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(54) **REFRIGERATOR**

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(56) References cited:

EP-A1- 3 450 893

EP-A2- 2 168 876

CN-A- 106 895 630

CN-A- 106 895 631

CN-A- 106 895 631

CN-A- 106 895 650

CN-U- 205 525 152

CN-U- 207 450 356

CN-U- 207 565 913

CN-U- 207 565 913

KR-A- 20070 121 252

US-A1- 2006 090 427

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of household appliances and in particular to a refrigerator.

BACKGROUND ART

[0002] In recent years, people have an increasing requirement for food material preservation along with increasing awareness of health. Refrigerator is the commonest household appliance for preservation of food materials. Therefore, the food material preservation storage becomes a technical need to be met in the field of refrigerators.

[0003] At present, various manufacturers launch different preservation technologies for food material preservation storage. For example, with vacuum preservation technology, the condition of food spoilage under vacuum takes change. Firstly, in a vacuum environment, it is difficult for microorganisms and various promoting enzymes to survive and the microorganisms will take a long time to grow. Secondly, under vacuum, oxygen in a container will decrease significantly, various chemical reactions cannot be completed, and foods will not be oxidized, so that the foods can be preserved for long.

[0004] Currently, in the vacuum preservation technology applied to refrigerators, a sealing drawer is provided inside the refrigerator. A miniature vacuum pump is disposed outside the drawer to perform vacuumization treatment for the drawer, so that the drawer maintains in a negative pressure state, thereby realizing preservation of food materials in the drawer. The preservation manner has the following limitations: 1. the vacuum pump will take up a partial storage space of a refrigerating compartment because the vacuumization treatment is to be performed by the vacuum pump; 2. the preservation manner requires sealing for the drawer, otherwise vacuum state cannot be formed inside the drawer, and thus higher requirements are proposed for the forming and assembly process of the drawer; 3. the preservation manner can only perform preservation for the food materials in the drawer and have no preservation effect on those food materials in other regions of the refrigerator.

[0005] For example, patent application No. CN106895631A discloses a vacuum sealing device and a refrigerator with the vacuum sealing device. The vacuum sealing device includes a storage bag supply device, wherein the storage bag supply device includes a box body, a reel mounting component, a first roller shaft and a second roller shaft; the front part of the box body is provided with a storage bag outlet which extends along the transverse direction; the reel mounting component is detachably mounted in the box body, and designed to mount the reel of a storage bag roll and allow the reel to rotate relative to the box body around the axis which extends along the transverse direction; the first roller

shaft can be rotationally mounted in front of the reel mounting component around the axis which extends along the transverse direction; the second roller shaft can also be rotationally mounted in front of the reel mounting component around the axis which extends along the transverse direction; and when the first roller shaft and the second roller shaft rotate simultaneously, storage bags of the storage bag roll can be driven to move out of the storage bag supply device through the storage bag outlet. By adoption of the vacuum sealing device and the refrigerator provided by the invention, the storage bag pick-and-place operation can be conveniently performed by a user, and the storage bags are convenient to pick.

[0006] Patent application No. EP3450893A1 discloses a vacuuming system developed including the vacuum pump; the carrier chassis; the stationary plate; the movable plate, being able to move to get close to and away from the stationary plate, having a closed state and an open state, and including a reservoir in which a vacuuming operation takes place when it assumes its closed state; the insulation element, which when placed in the vacuuming chamber, is provided so as to extend along the edge of the stationary plate and/or the movable plate that is remote to the opening; the heater, which when placed in the vacuuming chamber, is provided so as to extend along the edge of the stationary plate or the movable plate that is remote to the opening, and after a vacuuming operation is completed, applies heat to the part of a bag left in the heater so that the bag becomes sealed; the first resilient element provided on the movable plate or stationary plate against the heater; and the actuator mechanism effecting the movement of the movable plate.

[0007] Patent application KR20070121252A discloses a refrigerator to carry out vacuum-packing work conveniently by securing food to pack on a cover of a vacuum-packing unit. A refrigerator includes a vacuum-packing unit which has a vinyl pack supply part, a heating part for fusing an opening part of the vinyl pack by heat, a vacuum part, a closing part and a cover. The vacuum part has an air suction part for holding the vinyl pack and a vacuum pump for inhaling air from the inside of the vinyl pack, wherein the vacuum pump is connected to the air suction part with an air suction hose. The closing part has a sealing part, with which the air suction part holds the vinyl pack, and a heating contact part which contacts the heating part for the thermal fusion of the vinyl pack. The cover has a body part for opening or closing a mounting part for the vacuum-packing unit and a slide cover sliding with respect to the body part according to the size of food to be packed in the vinyl pack. A control part controls operation of the vacuum part and the heating part by the rotation of the cover.

[0008] Patent application EP2168876A2 discloses a cooling appliance with a structure including a packing device suitable for vacuum packing products contained in flexible bags. Said packing device includes packing means that includes a vacuum chamber in which is

disposed an open end of a flexible bag, suction means for extracting air from said vacuum chamber, and sealing means for closing said flexible bag along a line beyond the vacuum chamber. The packing device is housed inside the structure of the refrigerator when it is not being used, and is slidably extractable for its use.

[0009] Patent application CN207565913U discloses a utility model belonging to the technical field of the packing, refer in particular to a vacuum packaging machine's sealed air suction mechanism. The utility model provides a seal vacuum packaging machine's sealed air suction mechanism effectual, simple structure. The utility model discloses a realize like this: a vacuum packaging machine's sealed air suction mechanism, includes the host computerbody and hinges the last organism on the host computer body, and the up end of the host computer body is provided with sealed air suction mechanism, and sealed air suction mechanism includes an air cock and sealed elevating gear, and the air cock setting is at the up end of the host computer body and be used for bleeding, and the air cock below is provided with sealed elevating gear, and sealed elevating gear upper surface has set firmly a sealing layer, and the sealing layer supports when rising by the lower terminal surface at the air cock, upward organism lower extreme face is provided with a relative sealing washer no. 1 that sets up with the air cock, when acting as organism and host computer body closure, and the mutual butt of sealing layer on sealing washer no. 1 and the sealed elevating gear and the week side space of sealing gas mouth.

SUMMARY

[0010] The present invention defined by the features of claim 1 relates to a refrigerator including a storage compartment and a door opening or closing the storage compartment. The door is provided with a vacuum sealing device including an upper support and a lower support corresponding to each other in position and a vacuumization assembly. The lower support is detachably connected to the door; opening cavities are opened on mutually-facing surfaces of the upper support and /the lower support; the upper support may be moved close to or away from the lower support under the drive of a driving device; the upper support moves close to the lower support until the upper support is butt-joined with the lower support, and the opening cavities sealingly form a vacuumization region by sealing portions. The vacuumization assembly is in communication with the vacuumization region through a pipe so as to perform vacuumization or depressurization for the vacuumization region.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The preferred examples of the present disclosure will be described below with accompanying drawings to help understanding the object and advantages of

the present disclosure.

FIG. 1 is a structural schematic diagram of a refrigerator according to example 1 of the present disclosure.

FIG. 2 is a structural schematic diagram of a refrigerating door according to example 1 of the present disclosure.

FIG. 3 is an exploded diagram of a refrigerating door according to example 1 of the present disclosure.

FIG. 4 is a side sectional diagram of a vacuum sealing device according to the present disclosure.

FIG. 5 is a structural schematic diagram along a forward direction and reverse direction of an upper support of a vacuum sealing device according to the present disclosure.

FIG. 6 is a schematic diagram of assembly of an upper support, a driving device and a vacuumization assembly in a vacuum sealing device according to the present disclosure.

FIG. 7 is an exploded diagram of an upper support, a driving device and a vacuumization assembly in a vacuum sealing device according to the present disclosure.

FIG. 8 is a diagram of connection relationship of an upper support in a vacuum sealing device and a filtering container according to the present disclosure.

FIG. 9 is a diagram of connection relationship of an upper support in a vacuum sealing device and a filtering net according to the present disclosure.

FIG. 10 is an exploded diagram of an upper support, a heating device and a sealing ring according to the present disclosure.

FIG. 11 is a partial sectional view of connection of an upper support and a heating device according to the present disclosure.

FIG. 12 is a schematic diagram of connection relationship of an upper support in an initial position and a driving device according to the present disclosure.

FIG. 13 is a schematic diagram of connection relationship of an upper support in a descending position and a driving device according to the present disclosure.

FIG. 14A is a structural schematic diagram of a lower support, an insulation door and a door in a locked state according to example 1 of the present disclosure.

FIG. 14B is a structural schematic diagram of a lower support, an insulation door and a door in an unlocked state according to example 1 of the present disclosure.

FIG. 14C is a structural schematic diagram of dismounting a lower support and an insulation door from a door according to example 1 of the present disclosure.

FIG. 15 is a structural schematic diagram along a forward direction and a reverse direction of an in-

sulation door and a lower support in an assembled state according to example 1 of the present disclosure.

FIG. 16 is an exploded view of an insulation door, a lower support and a locking hook assembly according to example 1 of the present disclosure.

FIG. 17 is a structural schematic diagram of mounting a locking hook assembly onto the insulation door according to example 1 of the present disclosure.

FIG. 18 is a partial sectional view of mounting a locking hook assembly onto the insulation door according to example 1 of the present disclosure.

FIG. 19 is a perspective diagram of a lower hook according to example 1 of the present disclosure.

FIG. 20 is a structural schematic diagram of forward and reverse structures of an upper hook according to example 1 of the present disclosure.

FIG. 21A is a structural schematic diagram of a lower support, an insulation door and a door in a locked state according to example 2 of the present disclosure.

FIG. 21B is a structural schematic diagram of dismounting a lower support and an insulation door from a door according to example 2 of the present disclosure.

FIG. 22 is an exploded view of an insulation door, a lower support and a locking hook assembly according to example 2 of the present disclosure.

FIG. 23A is a structural schematic diagram of a lower support, an insulation door and a door in a locked state according to example 3 of the present disclosure.

FIG. 23B is a structural schematic diagram of an insulation door and a door in an unlocked state according to example 3 of the present disclosure.

FIG. 23C is a structural schematic diagram of dismounting a lower support and an insulation door from a door according to example 3 of the present disclosure.

FIG. 24 is a structural schematic diagram of a refrigerator according to example 4 of the present disclosure.

FIG. 25 is an exploded view of a refrigerating door according to example 4 of the present disclosure.

FIG. 26 is a structural schematic diagram of a refrigerator according to example 5 of the present disclosure.

FIG. 27 is an exploded view of a refrigerating door according to example 5 of the present disclosure.

FIG. 28 is an exploded view of a lower support according to example 5 of the present disclosure.

FIG. 29A is a structural schematic diagram of a lower support and a door in a locked state according to example 5 of the present disclosure.

FIG. 29B is a structural schematic diagram of a lower support dismounted from a door according to example 5 of the present disclosure.

FIG. 30A is a structural schematic diagram of a lower

support and a door in a locked state according to example 6 of the present disclosure.

FIG. 30B is a structural schematic diagram of a lower support dismounted from a door according to example 6 of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0012] The technical solution of the present disclosure will be clearly and fully described below in combination with accompanying drawings. In the description of the present disclosure, it is to be understood that orientations or positional relationships indicated by terms such as "center", "upper", "lower", "left", "right", "vertical", "horizontal", "inside", "outside", are based on orientations or positional relationships shown in the drawings and are used only for convenience and simplification of descriptions of the present disclosure, rather than indicate or imply that the indicated apparatus or element shall have a specific orientation and be configured or operated in a specific orientation. Thus, the terms shall not be understood as limiting of the present disclosure. In addition, the terms "first", "second" and "third" are used only for descriptions and shall not be understood as indicating or implying relative importance.

[0013] In the descriptions of the present disclosure, it is noted that the terms "mounting", "connection" and "coupling" shall be understood in a broad sense, for example, it may be a fixed connection, or a detachable connection, or integrated connection; or direct connection or an indirect connection through an intermediate medium, or may be internal communication between two elements. Those skilled in the art may understand the specific meanings of the above terms in the present disclosure according to the specific situations.

[0014] Furthermore, the below-described technical features involved in different examples of the present disclosure may be combined with each other as long as they do not constitute conflict.

Example 1

[0015] FIG. 1 is a perspective diagram of a specific example of a refrigerator according to the present disclosure. With reference to FIG. 1, the refrigerator 1 of the example has an approximate cuboid shape. The external appearance of the refrigerator 1 is defined by a storage compartment 100 defining a storage space and a plurality of doors 200 disposed in the storage compartment 100. By referring to FIG. 2, the door 200 includes a door housing 210 located at an outer side of the storage compartment 100, a door inner liner 220 at an inner side of the storage compartment 100, an upper end cover 230, a lower end cover 240, and an insulation layer located among the door housing 210, the door inner liner 220, the upper end cover 230, and the lower end cover 240. Generally, the insulation layer is formed by filling with foaming materials.

[0016] The storage compartment 100 has an open box body. The storage compartment 100 is vertically divided into a lower freezing compartment 100A and an upper refrigerating compartment 100B. Each of the partitioned spaces may have an independent storage space. Specifically, the freezing compartment 100A is at the lower part of the storage compartment 100 and may be selectively covered by a drawer-type freezing compartment door A. The space above the freezing compartment 100A is divided into a left side and a right side to form the refrigerating compartment 100B respectively. The refrigerating compartment 100B may be selectively closed or opened by a refrigerating door 200B pivotably mounted on the refrigerating compartment 100B.

[0017] As shown in FIGS. 3 and 4, a vacuum sealing device 300 is provided on the door 200 of the refrigerator to perform vacuumization and plastic sealing for storage bags. The vacuum sealing device 300 may be disposed on a freezing door 200A or may be disposed on a refrigerating door 200B. Because the refrigerating door 200B is located above, the vacuum sealing device 300 is generally preferably disposed on the refrigerating door 200B so as to meet the use habit of users.

[0018] FIGS. 4-17 are an example of the vacuum sealing device 300. In this example, as shown in FIG. 4, the vacuum sealing device 300 includes a lower support 310, provided with a first opening cavity 311; and an upper support 320 provided with a second opening cavity 321. The upper support 320 may be moved close to or away from the lower support 310 under the drive of a driving device 340. After the upper support 320 moves close to the lower support 310 to be in place, the first opening cavity 311 and the second opening cavity 321 are butt-joined and sealed up to form a vacuumization region 301. The above vacuum sealing device 300 locks and unlocks the lower support 310 and the upper support 320 by controlling automatic ascent and descent of the driving device 340, thereby realizing automatic vacuum sealing and improving the degree of intelligence of the refrigerator.

[0019] Specifically, as shown in FIG. 4, in order to improve the sealing of the vacuumization region 301, sealing portions for sealing the vacuumization region 301 are disposed on the opposing surfaces of the lower support 310 and the upper support 320. Specifically, a first sealing groove 313 is disposed on the periphery of the first opening cavity 311 of the lower support 310 and a second sealing groove 323 is disposed on the periphery of the second opening cavity 321 of the upper support 320. The first sealing groove 313 and the second sealing groove 323 are opposed in position and internally provided with a sealing ring 350 respectively. The two sealing rings 350 of the first sealing groove 313 and the second sealing groove 323 seal the vacuumization region 301 inside, realizing reliable sealing of the vacuumization region 301.

[0020] Specifically, as shown in FIG. 5, the first opening cavity 311 or the second opening cavity 321 is internally

provided with a limiting portion to limit an inserting position of a storage bag inserted into the vacuumization region 301, thereby preventing an opening position of the storage bag protruding out of the vacuumization region 301. Specifically, the limiting portion is a limiting rib 322 disposed in the first opening cavity 311 or the second opening cavity 321, a height of the limiting rib 322 is greater than a depth of the first opening cavity 311 or the second opening cavity 321, and a length of the limiting rib 322 is slightly lower than that of the first opening cavity 311 or the second opening cavity 321. When the user inserts the storage bag into the vacuumization region 301, the limiting rib 322 may block the storage bag from being further inserted inwardly. In other examples, an in-place detection device may also be disposed on the vacuumization region 301. Specifically, a microwave sensor or an infrared sensor may be adopted to detect the presence and absence of the storage bag inserted into the vacuumization region 301, further send a signal indicating whether the storage bag is in place to a controller. The controller may control the vacuum pump to start according to the in-place signal. By disposing the in-place detection device, whether the storage bag is in place is detected automatically and the controller further automatically controls the vacuum pump to be switched on and off.

[0021] The vacuum sealing device 300 further includes a vacuumization assembly 330. As shown in FIGS. 6 and 7, the vacuumization assembly 330 includes a vacuum pump 331 communicating with the vacuumization region 301 through a pipe 335. Further, a pressure detection device 332 and a pressure relief device 333 are disposed on the pipe 335. The pressure detection device 332 is specifically a pressure sensor for detecting a pressure of the vacuumization region 301, and the pressure relief device 333 is specifically an electric pressure relief valve for releasing the pressure of the vacuumization region 301 when the valve is opened. When a user performs vacuumization sealing, the vacuum pump 331 is started to perform vacuumization treatment for the vacuumization region 301. When the pressure detection device 332 detects that the pressure of the vacuumization region 301 reaches a set negative pressure value, the controller controls the vacuum pump 331 to stop. The vacuum degree of the vacuumization region 301 can be controlled by disposing the pressure sensor, and the vacuum pump 331 can be switched on and off based on the detection value of the pressure sensor, thereby guaranteeing the vacuumization effect. After the vacuumization and sealing operations are completed, the above electric pressure relief valve may be started to automatically control the pressure relief of the vacuumization region 301, thereby facilitating taking out the storage bag by users. In order to prevent foreign matters in the vacuumization region 301 entering the vacuum pump 331 through the pipe 335, a filtering protection device is also disposed on the pipe 335. In an example, as shown in FIG. 8, the filtering protection device is specifically a filtering contain-

er 334 series-connected with the pipe 335. An inlet and an outlet are disposed on an upper end of the filtering container 334, the inlet is in communication with the vacuumization region 301 through the pipe and the outlet is in communication with the vacuum pump 331 through the pipe. The foreign matters in the vacuumization region 301 enter the filtering container 334 through the pipe 335 and are trapped at the bottom of the filtering container 334, avoiding entry of the foreign matters into the vacuum pump 331. In order to clean the filtering container 334 easily, the filtering container 334 specifically includes a tank body with an opening and an upper cover detachably connected to the tank body. The inlet and the outlet are disposed on the upper cover. During cleaning, the tank body may be dismantled, thereby avoiding the problem of poor sealing of the pipe 335 caused by frequent mounting and dismantling of the pipe 335.

