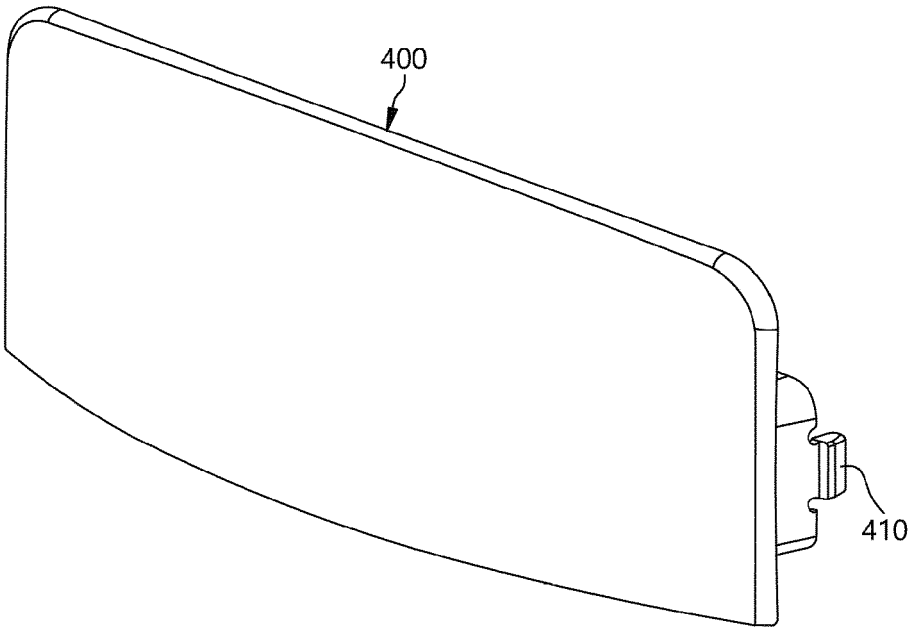


FIG. 17

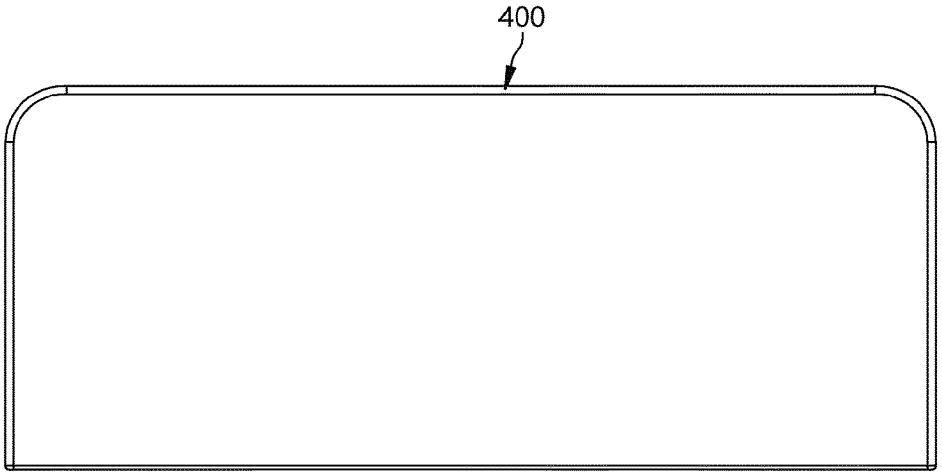


FIG. 18

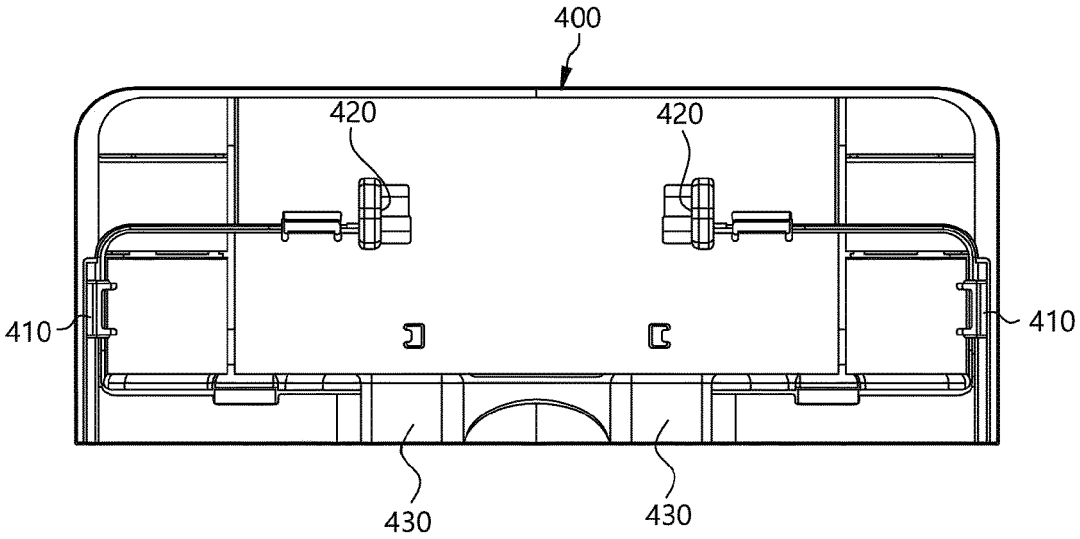


FIG. 19

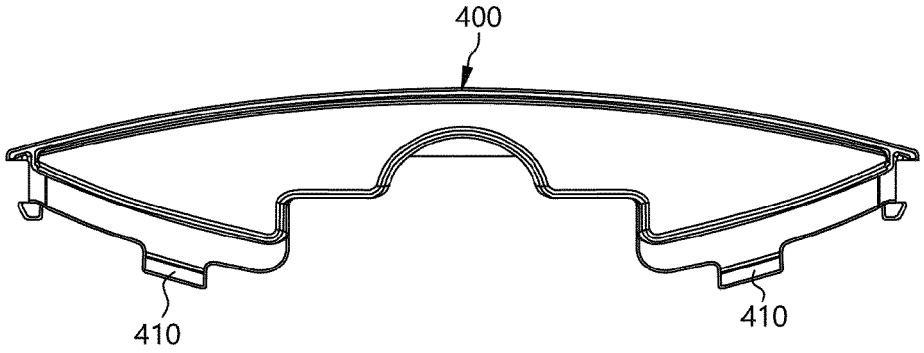


FIG. 20

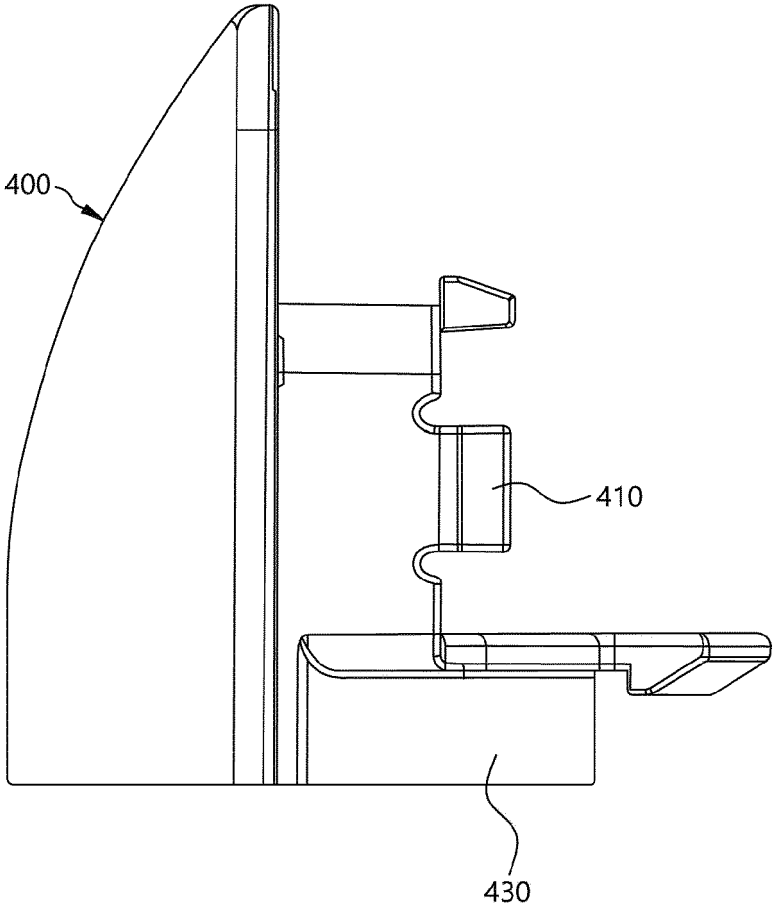


FIG. 21

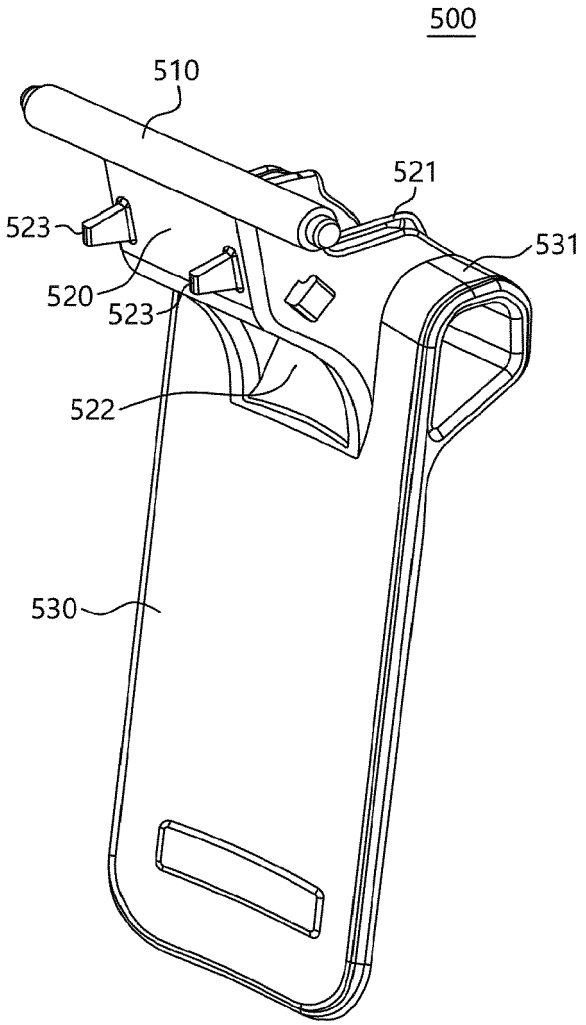


FIG. 22