[0022] In another example, as shown in FIG. 9, the filtering protection device is a filtering net 336 disposed on the pipe 335. Specifically, for ease of mounting and dismantling, the filtering net 336 is disposed at a vent 324 at the connection position of the upper support 320 and the pipe 335. The user may perform mounting/dismounting or cleaning for the filtering net 336 from the lower side by moving the upper support 320 to a highest position.

[0023] One connection hole of the vacuumization region 301 connecting with the pipe 335 may be disposed. Of course, in order to prevent vacuumization failure caused by plugging of the connection hole by the foreign matters in the vacuumization region 301 in a case of single connection hole, two or more connection holes may be disposed to connect with the pipe 335 respectively. The pipes 335 are parallel-disposed to connect with a main pipe through a three-way or multi-way connector. The pressure sensor and the electronic pressure relief valve are disposed on the main pipe.

[0024] As shown in FIG. 4, the vacuum sealing device 300 further includes an insulation cushion 360 and a heating device 370 mutually opposed for performing plastic sealing treatment for the storage bag after vacuumization. The insulation cushion 360 and the heating device 370 are located in a sealing zone 302 at an outer side of the vacuumization region 301. Specifically, the heating device 370 is mounted in a groove of a lower surface of the upper support 320. The insulation cushions 360 are mounted in grooves of upper surfaces of the upper support 320 and the lower support 310. When the upper support 320 moves to form the sealed vacuumization region 301 with the lower support 310, the insulation cushion 360 in the sealing zone 302 abuts against the heating device 370. After vacuumization is completed, the storage bag may be quickly sealed by the heating device 370 in the sealing zone 302. After the heating device 370 works for a set time length, the driving device 340 is controlled to drive the upper support 320 to move upward so that the user may pull out the storage bag to complete the plastic sealing.

[0025] More specifically, as shown in FIGS. 10 and 11, the heating device 370 includes a heating wire 371. A heat conducting plate 373 is disposed at a lower side of the heating wire 371 to expand the heating area of the heating wire 371 so that the plastic sealing area of the storage bag is expanded to realize tight sealing. The heating wire 371 extends along a length direction of the upper support 320 and bends upward at both sides of the upper support 320. The free end of the heating wire 371 extending to an upper side of the upper support 320 is fixed at the upper support 320 through an insulation plate 372. Specifically, the insulation plate 372 is made of insulation material and shaped into a bending plate wrapped around the heating wire 371, thereby avoiding external exposure of the heating wire 371. Further, the two free ends of the heating wire 371 are connected, through a spring 375, to two conducting wires leading from a connection terminal 374. With the spring 375, the heating wire 371 can be always maintained in tensioned state so that the heating wire 371 has a higher flatness. The heat conducting plate 373 at the lower side of the heating wire 371 is in close contact with the storage bag. Thus, the problem of loose contact and incomplete sealing at a particular position due to non-flatness of the heating wire 371 is avoided.

[0026] In the above vacuum sealing device, the driving device 340 may be an electric driving device or an air pressure driving device. Because of large occupation space of the air pressure driving device, the electric driving device is adopted as the driving device 340 in this example. Specifically, as shown in FIGS. 7, 12 and 13, the driving device 340 includes a motor 341 and a transmission mechanism. The transmission mechanism is used to convert a rotational movement of the motor into a rectilinear movement, and an output end of the transmission mechanism is connected with the upper support. The transmission mechanism includes a first gear 342 fixedly connected to an output shaft of the motor and a second gear 343 meshed with the first gear 342, a third gear 344 fixedly connected with the second gear 343 and an output rack 345 meshed with the third gear 344. A pin hole is disposed at a lower side of the output rack 345, and the upper support 320 and the output rack 345 are connected through a pin shaft 346 inserted into the pin hole. Through the transmission mechanism, the rotation of the motor 341 is converted into up and down movement of the upper support 320.

[0027] Specifically, as shown in FIG. 7, a connection plate 347 is disposed between the upper support 320 and the driving device 340. The connection plate 347 is thread-connected with the upper support 320, and a guide groove 3471 is formed on the connection plate 347. A lower end of the output rack is plugged into the guide groove 3471, and an elongated pin hole is disposed at the guide groove 3471 and the lower end of the output rack 345 respectively. The pin shaft 346 is inserted through the pin holes of the guide groove 3471 and the output rack 345. There is a clearance between a lower

end surface of the output rack 345 and a groove bottom of the guide groove 3471 and an elastomer 348 is disposed in the clearance.

[0028] As shown in FIG. 12, at an initial position, the upper support 320 is at the highest position. During a pressing stage, as shown in FIG. 13, the driving device 340 brings the upper support 320 to move down. In order to ensure tight mating of the lower support 310 and the upper support 320, a set rotation stroke of the motor is generally taken as an in-place determination signal. Thus, by disposing the elastomer 348 between the output rack 345 and the guide groove 3471, the upper support 320 is enabled to move downward to be in contact with the lower support 310 and then the output rack 345 can continue moving a distance downwardly. Thus, the elastomer 348 is compressed to prevent stalling of the motor, thereby providing protection for the motor 341 and maintaining the pressing force stable.

[0029] During a vacuumization stage, a sealed vacuumization region 301 is formed between the lower support 310 and the upper support 320, and the upper support 320 moves downward under the action of atmospheric pressure due to decrease of air pressure. At this time, due to existence of the elongated pin hole, the output rack 345 keeps stationary when the upper support 320 moves downward, thereby providing protection for the entire driving device 340.

[0030] In order to accurately control the movement of the upper support 320 and further determine whether the upper support 320 moves to be in place, the vacuumization region 301 is enabled to form a sealed space. In an example, the motor 341 is a stepping motor 341 and whether the upper support 320 moves to be in place can be determined by detecting the rotational stroke of the stepping motor 341. In another example, a microswitch is disposed at the lower support 310 or the upper support 320. After the upper support 320 moves to be in place and then triggers the microswitch, the controller controls the driving device 340 to be stopped and locked at a current position according to a feedback signal of the microswitch.

[0031] One driving device 340 may be disposed. The output gear is located in a middle region of the upper support 320. In this case, it causes an edge area of the upper support 320 and the lower support 310 to be loosely attached, resulting in air leakage of the vacuumization region 301. Thus, in order to provide sealing of the vacuumization region 301, the driving devices 340 are disposed at both sides of the upper support 320 respectively. Correspondingly, one connection plate 347 is disposed, two guide grooves 3471 are disposed on the connection plate 347, and two output racks 345 protrude into the guide grooves 3471 respectively.

[0032] Specifically, as shown in FIGS. 6 and 7, the driving device 340 and the vacuumization assembly 330 are both mounted on a mounting base 305 at the upper side of the upper support 320. A vent 324 is opened at the upper support 320 to communicate with the va-

cuumization assembly 330. Three cavities are disposed at a side of the mounting base 305, and the cavities include a vacuum pump mounting cavity 3051 at the middle position, and driving device mounting cavities 3052 at right and left sides. In order to guarantee entire aesthetics of external surface of the door 200 of the refrigerator and ease of application of the vacuum sealing device 300, as shown in FIG. 3, a mounting cavity 211 recessed inwardly is disposed on the door housing 210. The driving device 340 is connected with the upper support 320 and then connected to the mounting base 305 through a screw. The vacuumization assembly 330 is connected with the vent 324 on the upper support 320 and then mounted to the mounting base 305. In this way, one assembly is formed and then entirely mounted into the mounting cavity 211 by inserting a screw through two support lugs at both sides of the mounting base 305. Thus, modularized assembly is realized for various parts with no part exposed out of the external surface, realizing good entirety of the device.

[0033] When the user performs plastic sealing for a storage bag, especially powder-like foods such as flour or liquid or the like by use of the vacuum sealing device 300, the powder or liquid may enter the vacuumization region 301 during vacuumization and finally accumulate in the first opening cavity 311 of the lower support 310. Therefore, in order to help the user to clean the food residues in the lower support 310, the lower support 310 is detachably mounted relative to the door 200.

[0034] The lower support 310 may be mounted on the door 200 in several manners. In this example, as shown in FIGS. 14A-14C, the lower support 310 may be detachably mounted on the door 200 from an inner side of the door 200 (i. e. a side with an inner liner). Because the heat insulation of the door 200 of the refrigerator must be ensured, an insulation door 250 is disposed at an inner side portion of the lower support 310 facing the storage compartment 100. As shown in FIG. 14C, a mounting hole 201 communicating inside with outside is disposed on the door 200, and the lower support 310 and the insulation door 250 are inserted into the mounting hole 201 from the inner side of the door 200, thereby realizing dismounting cleaning of the lower support 310 and insulation performance of the door 200 at the same time.

[0035] According to the invention, as shown in FIG. 15, the lower support 310 and the insulation door are integrally formed. As shown in FIGS. 15 and 16, the lower support 310 and the insulation door 250 are formed by a first housing 251 and a second housing 252 with opening cavity structures and an insulation piece disposed between the first housing 251 and the second housing 252. The first housing 251 and the second housing 252 are snap-fitted. The first housing 251 is provided with an extension arm 2511 along a direction away from the second housing 252, and the lower support 310 is formed on the extension arm 2511. The first opening cavity 311 is an open groove formed on an upper side of the extension arm 2511, and a first sealing groove 313 is formed on the

periphery of the open groove.

[0036] In order to further ensure the insulation performance of the door 200 and avoid cold leakage occurring from a clearance between the mounting hole 201 and the insulation door 250, as shown in FIGS. 15 and 16, a door gasket 253 is disposed between the insulation door 250 and the door inner liner 220. Specifically, a support arm 2512 is disposed at the position of the first housing 251 mated with the door inner liner 220 where the size of the support arm 2512 is greater than that of the mounting hole 201. A mounting groove surrounding the mounting hole 201 is disposed on the support arm 2512, and the door gasket 253 is mounted in the mounting groove.

[0037] Specifically, in order to guarantee the insulation door 250 is reliably fixed on the door 200, a locking device 400 is disposed between the insulation door 250 and the door inner liner 220. The locking device 400 is used to lock or unlock the insulation door 250 on or from the door 200.

[0038] As shown in FIGS. 14A-14C, 16 and 17, the locking device 400 includes a locking hook assembly disposed on the insulation door 250 and a locking groove 221 disposed on the door inner liner 220. The locking hook assembly includes a locking hook inserted through the insulation door 250. The locking hook may switch between a first position and a second position. When switching to the first position, the locking hook may be mated with the locking groove 221 to realize the locking of the insulation door 250 and when switching to the second position, may be separated from the locking groove 221 to realize unlocking of the insulation door 250.

[0039] Specifically, in order to improve the reliability of the locking device 400, two locking grooves 221 and two locking hooks are disposed respectively. The locking grooves 221 are located at upper and lower sides of the mounting hole 201. As shown in FIGS. 17-20, the locking hook assembly includes an upper locking hook 420 and a lower locking hook 410 and a reset spring 430. As shown in FIG. 19, the lower locking hook 410 includes a hooking portion 414 mated with the locking groove 221 at the lower side, a hinging portion 412 rotatably connected with the insulation door 250 and a handle portion 411 at the lower side of the insulation door 250. The handle portion 411 and the hooking portion 414 are located at both sides of the hinging portion 412 respectively. The lower locking hook 410 further includes a lower connection portion 413 connecting with the upper locking hook 420, where the lower connection portion 413 extends above the handle portion 411. Specifically, an end of the lower connection portion 413 is formed into a T-shaped protrusion 4131. As shown in FIG. 20, the upper locking hook 420 includes a hooking portion 421 mated with the locking groove 221 at the upper side and an upper connection portion 423 connecting with the lower locking hook 410. Specifically, a lower end of the upper connection portion 423 is formed into an open groove structure 4231. The T-shaped protrusion 4131 is inserted into the open groove 4231 to realize connection of the

upper locking hook 420 and the lower locking hook 410. The reset spring 430 is disposed between the upper locking hook 420 and an upper end surface of the insulation door 250. More specifically, a connection shaft 422 is formed on the upper locking hook 420 and the reset spring 430 is sleeved on the connection shaft 422.

[0040] As shown in FIG. 17, a guide positioning portion is formed on an inner surface of the second housing 252, and the upper connection portion 423 is fitted on the guide positioning portion. The upper locking hook 420 may slide along the guide positioning portion. Specifically, the guide positioning portion is a snapping hook 2521 formed on the inner surface of the second housing 252. The snapping hooks 2521 are located at left and right sides of the upper connection portion 423 and extend a distance up and down, and the upper connection portion 423 is fitted between the two snapping hooks 2521.

[0041] In an initial state, the upper locking hook 420 and the lower locking hook 410 are in the first position under the elastic force of the reset spring 430 to realize the locking of the insulation door 250 and the door inner liner 220. When the user moves the lower locking hook 410 by hand, the lower locking hook 410 rotates around the hinging portion 412, the hooking portion 414 moves downward to separate from the locking groove 221 at the lower side, and at the same time, the connection portion push up the upper locking hook 420 to move upward so that the upper locking hook 420 separates from the locking groove 221 at the upper side. In this way, the upper locking hook 420 and the lower locking hook 410 are in the second position to realize the unlocking of the insulation door 250 and the door inner liner 220.

[0042] In order to ensure the external aesthetics of the door 200 of refrigerator, as shown in FIGS. 1 and 2, a bar table door 260 is disposed in the region of the refrigerator door 200 where the vacuum sealing device 300 is located. A lower end of the bar table door 260 is hinged with the door 200 and the bar table door 260 can be flipped to the position where it is perpendicular to the surface of the door housing 210. An upper end of the bar table door 260 is connected with the door housing 210 through a first push ejection switch 212. With the disposal of the bar table door 260 structure, in the state of the bar table door 260 being opened, the storage bag holding foods can be put on the bar table door 260 and then is subjected to vacuum sealing treatment, thereby facilitation operation of users. When the bar table door 260 is closed, the external aesthetics of door 200 can be ensured.

[0043] The inner side of the bar table door 260 further includes an operation panel 270 covered on the outer side of the mounting cavity. An inserting hole 271 is formed on the operation panel 270, and a lower surface of the inserting hole 271 is flushed with an upper surface of the first opening cavity 311. In this case, the vacuum sealing device 300 can be entirely hidden at the rear side of the operation panel 270. When performing vacuum plastic sealing, the user may directly insert the opening of

the storage bag from the inserting hole 271 of the operation panel 270, and directly extend it to the upper surface of the first opening cavity 311. When the upper support 320 moves downward, the opening of the storage bag can be placed in the vacuumization region 301. Specifically, the operation panel 270 is detachably connected to the door housing 210. A display control device 272 is further disposed on the operation panel 270. The display control device 272 includes an indicating device for displaying a working state of the vacuum sealing device 300 and a control button for controlling the vacuum sealing device 300 to stop or start. The user may determine whether to pull out the storage bag according to the working state of the vacuum sealing device 300 indicated by the display control device 272.

[0044] When applying the vacuum sealing device 300, the user may insert the storage bag to be sealed through the inserting hole 271 on the operation panel 270. After the storage bag is inserted to be in place (the storage bag abuts against the limiting rib 322), the user may trigger a start button on the operation panel 270 to start the motor 341 so as to control the upper support 320 to descend until the upper support 320 moves to be in place (sealing the vacuumization region 301) and then control the vacuum pump 331 to start so as to perform vacuumization treatment for the vacuumization region 301. The storage bag is vacuumized through the opening of the storage bag in the vacuumization region 301. When the pressure sensor detects a pressure value reaches the set negative pressure value, the vacuum pump 331 is controlled to stop and the heating device 370 is started to work at the same time. After the heating device 370 works for a set time, the electric pressure relief valve is controlled to start, and then the linear motor 341 is controlled to start to control the upper support 320 to ascend until the first opening cavity 311 separates from the second opening cavity 321. The display control device 272 on the operation panel 270 indicates the user can pull out the storage bag. In this way, the vacuum sealing of the storage bag is completed.

Example 2

[0045] The structure of example 2 is basically same as that of the example 1 except the connection manner of the lower support 310 and the insulation door 250. Specifically, in this example, as shown in FIGS. 21A and 21B, the lower support 310 is detachably connected to the insulation door 250. As shown in FIG. 22, the insulation door 250 is formed of the first housing 251 and the second housing 252 with opening cavity structures and the insulation piece disposed between the first housing 251 and the second housing 252. The first housing 251 is snap-fitted with the second housing 252, the extension arm 2511 is disposed on the first housing 251 along a direction away from the second housing 252, and the lower support 310 is detachably connected to the extension arm 2511.

[0046] Specifically, a first limiting portion extending upward is formed on an end of the extension arm 2511, a second limiting portion mated with the first limiting portion is formed on a lower side of the lower support 310, and the first limiting portion and the second limiting portion are mated to position the lower support 310 on the extension arm 2511. More specifically, the first limiting portion is a limiting plate and the limiting portion is a baffle plate formed on the bottom of the lower support 310 and extending downwardly. The baffle plate is inserted into the inner side of the limiting plate to mount the lower support 310 to the extension arm 2511, thus avoiding the problem of poor sealing of the vacuumization region caused by horizontal movement of the lower support 310.

[0047] In order to further guarantee the heat insulation of the door 200 and avoid cold leakage occurring from the clearance between the mounting hole 201 and the insulation door 250, the door gasket 253 is disposed between the insulation door 250 and the door inner liner 220. Specifically, the support arm 2512 is disposed at the position of the first housing 251 mated with the door inner liner 220, and the size of the support arm 2512 is greater than that of the mounting hole 201. A mounting groove surrounding the mounting hole 201 is disposed on the support arm 2512 and the door gasket 253 is mounted in the mounting groove.

[0048] Specifically, in order to guarantee the insulation door 250 can be reliably fixed on the door 200, the locking device 400 is disposed between the insulation door 250 and the door inner liner 220.

[0049] As shown in FIG. 22, the locking device 400 includes a locking hook 440 hinged at the bottom of the insulation door 250. The middle of the locking hook 440 is provided with a hinging shaft for connecting with the insulation door 250 to connect with the insulation door 250. The locking device further includes a locking groove formed on the door inner liner 220 to mate with the locking hook and a reset torsion spring 450 sleeved on the hinging shaft. One support leg of the reset torsion spring is abutted against the insulation door 250 and the other support leg is abutted against the locking hook 440. In an initial state, the torsional force of the reset torsion spring 450 enables the locking hook 450 to be in the first position so that the insulation door 250 can be mounted on the door.

[0050] Specifically, in order to improve the aesthetics of the door, a mounting recess is formed on the bottom of the door and the locking hook is mounted into the mounting recess. FIGS. 21A and 21B show a process of dismounting the insulation door 250 and the lower support 310. When the insulation door 250 and the lower support 310 are mounted on the door 200, the locking hook is mated with the locking groove to realize the locked state of the insulation door 250. When the insulation door 250 and the lower support 310 are to be dismantled, the locking hook is moved away from the locking groove, the locking device 400 is in an unlocked state, and the insulation door 250 and the lower support 310 can be

pulled out. After the lower support 310 is removed from the insulation door 250, cleaning can be performed for the lower support 310. In this example, the lower support 310 is detachably connected to the insulation door 250, facilitating cleaning the lower support 310.

Example 3

[0051] The structure of the example 3 is basically same as that of the example 1 except the connection manner of the lower support 310, the insulation door 250 and the door 200.

[0052] As shown in FIGS. 23A-23C, the lower support 310 and the insulation door 250 are disposed independent from each other. The lower side of the mounting hole 201 is provided with a limiting portion limiting the lower support 310 to be in place, one end of the lower support 310 is abutted against the limiting portion and the other end is abutted against the insulation door 250. In this case, the insulation door 250 can be mounted to the door 200 by use of the locking device 400 of example 1 or 2.

Example 4

[0053] The structure of the example 4 is basically same as that of the example 1 except the structure of the area of the door 200 where the vacuum sealing device 300 is located.

[0054] Specifically, in this example, as shown in FIGS. 24 and 25, in order to ensure the external aesthetics of the door 200 of the refrigerator and avoid exposure of the vacuum sealing device 300 at the outer side of the door 200, an auxiliary door plate 280 is disposed at the area of the door 200 where the vacuum sealing device 300 is located. The auxiliary door plate 280 has a width identical with that of other area of the door 200. The auxiliary door plate 280 is connected to the area by snap fitting or bonding. A surface of the auxiliary door plate 280 is flushed with the surface of other area of the door 200. An inserting hole 281 is formed on the auxiliary door plate 280 and a lower surface of the inserting hole is flushed with the upper surface of the first opening cavity 311. When performing vacuum plastic sealing, the user may directly insert the opening of the storage bag from the inserting hole 281 of the auxiliary door plate 280 and directly extend it to the upper surface of the first opening cavity 311. When the upper support 320 moves downward, the opening of the storage bag can be placed in the vacuumization region 301. A display control device 282 is further disposed on the auxiliary door plate 280. The display control device 282 includes an indicating device for displaying a working state of the vacuum sealing device 300 and a control button for controlling the vacuum sealing device 300 to stop or start. The user may determine whether to pull out the storage bag according to the working state of the vacuum sealing device 300 indicated by the indicating device.

Example 5

[0055] The structure of the example 5 is basically same as that of the example 1 except the manner of mounting the lower support 310 to the door 200.

[0056] Specifically, as shown in FIGS. 26-29, in this example, the lower support 310 is detachably mounted to the door 200 from the outer side of the door 200.

[0057] More specifically, the lower support 310 is detachably connected to the door 200 by push ejection. As shown in FIGS. 27 and 28, a connection surface of the lower support 310 connecting with the door 200 is provided with a second push ejection switch 380. The second push ejection switch 380 includes a push ejection lock 381, and a lock catch 382. A groove for receiving the lock catch 382 is disposed on an inner side surface of the lower support 310 and the push ejection lock 381 is fixed on the outer side surface of the door 200.

[0058] As shown in FIG. 29A, when the lower support 310 is pressed along a direction perpendicular to the door 200, the push ejection lock 381 is fitted with the lock catch 382, and the lower support 310 is mounted on the door 200. As shown in FIG. 29B, when the lower support 310 is pressed again, the push ejection lock 381 releases the lock catch 382 so that the lower support 310 is dismounted from the door 200. In this way, the user may perform cleaning for the lower support 310 separately, facilitating user operation.

Example 6

[0059] The structure of the example 6 is basically same as that of the example 5 except the manner of mounting the lower support 310 on the door 200.

[0060] Specifically, in this example, as shown in FIGS. 30A and 30B, the lower support 310 is detachably mounted to the door 200 from the outer side of the door 200.

[0061] More specifically, the lower support 310 is detachably connected to the door 200 by snap fitting. A first fitting portion 391 and a second fitting portion 392 mutually mated are formed respectively on the lower support 310 and the door 200. The first fitting portion 391 is formed on the lower surface of the lower support 310 and specifically is a bending hook. The second fitting portion 392 is fixedly connected to a front side surface of the door 200. The lower support 310 moves close to the door 200 until the first fitting portion 391 and the second fitting portion 392 are mated, realizing the mounting of the lower support 310. During dismounting, the lower support 310 is pulled outwardly, and the first fitting portion 391 and the second fitting portion 392 are separated due to elastic deformation. Thus, the user can perform separate cleaning for the lower support 310, facilitating user operation.

[0062] Obviously, the above examples are only used to clearly describe the present disclosure rather than limit the present disclosure. Those skilled in the prior art may make different types of other changes or modifications

based on the above descriptions. All examples are not necessarily or cannot be exhausted herein. All apparent changes or modifications derived herein still fall within the scope of protection of the present disclosure.

Claims

1. A refrigerator (1), comprising:

a storage compartment (100);
a door (200) opening or closing the storage compartment (100), a vacuum sealing device (300) is disposed on the door (200), and the vacuum sealing device (300) comprises:

an upper support (320) and a lower support (310) opposite to each other, opening cavities are formed on mutually-opposed surfaces of the upper support (320) and/or the lower support (310); when the upper support (320) and the lower support (310) are butt-joined, the opening cavities sealingly form a vacuumization region (301) by sealing portions; the lower support (310) is detachably mounted to the door (200);

a driving device (340) configured to drive the upper support (320) close to or away from the lower support (310);

a vacuumization assembly (330) in communication with the vacuumization region (301) through a pipe (335) to perform vacuumization or depressurization for the vacuumization region (301);

characterized in that a mounting hole (201) communicating inside with outside is formed on the door (200), the lower support (310) and an insulation door (250) are disposed in the mounting hole (201), and the insulation door (250) is at an inner side of the door (200);

the lower support (310) and the insulation door (250) are formed of a first housing (251) and a second housing (252) with opening cavities and an insulation piece disposed between the first housing (251) and the second housing (252); the first housing (251) is snap-fitted with the second housing (252), the first housing (251) is provided with an extension arm (2511) along a direction away from the second housing (252), and the lower support (310) is formed on the extension arm (2511).

2. The refrigerator (1) according to claim 1, wherein the insulation door (250) and the lower support (310) are integrally formed, or, the lower support (310) is de-

tachably connected to the insulation door (250).

3. The refrigerator (1) according to claim 1, wherein a door gasket (253) is disposed between the insulation door (250) and a door inner liner (220), and/or, the locking device (400) is used to lock the insulation door (250) to the door (200).

4. The refrigerator (1) according to claim 3, wherein the locking device (400) comprises:

a locking hook assembly disposed on the insulation door (250) and a locking groove (221) disposed on the door inner liner (220); wherein the locking hook assembly comprises a locking hook (440) inserted through the insulation door (250), the locking hook (440) switches between a first position and a second position, and the locking hook (440), when in the first position, is mated with the locking groove (221) to lock the insulation door (250), and when in the second position, is separated from the locking groove (221) to unlock the insulation door (250).

5. The refrigerator (1) according to claim 1, wherein the lower support (310) is detachably mounted to the door (200) from an outer side of the door (200).

6. The refrigerator (1) according to claim 5, wherein the lower support (310) is detachably connected to the door (200) through a second push ejection switch (380), or the lower support (310) is detachably connected to the door (200) by snap-fitting.

7. The refrigerator (1) according to claim 1, wherein the vacuum sealing device (300) further comprises an insulation cushion (360) disposed at one of the lower support (310) and the upper support (320); and a heating device (370) disposed at the other of the lower support (310) and the upper support (320), wherein the insulation cushion (360) and the heating device (370) are opposed to each other.

8. The refrigerator (1) according to claim 1, wherein the vacuumization assembly (330) comprises a vacuum pump (331) in communication with the vacuumization region (301) through a pipe (335); a pressure detection device (332) and a pressure relief device (333) are further disposed on the pipe (335), the pressure detection device (332) is used to detect the pressure of the vacuumization region (301), and the pressure relief device (333) is controlled to release the pressure of the vacuumization region (301).

9. The refrigerator (1) according to claim 8, wherein the driving device (340) comprises a motor (341) and a

transmission mechanism, the transmission mechanism is used to convert a rotational movement of the motor (341) into a rectilinear movement and an output end of the transmission mechanism is connected with the upper support (320),

the driving device (340) and the vacuumization assembly (330) are mounted in one mounting base (305), a mounting cavity (211) recessed inwardly is disposed at the door housing (210), and the mounting base (305) and the upper support (320) are mounted into the mounting cavity (211).

10. The refrigerator (1) according to claim 9, wherein a bar table door (260) is disposed at an area of the outer side of the door (200) where the vacuum sealing device (300) is located, a lower end of the bar table door (260) is hinged with the door (200), and an upper end of the bar table door (260) is connected with the door housing (210) through a first push ejection switch (212).

11. The refrigerator (1) according to claim 10, wherein an inner side of the bar table door (260) further includes an operation panel (270) covered on an outer side of the mounting cavity (211), an inserting hole (271) applicable for inserting a storage bag to be inserted is formed on the operation panel (270), a display control device (272) is further disposed on the operation panel (270) and the display control panel comprises an indicating device for displaying a working state of the vacuum sealing device (300).

12. The refrigerator (1) according to claim 11, wherein an auxiliary door plate (280) is disposed at an area of the door (200) where the vacuum sealing device (300) is located, a surface of the auxiliary door plate (280) is flushed with a surface of the door housing (210), an inserting hole (271) applicable for inserting a storage bag to be inserted is formed on the auxiliary door plate (280), a display control device (272) is further disposed on the auxiliary door plate (280) and the display control device (272) comprises an indicating device for displaying a working state of the vacuum sealing device (300).

Patentansprüche

1. Ein Kühlschrank (1), umfassend:

ein Lagerfach (100);
eine Tür (200), die das Lagerfach (100) öffnet oder schließt, wobei eine Vakuumversiegelungsvorrichtung (300) an der Tür (200) angeordnet ist, und wobei die Vakuumversiegelungsvorrichtung (300) umfasst:

eine obere Halterung (320) und eine untere

Halterung (310), die einander gegenüberliegen, wobei auf den einander zugewandten Oberflächen der oberen Halterung (320) und/oder der unteren Halterung (310) Öffnungshohlräume ausgebildet sind; wenn die obere Halterung (320) und die untere Halterung (310) aneinandergesetzt sind, bilden die Öffnungshohlräume durch Dichtabschnitte einen vakuumdichten Bereich (301); die untere Halterung (310) ist lösbar an der Tür (200) befestigt; eine Antriebsvorrichtung (340), die eingerichtet ist, die obere Halterung (320) in Richtung auf die untere Halterung (310) oder von dieser weg zu bewegen;
eine Vakuumierungsanordnung (330), die über ein Rohr (335) mit dem vakuumdichten Bereich (301) in Verbindung steht, um eine Vakuumierung oder Druckentlastung des vakuumdichten Bereichs (301) durchzuführen;

dadurch gekennzeichnet, dass

eine Montageöffnung (201), die innen mit außen kommuniziert, an der Tür (200) ausgebildet ist, wobei die untere Halterung (310) und eine Isoliertür (250) in der Montageöffnung (201) angeordnet sind, und die Isoliertür (250) sich an der Innenseite der Tür (200) befindet;
die untere Halterung (310) und die Isoliertür (250) bestehen aus einem ersten Gehäuse (251) und einem zweiten Gehäuse (252) mit Öffnungshohlräumen sowie einem zwischen dem ersten Gehäuse (251) und dem zweiten Gehäuse (252) angeordneten Isolierteil; das erste Gehäuse (251) ist mit dem zweiten Gehäuse (252) durch Schnappverbindung verbunden, das erste Gehäuse (251) weist einen Verlängerungsarm (2511) in eine vom zweiten Gehäuse (252) wegweisende Richtung auf, und die untere Halterung (310) ist an dem Verlängerungsarm (2511) ausgebildet.

2. Der Kühlschrank (1) nach Anspruch 1, wobei die Isoliertür (250) und die untere Halterung (310) einstückig ausgebildet sind, oder wobei die untere Halterung (310) lösbar mit der Isoliertür (250) verbunden ist.

3. Der Kühlschrank (1) nach Anspruch 1, wobei eine Türdichtung (253) zwischen der Isoliertür (250) und einer inneren Türverkleidung (220) angeordnet ist und/oder eine Verriegelungsvorrichtung (400) dazu verwendet wird, die Isoliertür (250) an der Tür (200) zu verriegeln.

4. Der Kühlschrank (1) nach Anspruch 3, wobei die

Verriegelungsvorrichtung (400) umfasst:

eine Verriegelungshakenanordnung, die an der Isoliertür (250) angeordnet ist, und eine Verriegelungsnut (221), die an der inneren Türverkleidung (220) angeordnet ist;

wobei

die Verriegelungshakenanordnung einen Verriegelungshaken (440) umfasst, der durch die Isoliertür (250) hindurchgeführt ist, wobei der Verriegelungshaken (440) zwischen einer ersten Position und einer zweiten Position umschaltbar ist, und der Verriegelungshaken (440) in der ersten Position mit der Verriegelungsnut (221) zusammenwirkt, um die Isoliertür (250) zu verriegeln, und in der zweiten Position von der Verriegelungsnut (221) getrennt ist, um die Isoliertür (250) zu entriegeln.

5. Der Kühlschrank (1) nach Anspruch 1, wobei die untere Halterung (310) lösbar an der Tür (200) von der Außenseite der Tür (200) montiert ist.

6. Der Kühlschrank (1) nach Anspruch 5, wobei die untere Halterung (310) lösbar mit der Tür (200) über einen zweiten Druckauswurfschalter (380) verbunden ist, oder wobei die untere Halterung (310) durch Schnappverbindung lösbar mit der Tür (200) verbunden ist.

7. Der Kühlschrank (1) nach Anspruch 1, wobei die Vakuumversiegelungsvorrichtung (300) ferner ein Isolierpolster (360) umfasst, das an einem der unteren Halterung (310) und der oberen Halterung (320) angeordnet ist, und ein Heizelement (370), das an dem jeweils anderen der unteren Halterung (310) und der oberen Halterung (320) angeordnet ist, wobei das Isolierpolster (360) und das Heizelement (370) einander gegenüberliegen.

8. Der Kühlschrank (1) nach Anspruch 1, wobei die Vakuumierungsanordnung (330) eine Vakuumpumpe (331) umfasst, die über ein Rohr (335) mit dem vakuumdichten Bereich (301) in Verbindung steht; wobei ein Druckerfassungsgerät (332) und ein Druckentlastungsgerät (333) ferner an dem Rohr (335) angeordnet sind, wobei das Druckerfassungsgerät (332) zur Erfassung des Drucks im vakuumdichten Bereich (301) verwendet wird und das Druckentlastungsgerät (333) gesteuert wird, um den Druck im vakuumdichten Bereich (301) abzulassen.

9. Der Kühlschrank (1) nach Anspruch 8, wobei die Antriebsvorrichtung (340) einen Motor (341) und einen Übertragungsmechanismus umfasst, wobei der Übertragungsmechanismus dazu dient, eine Drehbewegung des Motors (341) in eine Linearbewegung umzuwandeln, und wobei ein Ausgangs-

ende des Übertragungsmechanismus mit der oberen Halterung (320) verbunden ist,

wobei die Antriebsvorrichtung (340) und die Vakuumierungsanordnung (330) in einer gemeinsamen Montagebasis (305) montiert sind, wobei eine nach innen vertiefte Montagehöhlung (211) am Türgehäuse (210) ausgebildet ist, und wobei die Montagebasis (305) und die obere Halterung (320) in die Montagehöhlung (211) eingesetzt sind.