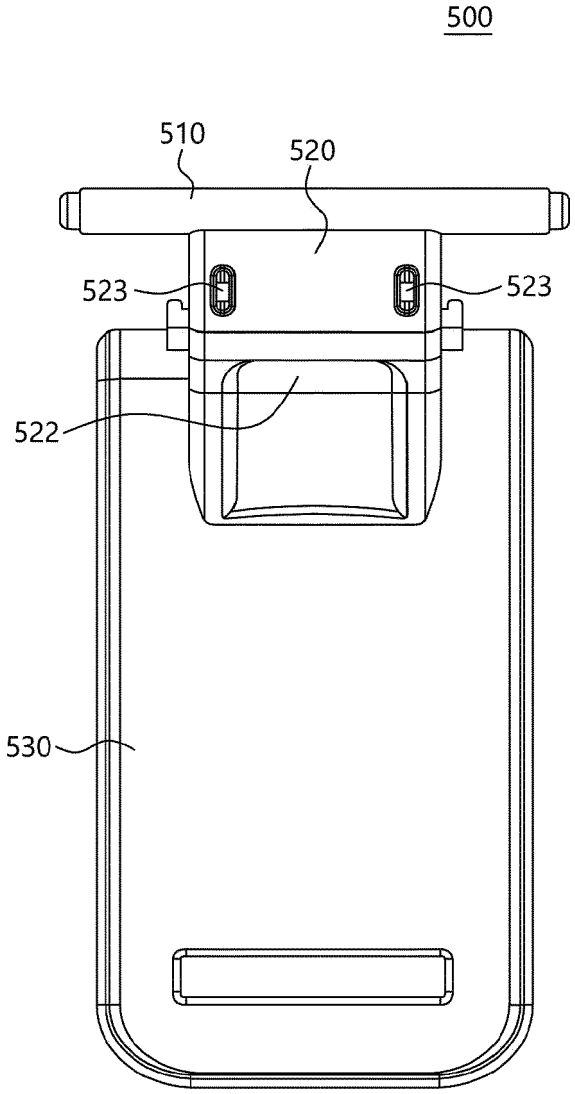


FIG. 23

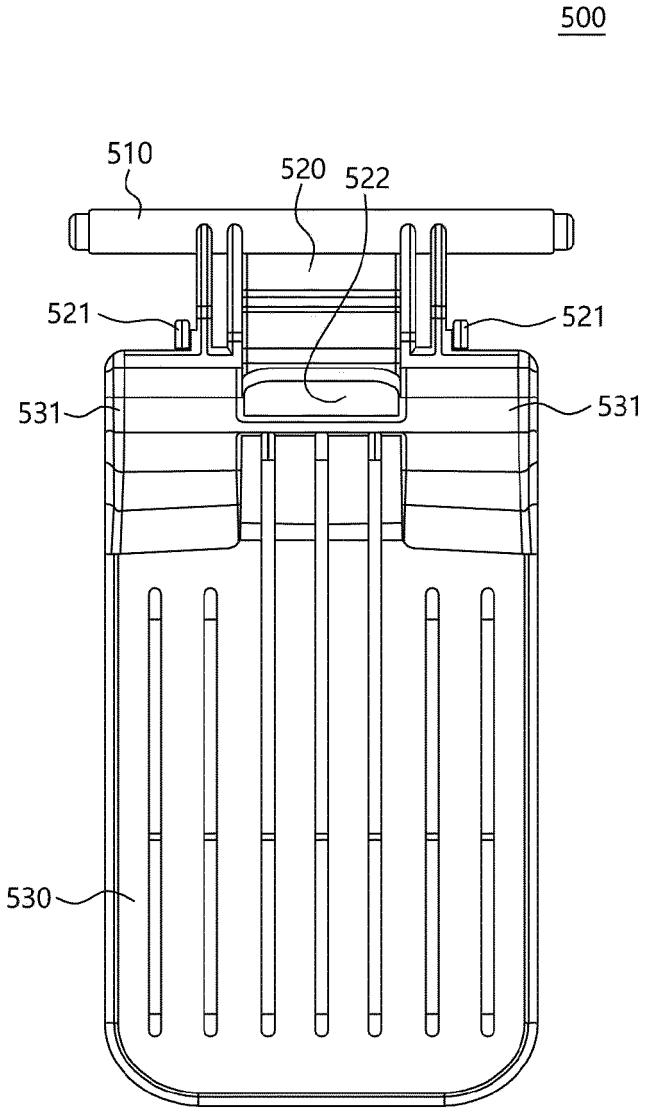
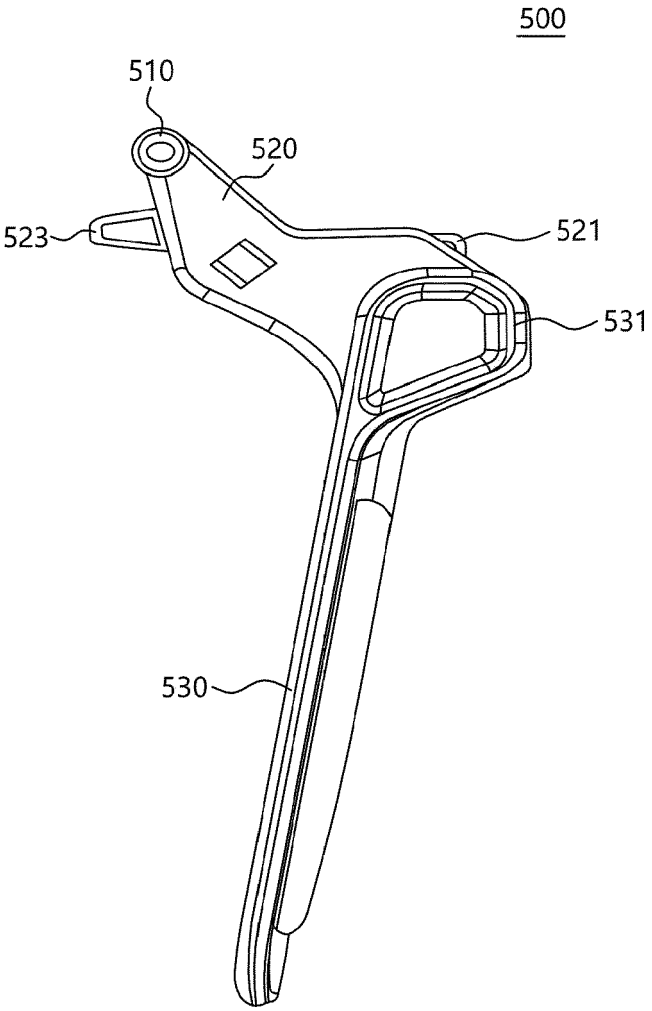


FIG. 24



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EUROPEAN SEARCH REPORT

Application Number
EP 21 18 6644

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,D Y	KR 2013 0045437 A (LG ELECTRONICS INC [KR]) 6 May 2013 (2013-05-06) * the whole document *	1-6,8,9, 11-14 10	INV. F25D23/02 F25D23/12
X	US 2010/293986 A1 (JUNG EUNKYUNG [KR]) 25 November 2010 (2010-11-25) * the whole document *	1,2,4-9, 12-15	
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F25D

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 January 2022	Kolev, Ivelin

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 18 6644

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04-01-2022

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REFERENCES CITED IN THE DESCRIPTION

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