10. Der Kühlschrank (1) nach Anspruch 9, wobei eine Bartheckenklappe (260) an einem Bereich der Außenseite der Tür (200) angeordnet ist, an dem sich die Vakuumversiegelungsvorrichtung (300) befindet, wobei ein unteres Ende der Bartheckenklappe (260) mit der Tür (200) schwenkbar verbunden ist, und ein oberes Ende der Bartheckenklappe (260) über einen ersten Druckauswurfschalter (212) mit dem Türgehäuse (210) verbunden ist.

11. Der Kühlschrank (1) nach Anspruch 10, wobei eine Innenseite der Bartheckenklappe (260) ferner ein Bedienfeld (270) umfasst, das eine Außenseite der Montagehöhlung (211) abdeckt, wobei eine Einführöffnung (271), die zum Einführen eines Lagerbeutels geeignet ist, im Bedienfeld (270) ausgebildet ist, wobei außerdem eine Anzeige- und Steuereinrichtung (272) auf dem Bedienfeld (270) angeordnet ist, und wobei die Anzeige- und Steuereinrichtung ein Anzeigeelement umfasst, das einen Betriebszustand der Vakuumversiegelungsvorrichtung (300) anzeigt.

12. Der Kühlschrank (1) nach Anspruch 11, wobei eine Hilfstürplatte (280) an einem Bereich der Tür (200) angeordnet ist, an dem sich die Vakuumversiegelungsvorrichtung (300) befindet, wobei eine Oberfläche der Hilfstürplatte (280) bündig mit einer Oberfläche des Türgehäuses (210) ist, wobei eine Einführöffnung (271), die zum Einführen eines Lagerbeutels geeignet ist, auf der Hilfstürplatte (280) ausgebildet ist, wobei ferner eine Anzeige- und Steuereinrichtung (272) auf der Hilfstürplatte (280) angeordnet ist, und wobei die Anzeige- und Steuereinrichtung (272) ein Anzeigeelement umfasst, das einen Betriebszustand der Vakuumversiegelungsvorrichtung (300) anzeigt.

Revendications

1. Un réfrigérateur (1), comprenant:

un compartiment de stockage (100);
une porte (200) permettant d'ouvrir ou de fermer le compartiment de stockage (100), un dispositif de scellage sous vide (300) étant disposé sur la porte (200), et le dispositif de scellage sous vide

(300) comprenant:

un support supérieur (320) et un support inférieur (310) opposés l'un à l'autre, des cavités ouvertes étant formées sur les surfaces opposées du support supérieur (320) et/ou du support inférieur (310); lorsque le support supérieur (320) et le support inférieur (310) sont accouplés, les cavités ouvertes forment de manière étanche une région de mise sous vide (301) par des parties d'étanchéité; le support inférieur (310) est monté de manière amovible sur la porte (200);

un dispositif d'entraînement (340) configuré pour déplacer le support supérieur (320) vers ou à l'écart du support inférieur (310); un ensemble de mise sous vide (330) en communication avec la région de mise sous vide (301) par l'intermédiaire d'un conduit (335) afin d'effectuer une mise sous vide ou une dépressurisation de la région de mise sous vide (301);

caractérisé en ce que

un orifice de montage (201) communiquant l'intérieur avec l'extérieur est formé sur la porte (200), le support inférieur (310) et une porte isolante (250) sont disposés dans l'orifice de montage (201), et la porte isolante (250) est située du côté intérieur de la porte (200);

le support inférieur (310) et la porte isolante (250) sont formés d'un premier boîtier (251) et d'un second boîtier (252) comportant des cavités ouvertes, et d'une pièce isolante disposée entre le premier boîtier (251) et le second boîtier (252); le premier boîtier (251) est assemblé au second boîtier (252) par encliquetage, le premier boîtier (251) est pourvu d'un bras d'extension (2511) s'étendant dans une direction s'éloignant du second boîtier (252), et le support inférieur (310) est formé sur le bras d'extension (2511).

2. Le réfrigérateur (1) selon la revendication 1, dans lequel la porte isolante (250) et le support inférieur (310) sont formés d'une seule pièce, ou bien le support inférieur (310) est relié de manière amovible à la porte isolante (250).

3. Le réfrigérateur (1) selon la revendication 1, dans lequel un joint d'étanchéité de porte (253) est disposé entre la porte isolante (250) et une doublure intérieure de porte (220), et/ou un dispositif de verrouillage (400) est utilisé pour verrouiller la porte isolante (250) à la porte (200).

4. Le réfrigérateur (1) selon la revendication 3, dans lequel le dispositif de verrouillage (400) comprend:

un ensemble crochet de verrouillage disposé sur la porte isolante (250) et une rainure de verrouillage (221) disposée sur la doublure intérieure de porte (220);

dans lequel

l'ensemble crochet de verrouillage comprend un crochet de verrouillage (440) inséré à travers la porte isolante (250), le crochet de verrouillage (440) étant commutable entre une première position et une seconde position, ledit crochet de verrouillage (440), lorsqu'il est dans la première position, s'engage avec la rainure de verrouillage (221) pour verrouiller la porte isolante (250), et lorsqu'il est dans la seconde position, est séparé de la rainure de verrouillage (221) pour déverrouiller la porte isolante (250).

5. Le réfrigérateur (1) selon la revendication 1, dans lequel le support inférieur (310) est monté de manière amovible sur la porte (200) depuis un côté extérieur de la porte (200).

6. Le réfrigérateur (1) selon la revendication 5, dans lequel le support inférieur (310) est relié de manière amovible à la porte (200) au moyen d'un second bouton-poussoir d'éjection (380), ou le support inférieur (310) est relié de manière amovible à la porte (200) par encliquetage.

7. Le réfrigérateur (1) selon la revendication 1, dans lequel le dispositif de scellage sous vide (300) comprend en outre un coussin isolant (360) disposé sur l'un parmi le support inférieur (310) et le support supérieur (320); et un dispositif de chauffage (370) disposé sur l'autre parmi le support inférieur (310) et le support supérieur (320), où le coussin isolant (360) et le dispositif de chauffage (370) étant disposés en regard l'un de l'autre.

8. Le réfrigérateur (1) selon la revendication 1, dans lequel l'ensemble de mise sous vide (330) comprend une pompe à vide (331) en communication avec la région de mise sous vide (301) par l'intermédiaire d'un conduit (335); un dispositif de détection de pression (332) et un dispositif de décompression (333) sont en outre disposés sur le conduit (335), le dispositif de détection de pression (332) étant utilisé pour détecter la pression de la région de mise sous vide (301), et le dispositif de décompression (333) étant commandé pour relâcher la pression de la région de mise sous vide (301).

9. Le réfrigérateur (1) selon la revendication 8, dans lequel le dispositif d'entraînement (340) comprend un moteur (341) et un mécanisme de transmission, le

mécanisme de transmission étant utilisé pour convertir un mouvement de rotation du moteur (341) en un mouvement rectiligne, et une extrémité de sortie du mécanisme de transmission étant reliée au support supérieur (320),
 le dispositif d'entraînement (340) et l'ensemble de mise sous vide (330) étant montés dans une même base de montage (305), une cavité de montage (211) en renforcement étant formée dans le boîtier de porte (210), et la base de montage (305) ainsi que le support supérieur (320) étant montés dans ladite cavité de montage (211).

10. Le réfrigérateur (1) selon la revendication 9, dans lequel une porte de comptoir (260) est disposée au niveau de la zone du côté extérieur de la porte (200) où se trouve le dispositif de scellage sous vide (300), une extrémité inférieure de la porte de comptoir (260) étant articulée avec la porte (200), et une extrémité supérieure de la porte de comptoir (260) étant reliée au boîtier de porte (210) par un premier bouton-poussoir d'éjection (212).
11. Le réfrigérateur (1) selon la revendication 10, dans lequel une face intérieure de la porte de comptoir (260) comprend en outre un panneau de commande (270) recouvrant une face extérieure de la cavité de montage (211), une ouverture d'insertion (271) apte à recevoir un sac de stockage à insérer étant formée sur le panneau de commande (270), un dispositif de commande avec affichage (272) étant en outre disposé sur le panneau de commande (270), et le dispositif de commande avec affichage comprenant un dispositif indicateur destiné à afficher un état de fonctionnement du dispositif de scellage sous vide (300).
12. Le réfrigérateur (1) selon la revendication 11, dans lequel une plaque de porte auxiliaire (280) est disposée au niveau de la zone de la porte (200) où se trouve le dispositif de scellage sous vide (300), une surface de la plaque de porte auxiliaire (280) étant affleurante à une surface du boîtier de porte (210), une ouverture d'insertion (271) apte à recevoir un sac de stockage à insérer étant formée sur la plaque de porte auxiliaire (280), un dispositif de commande avec affichage (272) étant en outre disposé sur la plaque de porte auxiliaire (280), et ledit dispositif de commande avec affichage (272) comprenant un dispositif indicateur destiné à afficher un état de fonctionnement du dispositif de scellage sous vide (300).

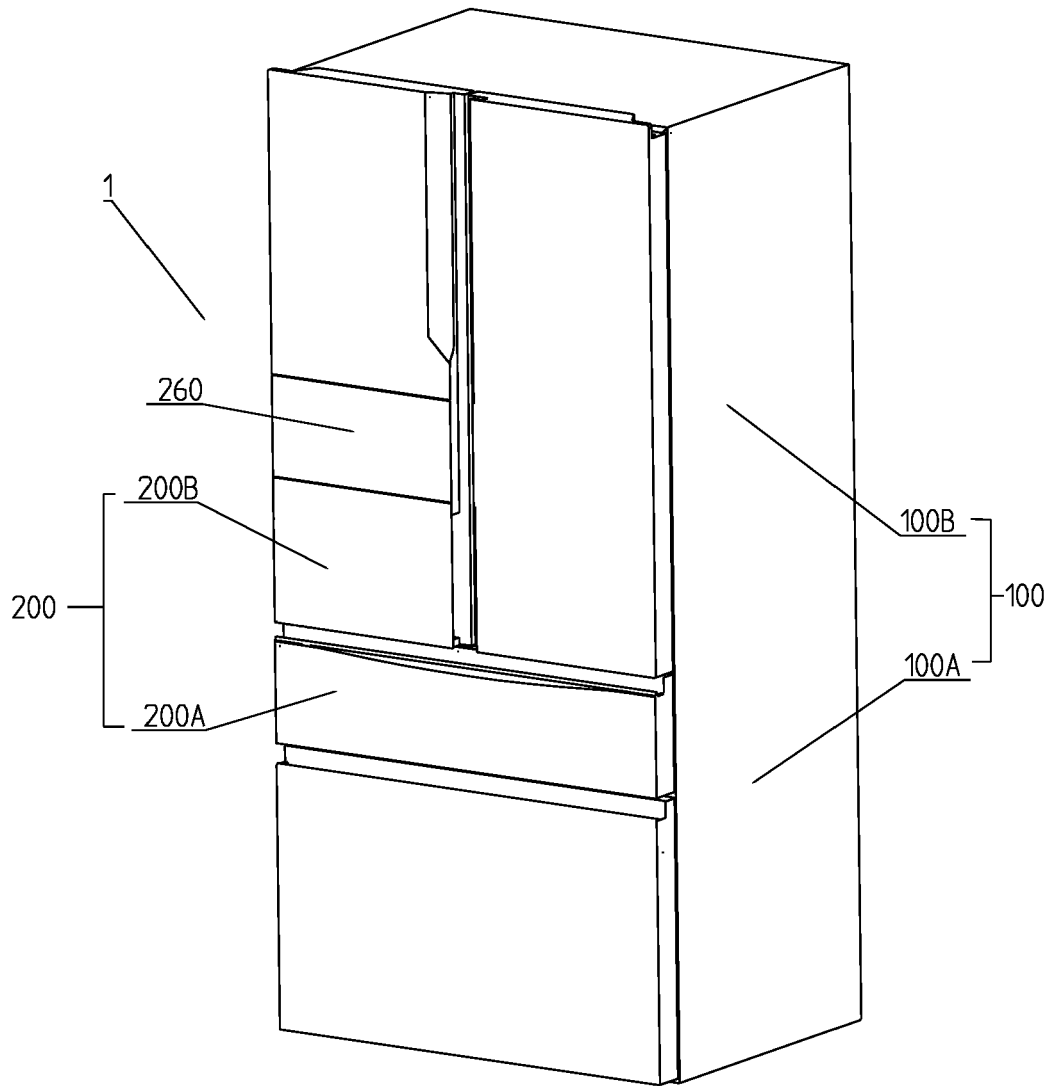


FIG.1

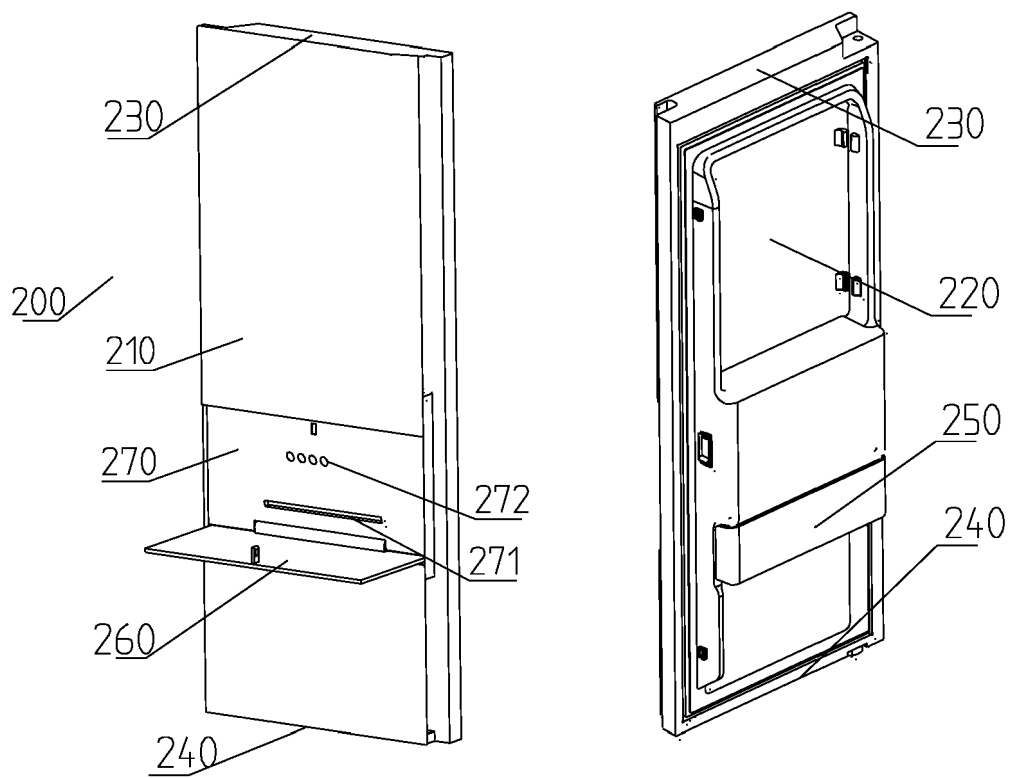


FIG.2

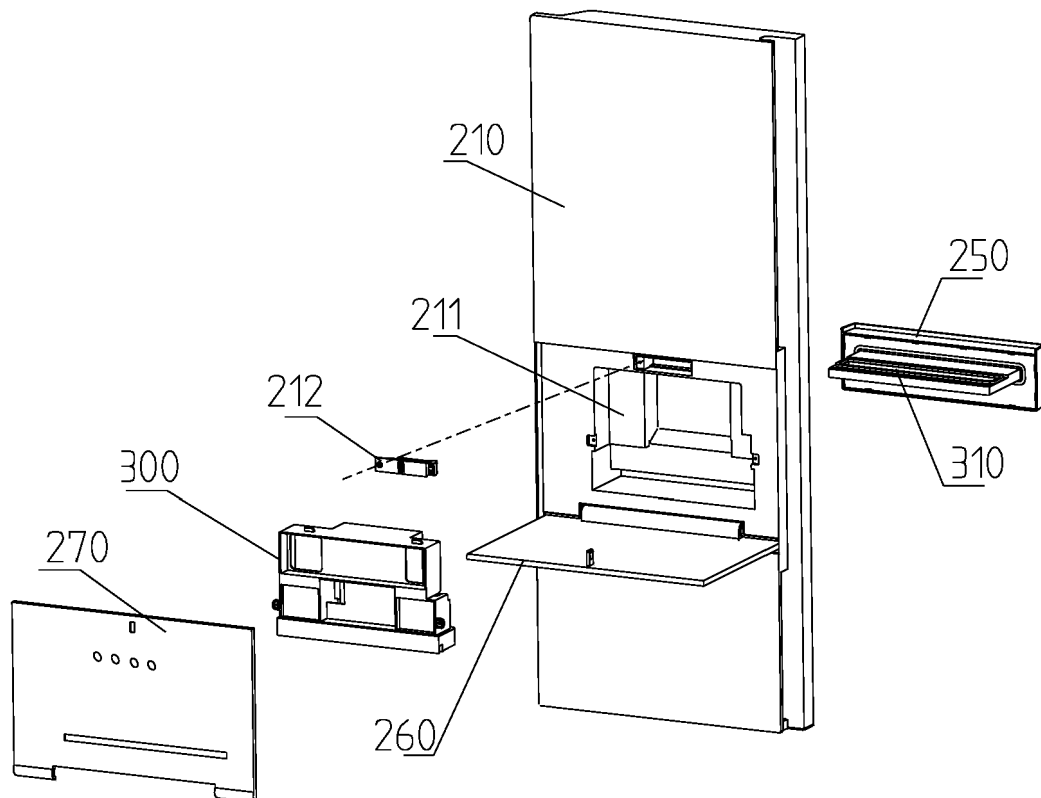


FIG.3

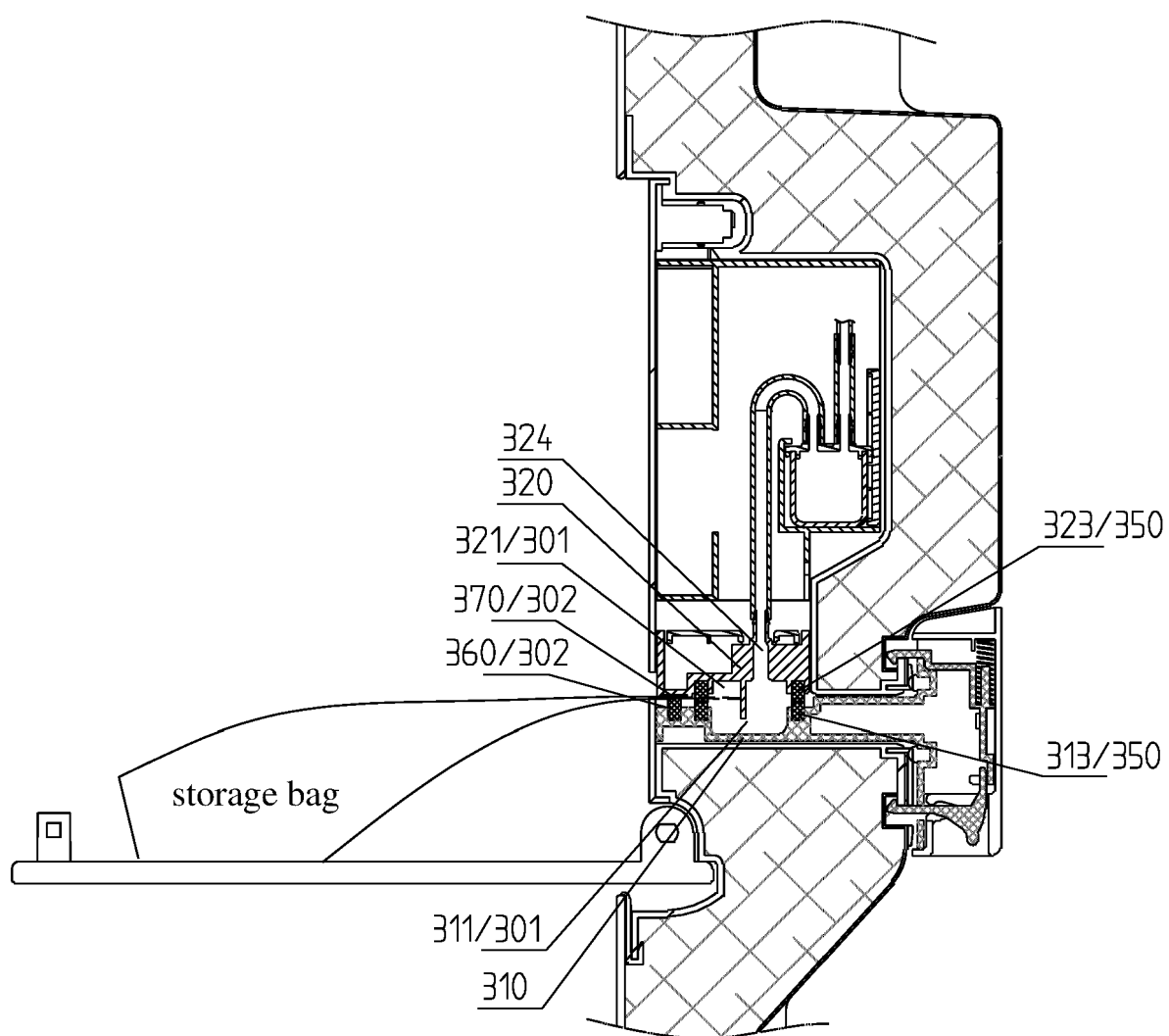


FIG.4

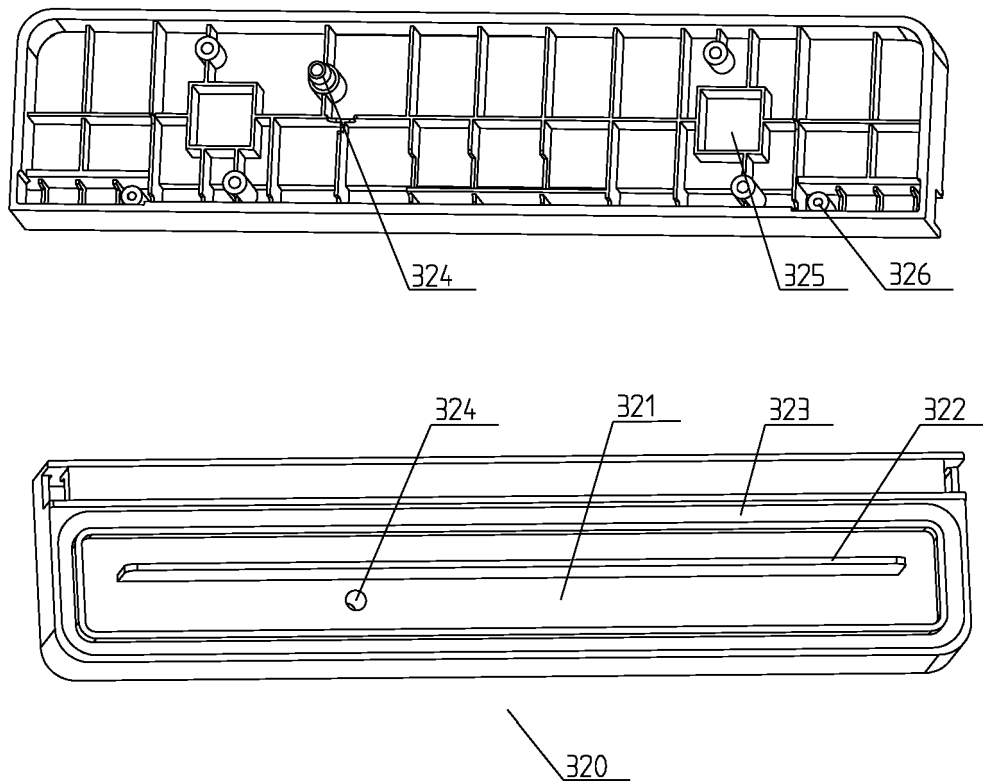


FIG. 5

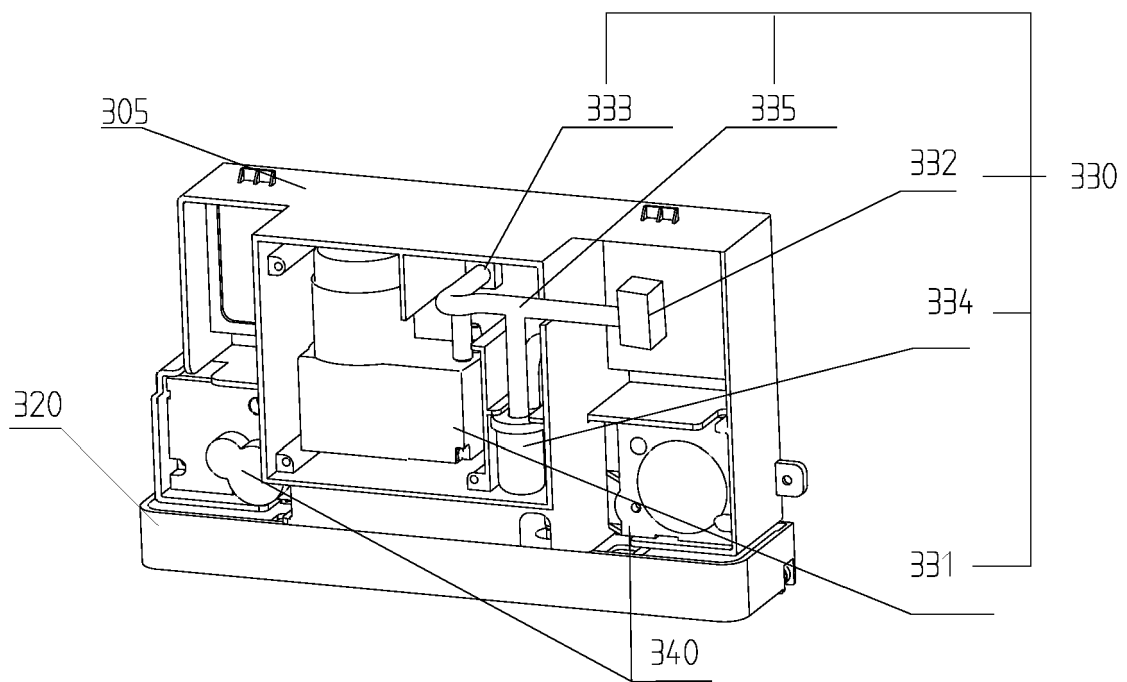


FIG. 6

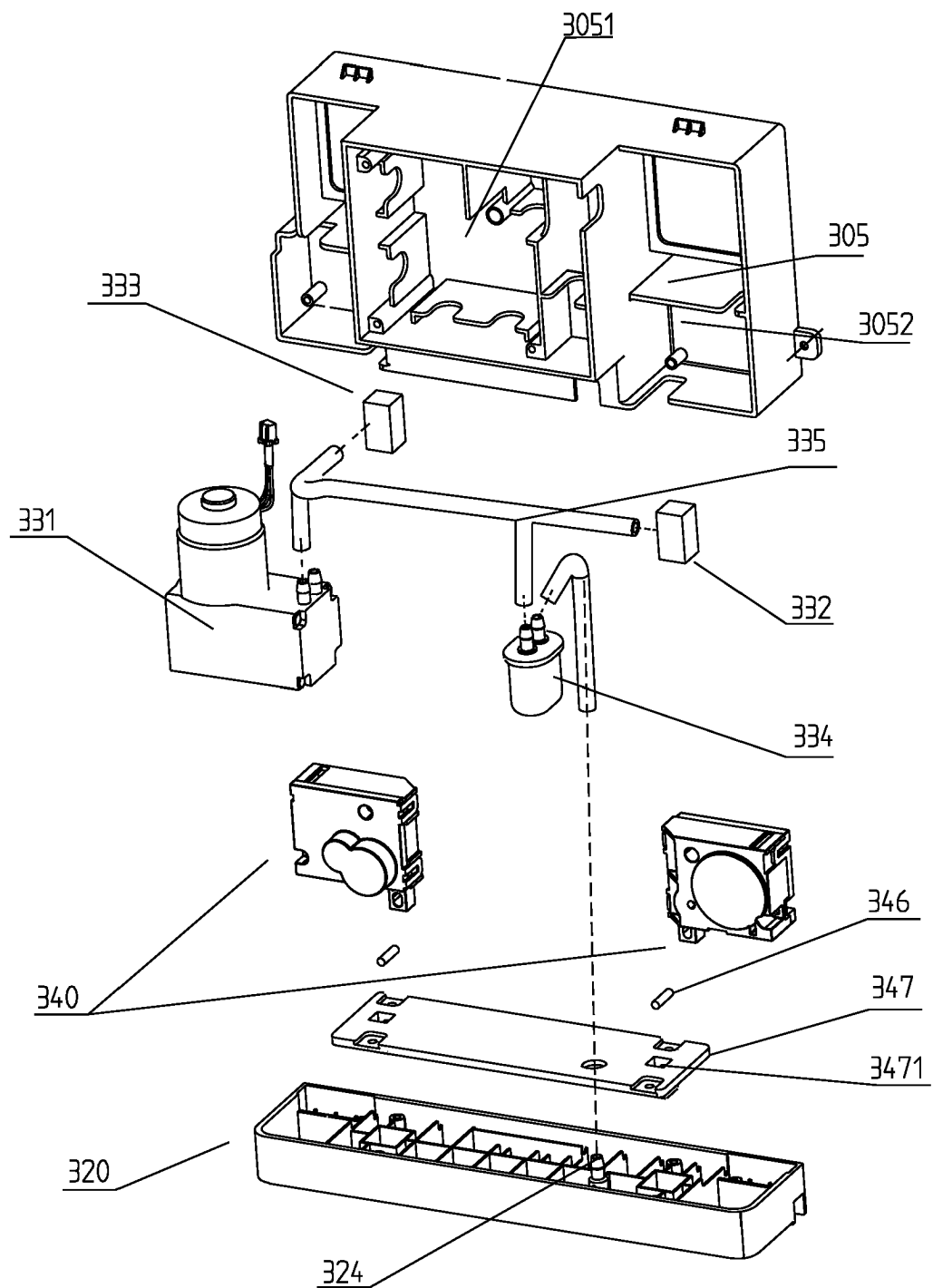


FIG.7

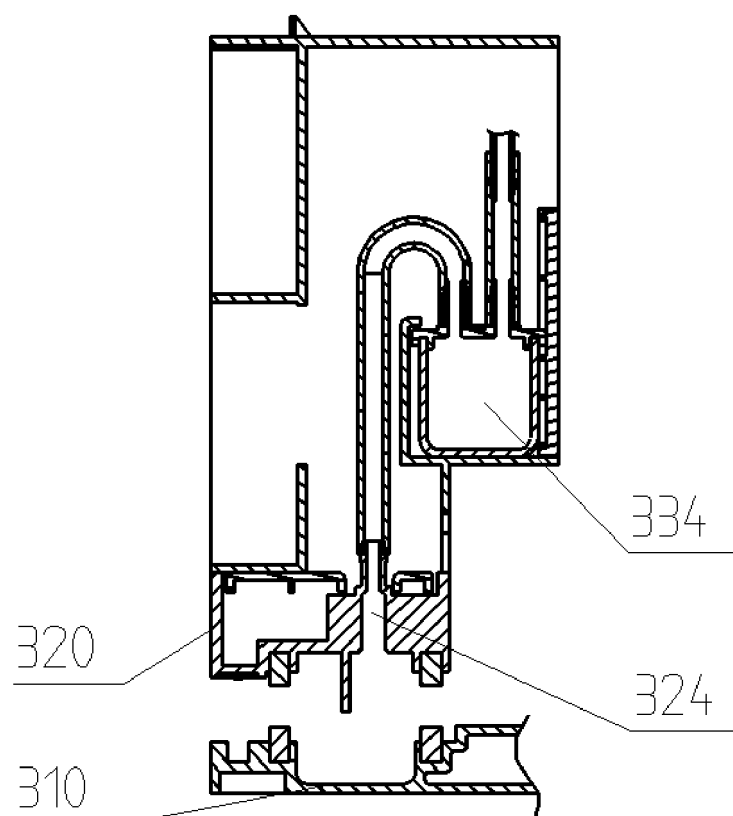


FIG. 8

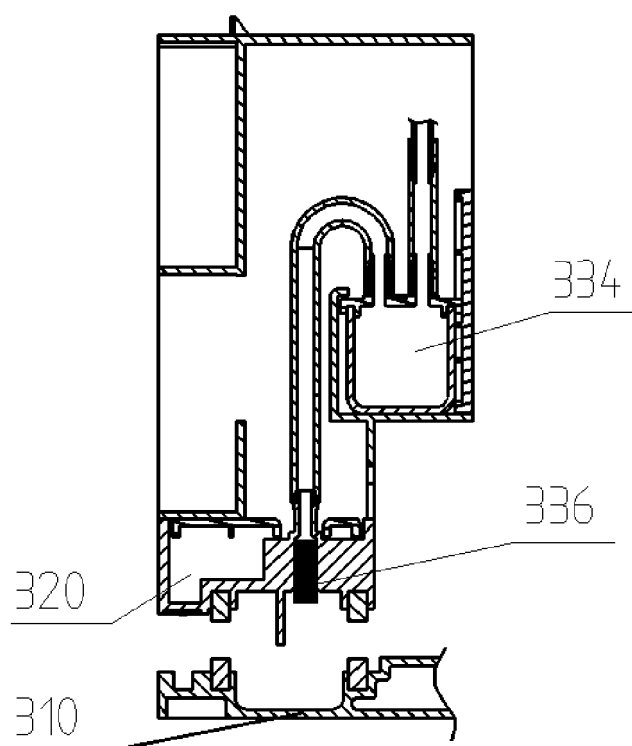


FIG. 9

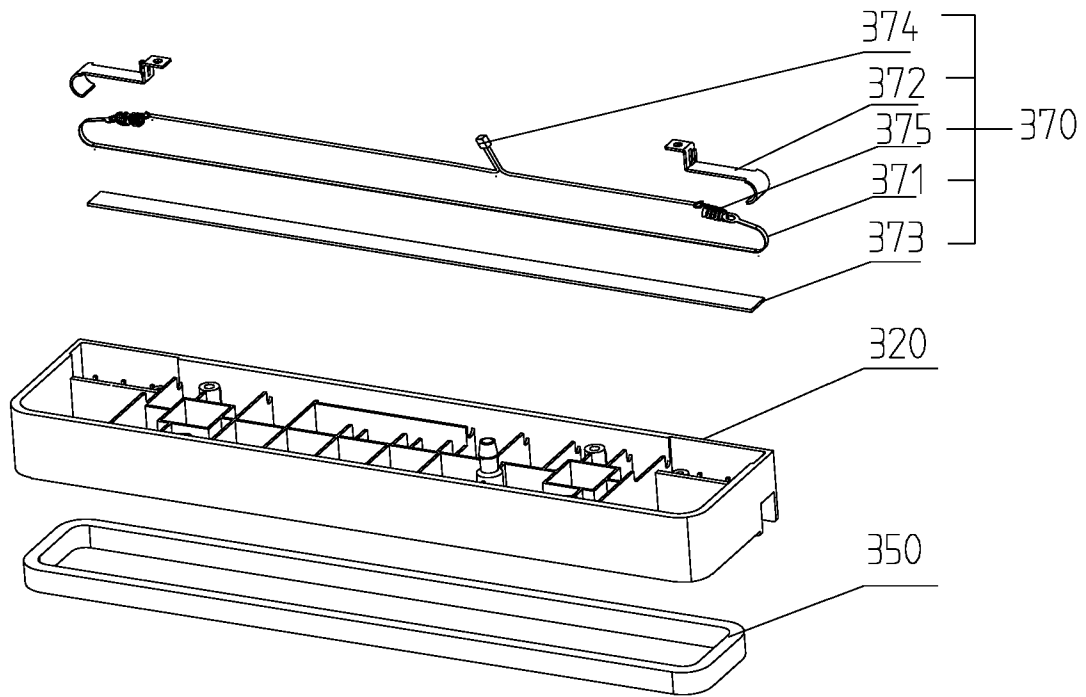


FIG.10

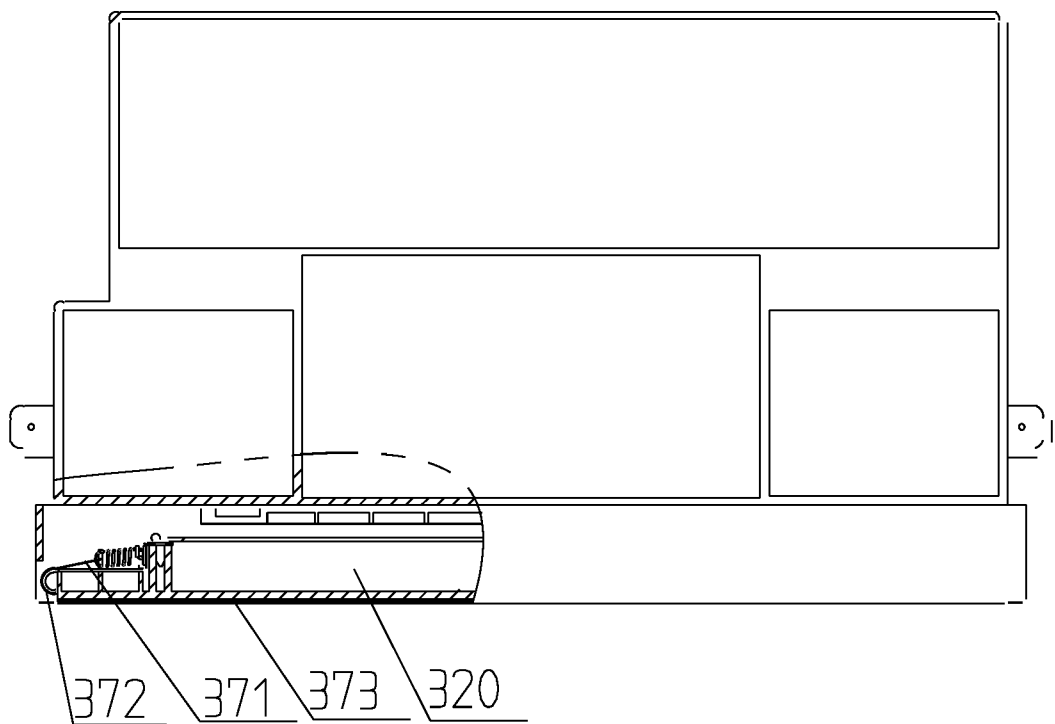
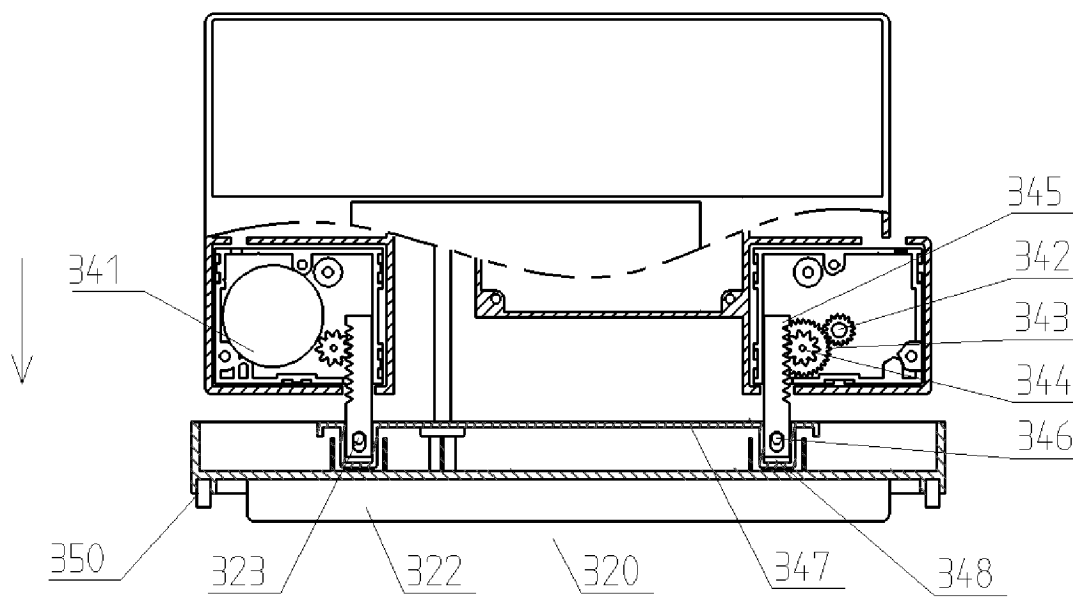
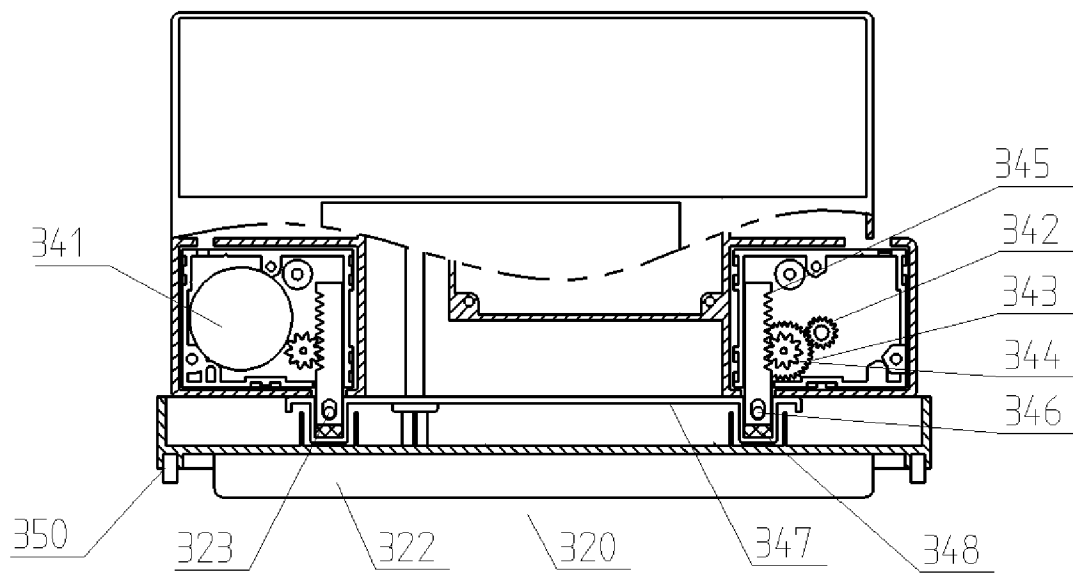


FIG.11



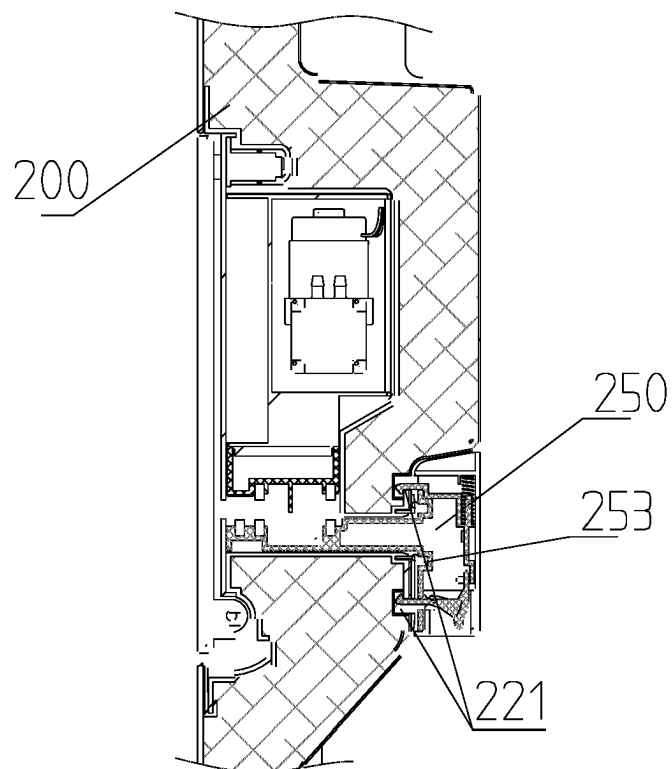


FIG. 14A

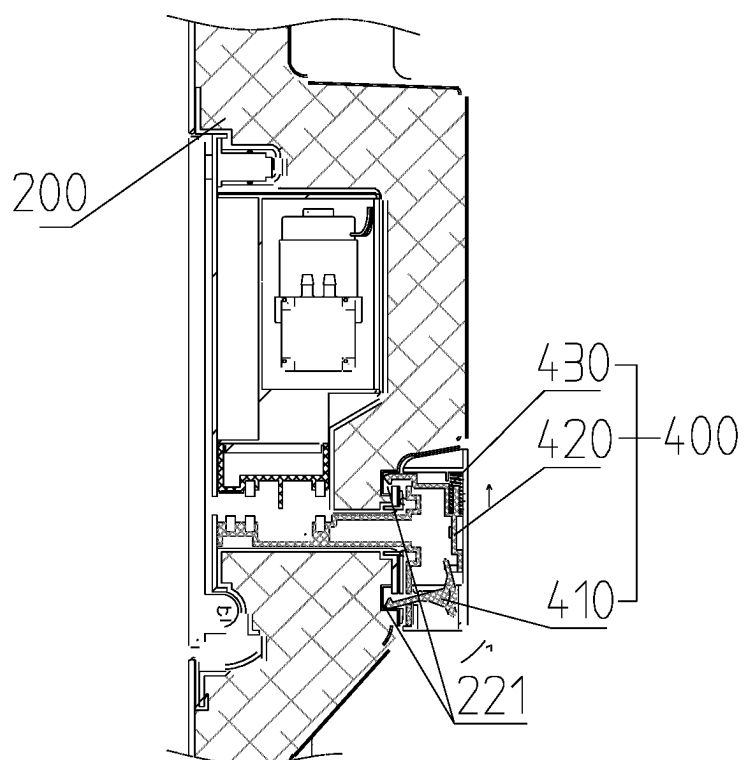


FIG. 14B

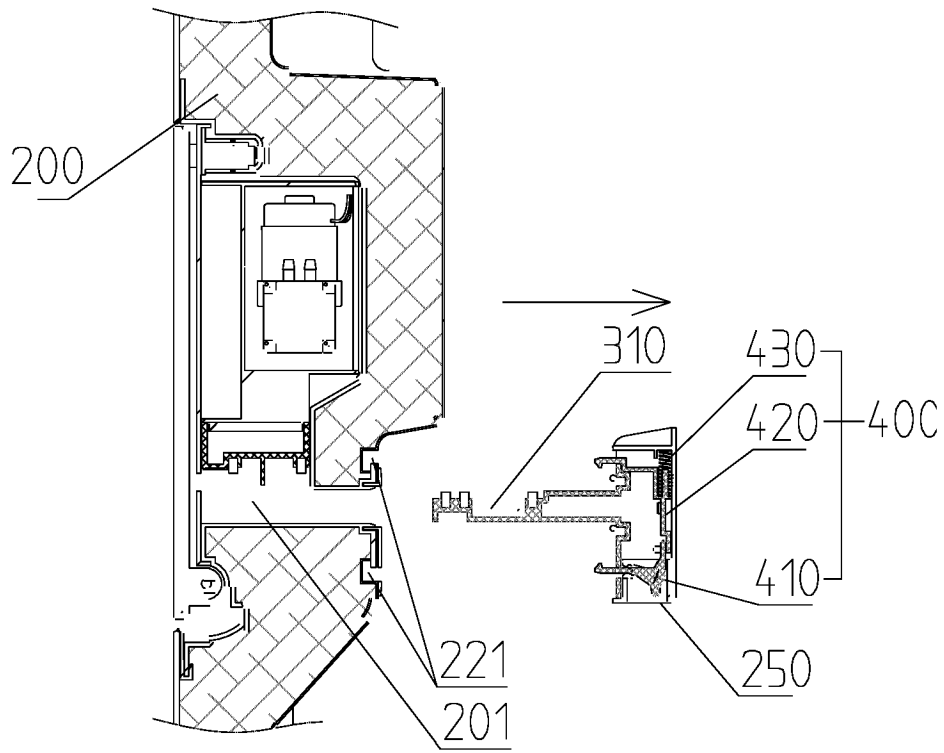


FIG. 14C

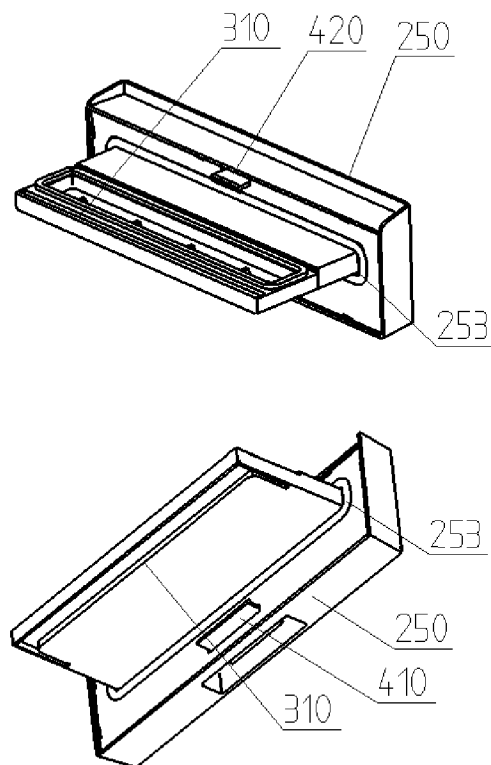


FIG. 15

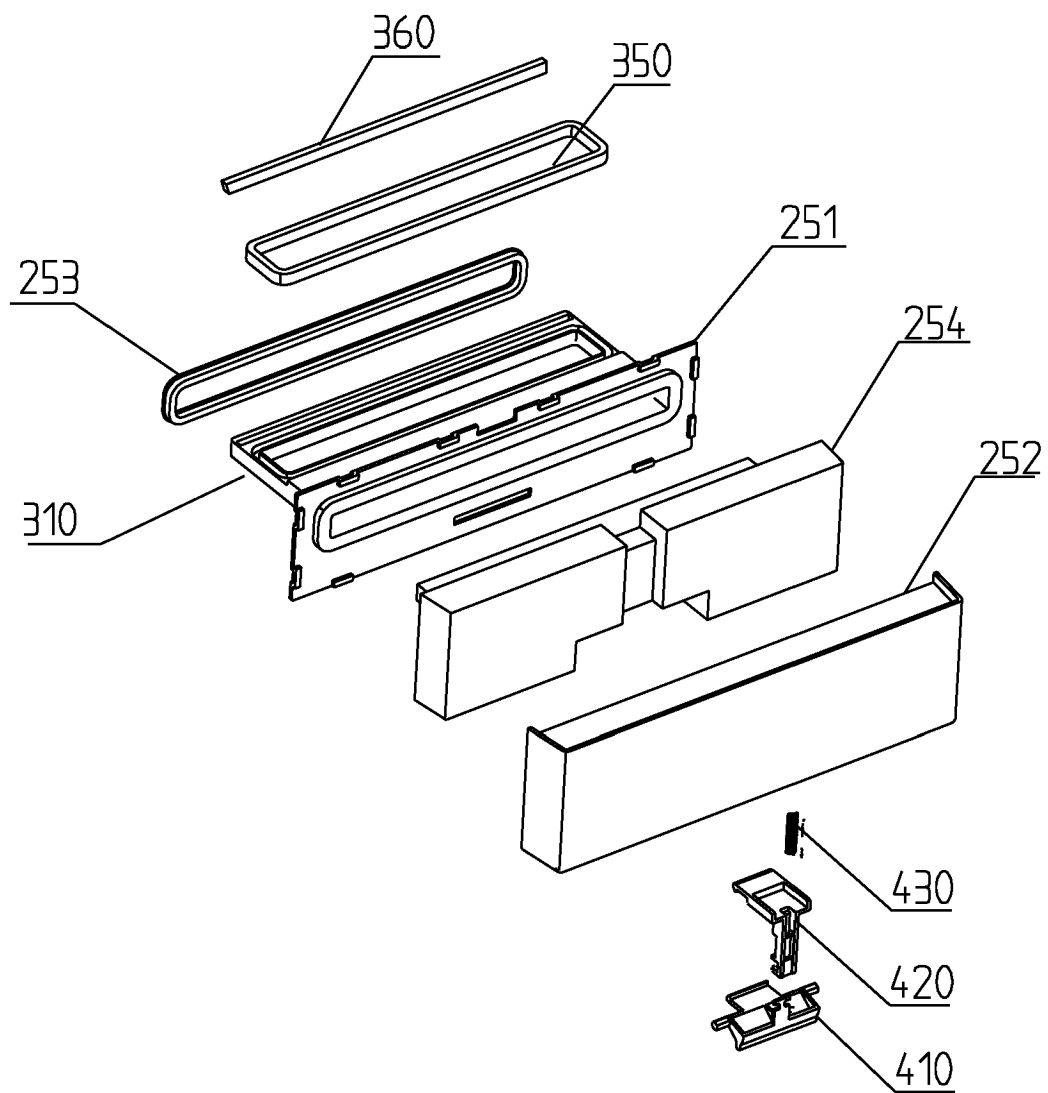


FIG.16

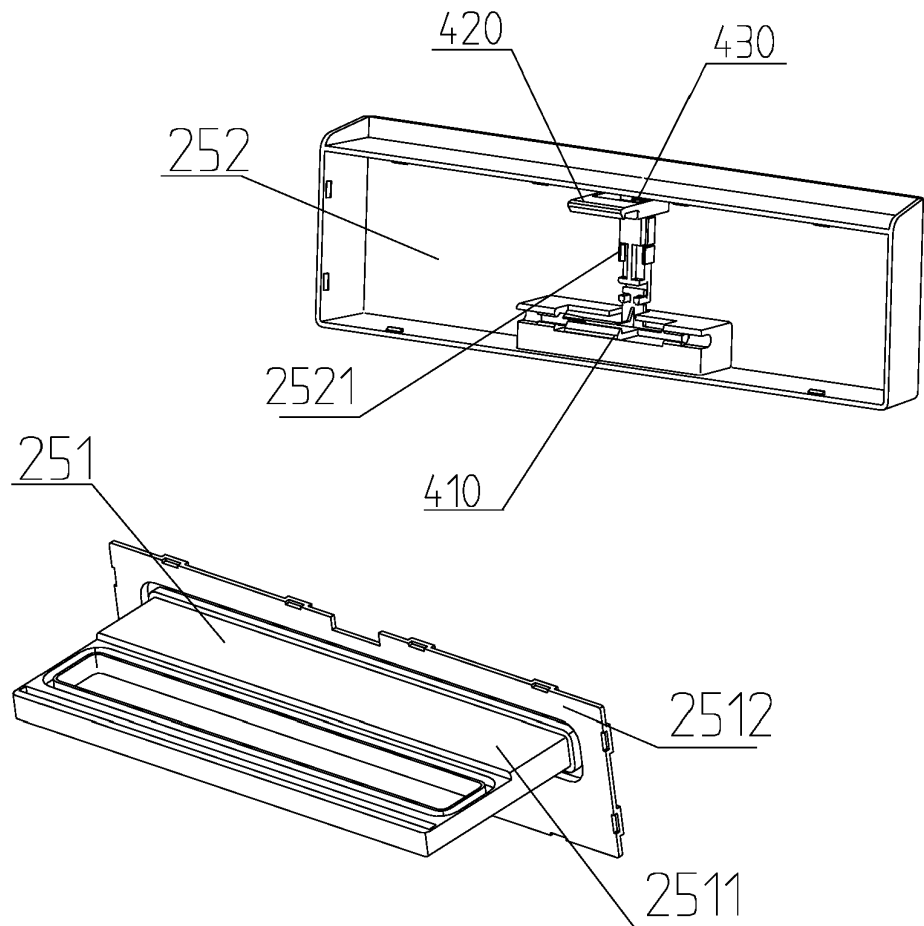


FIG. 17

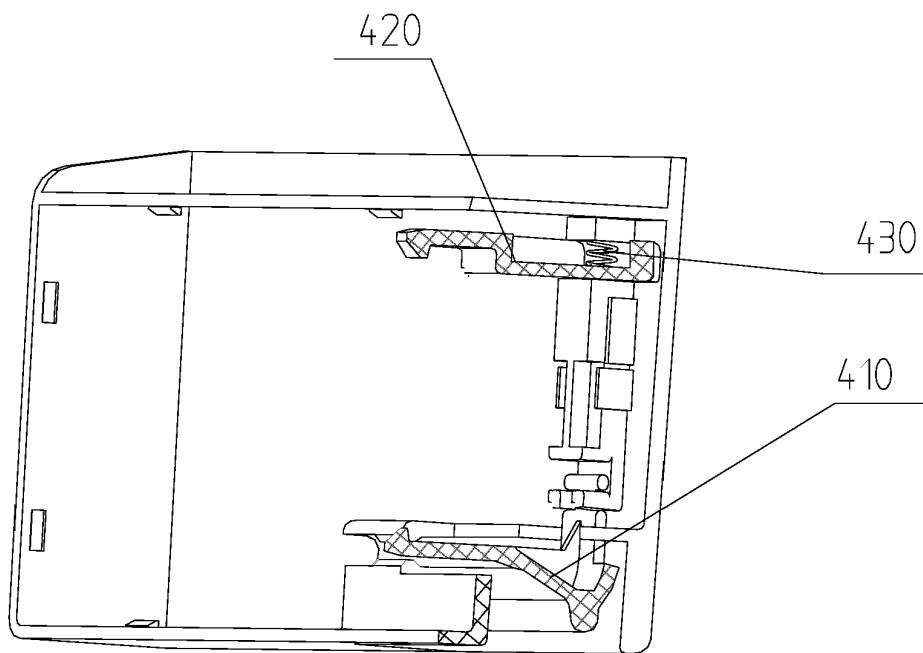


FIG. 18

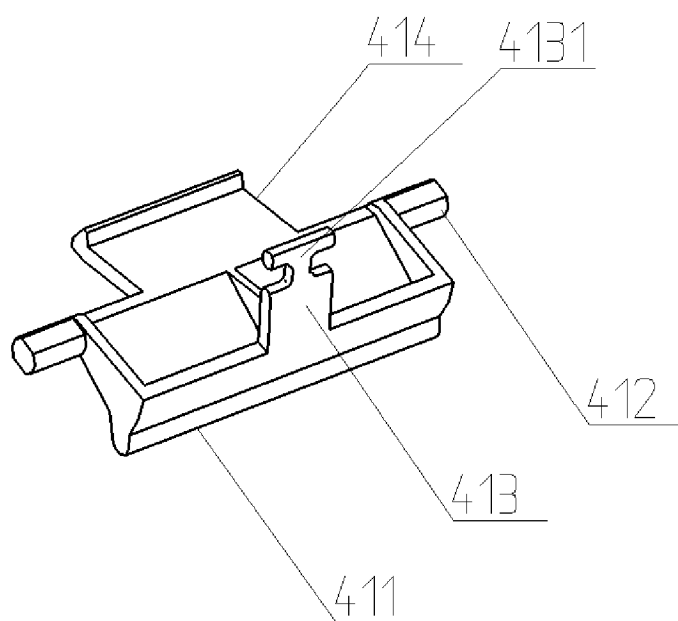


FIG. 19

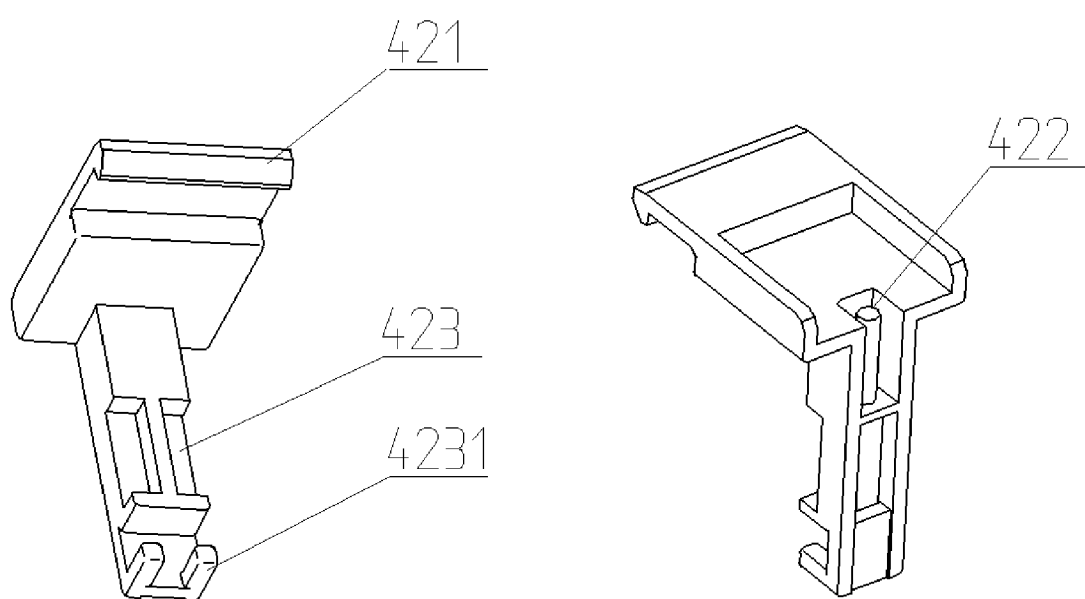


FIG. 20

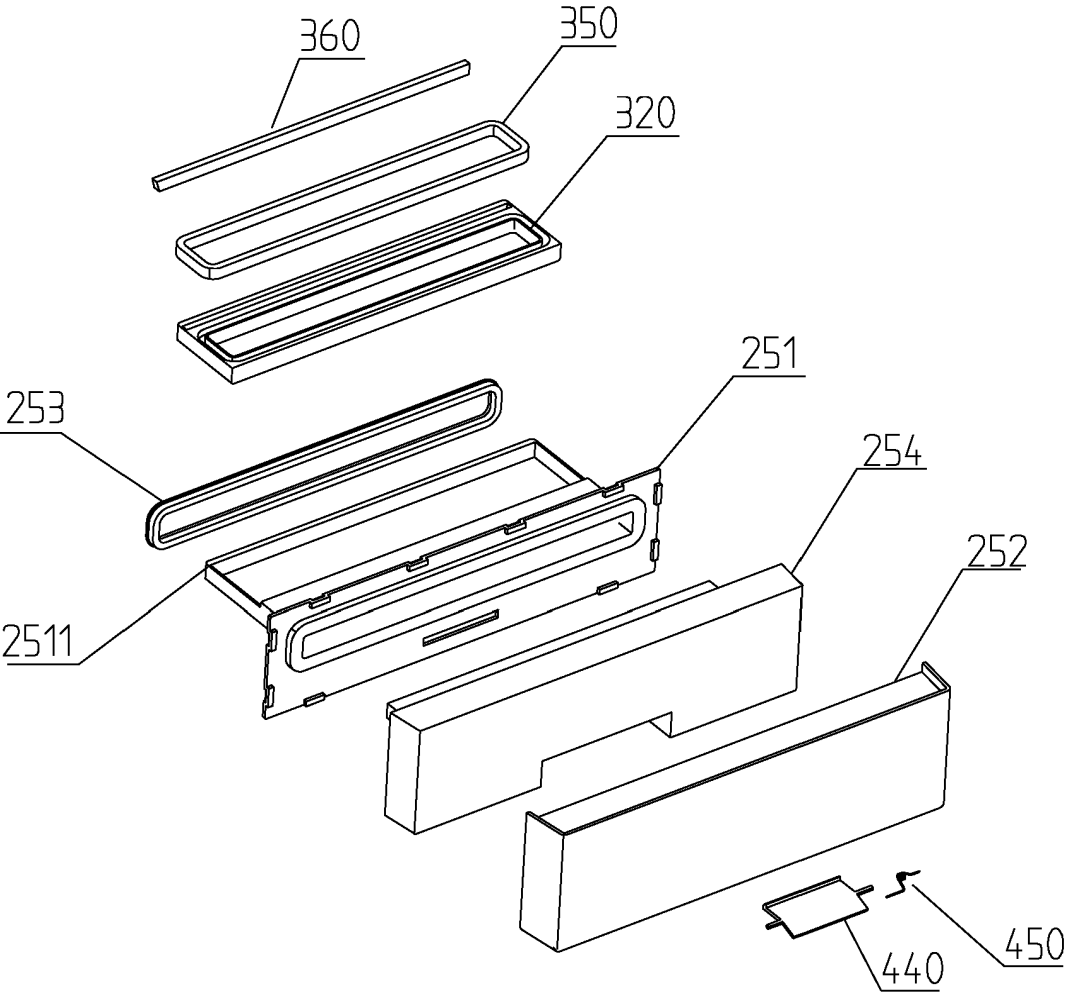
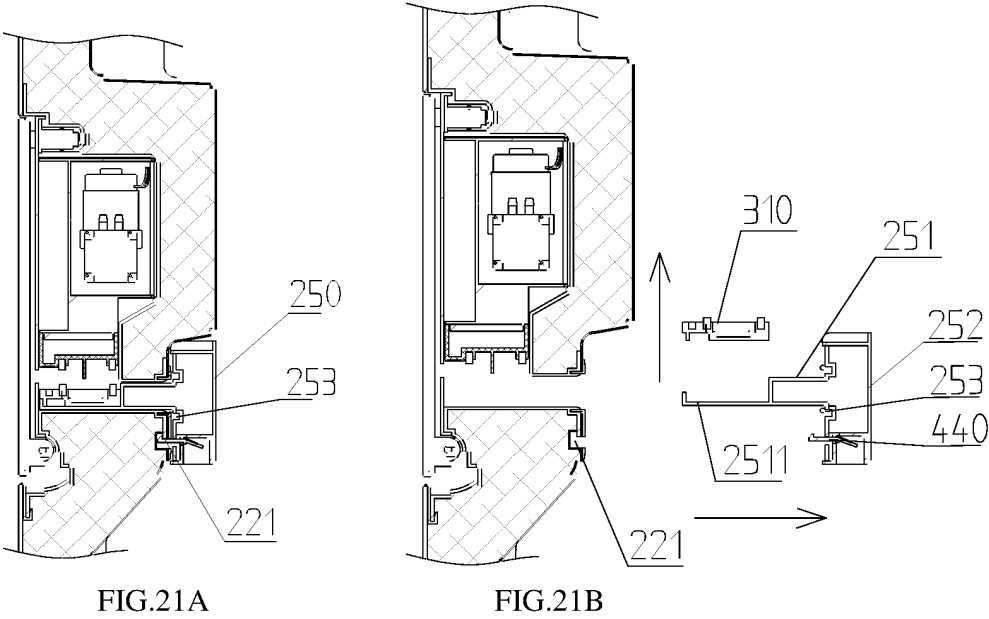


FIG. 22

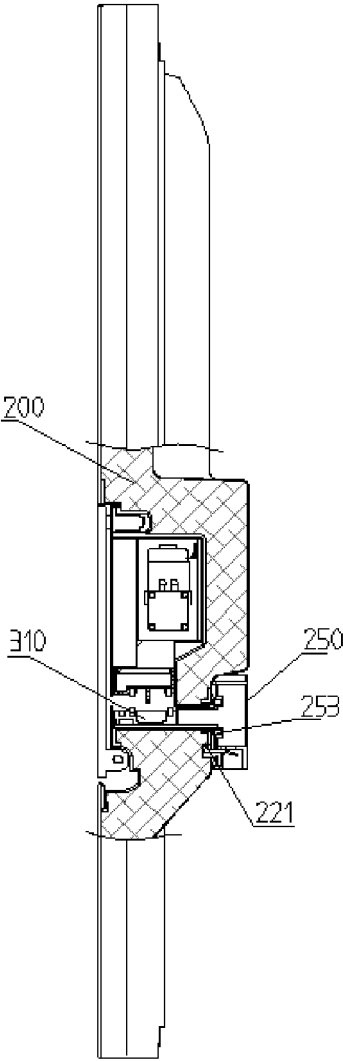


FIG. 23A

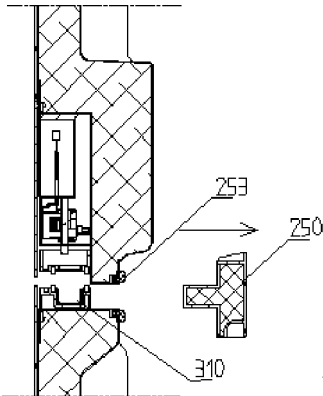


FIG. 23B

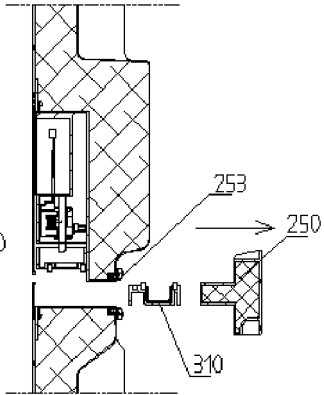


FIG. 23C

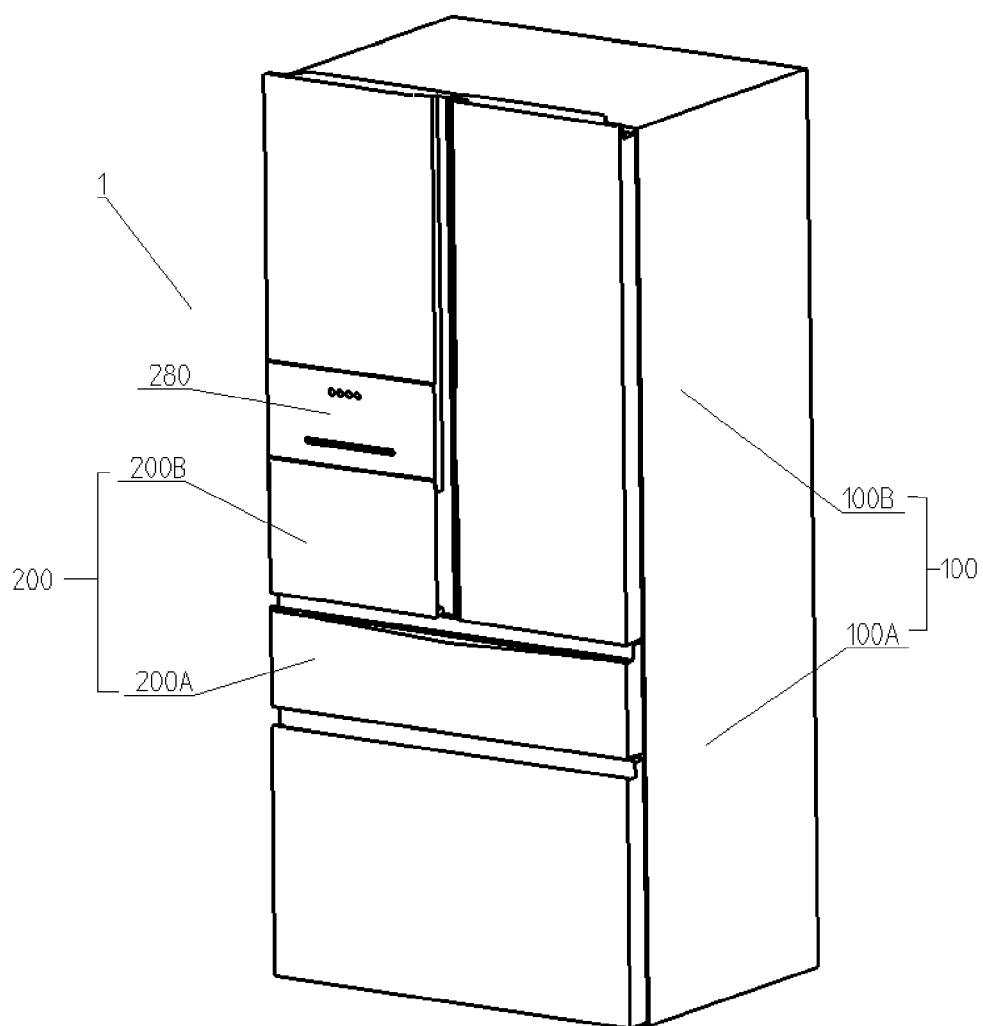


FIG. 24

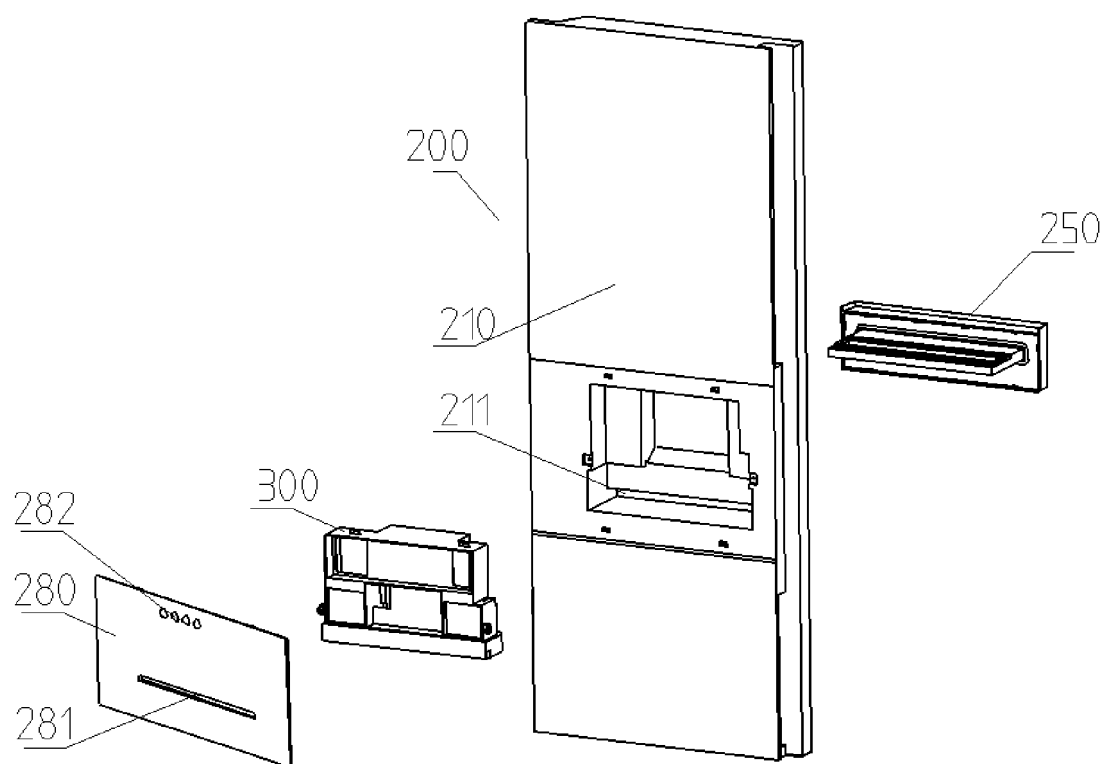


FIG. 25

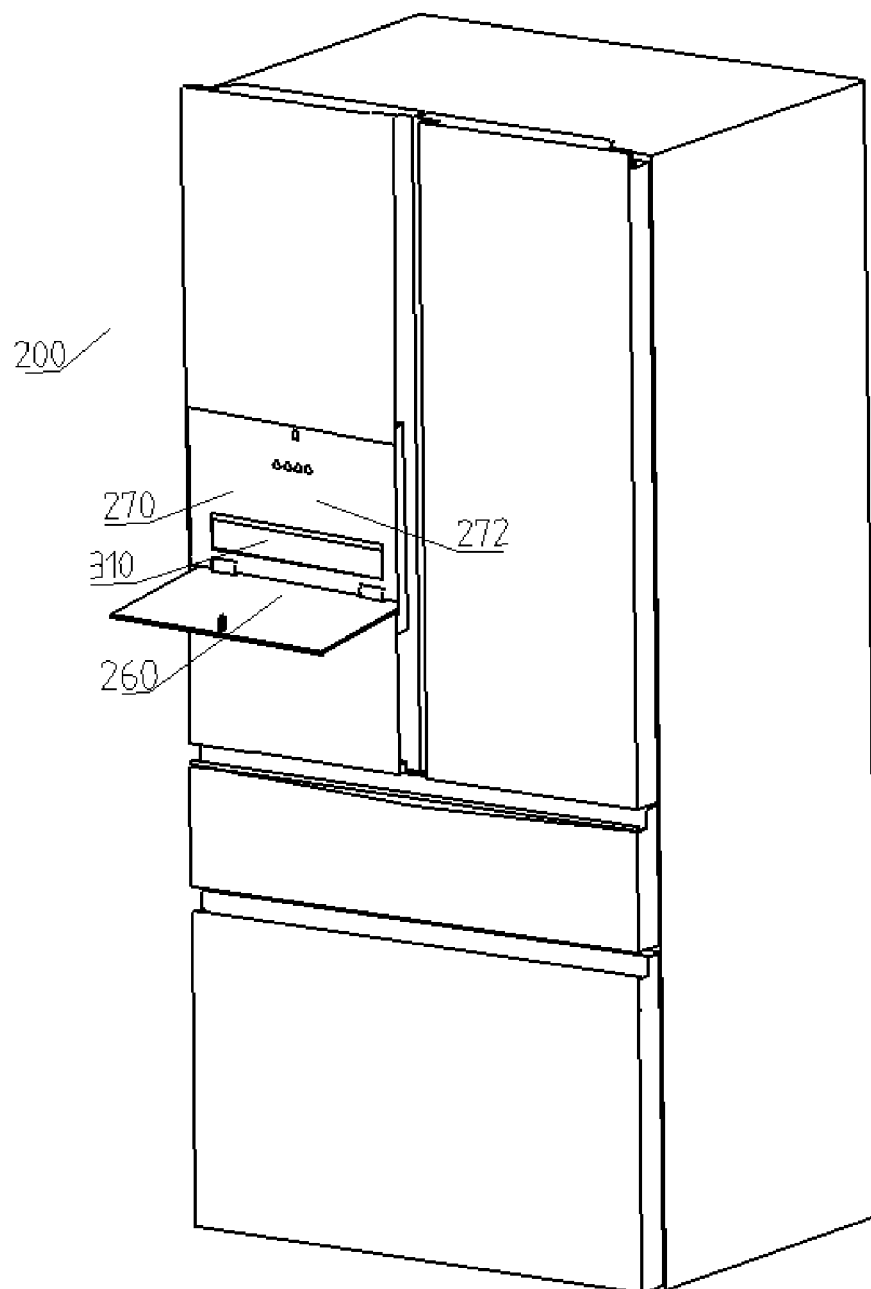


FIG. 26

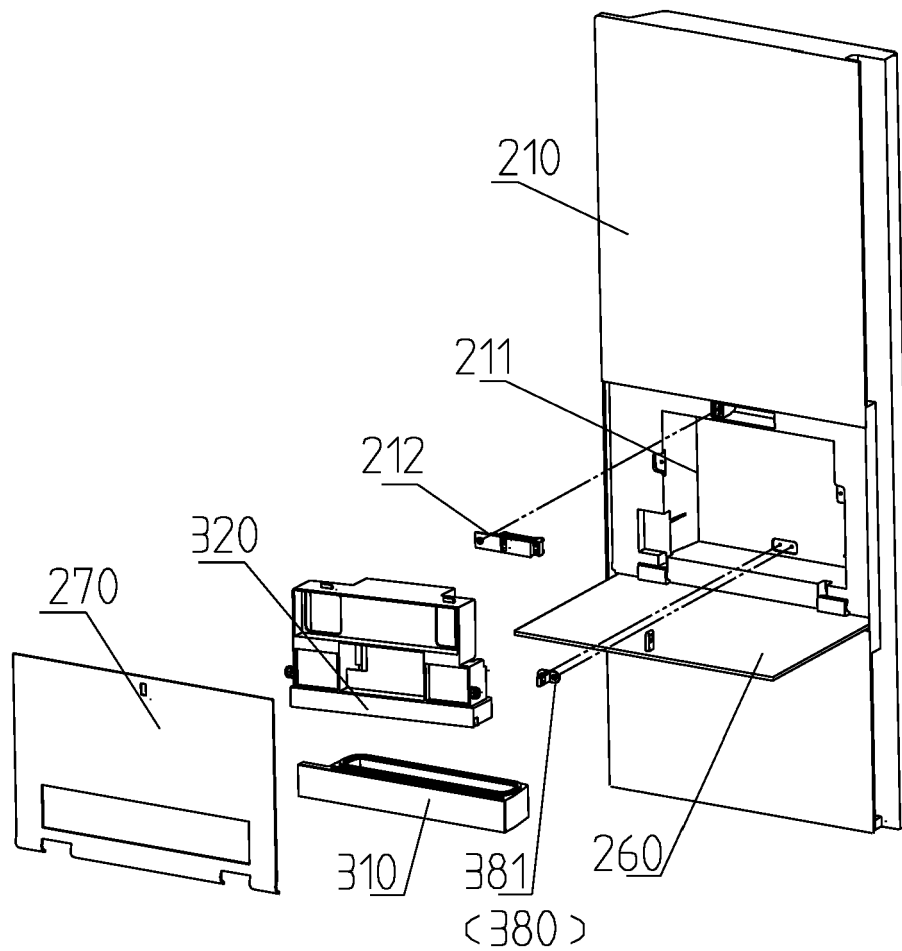


FIG. 27

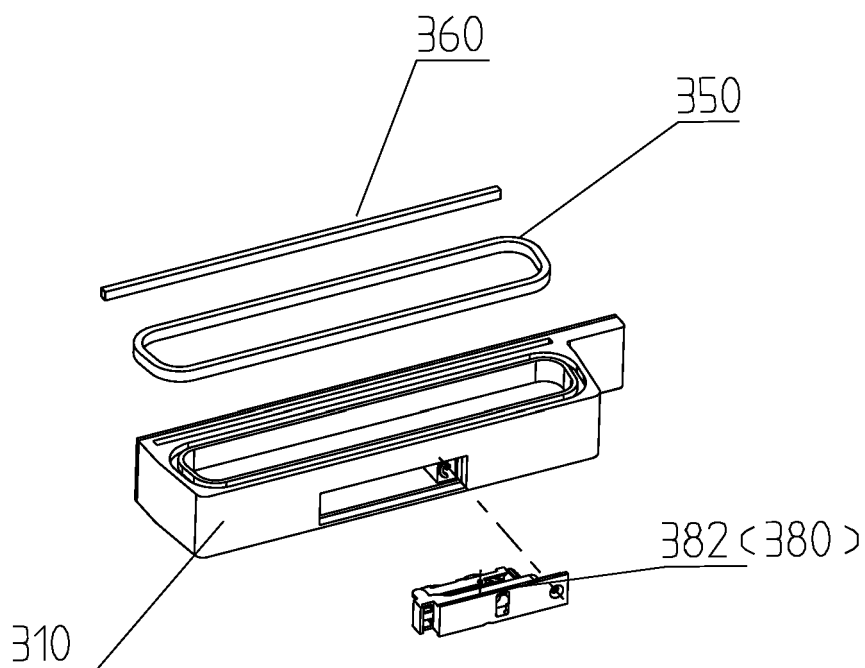


FIG. 28

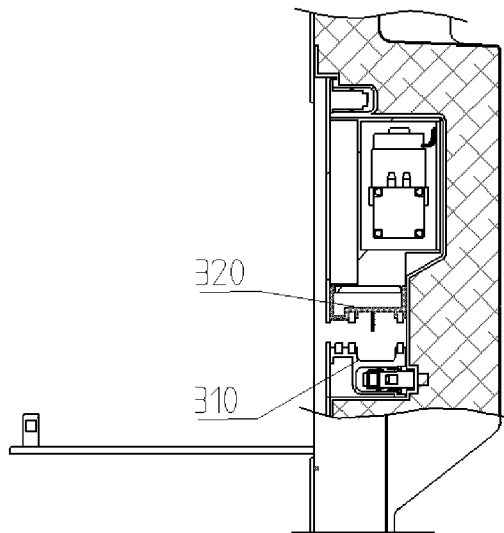


FIG. 29A

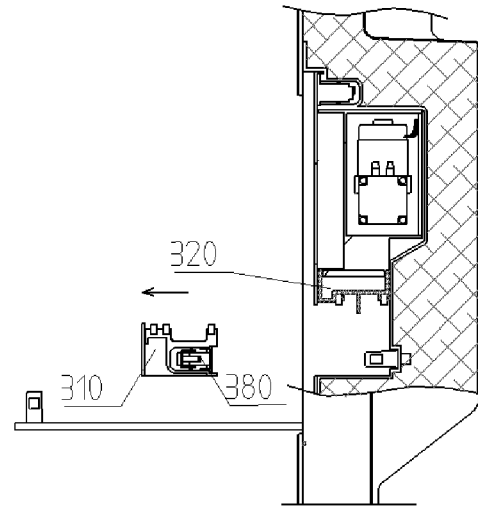


FIG. 29B

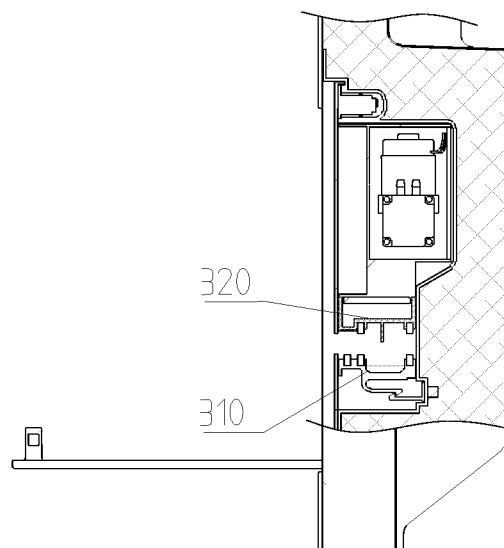


FIG. 30A

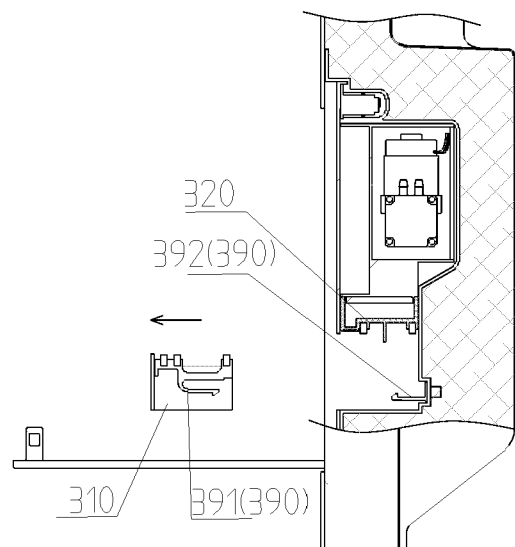


FIG. 30B

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 106895631 A [0005]
- EP 3450893 A1 [0006]
- KR 20070121252 A [0007]
- EP 2168876 A2 [0008]
- CN 207565913 U [0009]