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(54) **HINGE ASSEMBLY AND STORAGE CABINET**

(57) The present application relates to the technical field of hinges, and provides a hinge assembly and a storage cabinet. The hinge assembly comprises a first hinge body and a second hinge body; the first hinge body is provided with one of a hinge slot and a hinge shaft disposed within the hinge slot, and is further provided with one of a limiting slot and a limiting shaft disposed within the limiting slot; the second hinge body is provided with the other of the hinge shaft and the hinge slot, and is further provided with the other of the limiting shaft and the limiting slot; the hinge shaft is adapted to move within the hinge slot to make the limiting shaft move in the extension direction of the limiting slot; the bottom wall of the limiting slot is provided with a first guide surface; the first guide surface gradually descends along an extension direction from an open end to a closed end; the limiting shaft abuts against the first guide surface to make the first hinge body or the second hinge body move up/down along the first guide surface. According to the hinge assembly and the storage cabinet provided by the present application, assistance can be provided for a door closing process and a door opening process can be made more stable.

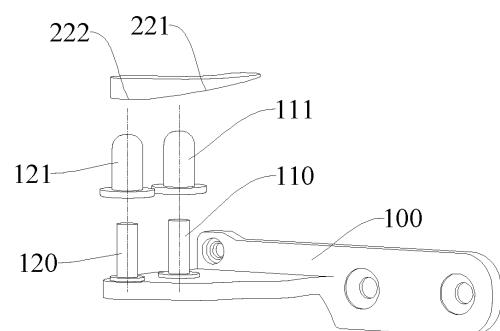


FIG. 2

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to Chinese Application, No. 202010839057.6, filed on August 19, 2020, entitled "Hinge Assembly and Storage Cabinet", which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present application relates to the technical field of hinge, in particular to a hinge assembly and a storage cabinet.

BACKGROUND

[0003] A storage cabinet comprises a cabinet body and a door body. In the related art, the door body is rotatably connected to the cabinet body through a hinge assembly. The storage cabinet may be a refrigerator, a freezer, a microwave oven, a display cabinet and other equipment whose door body is rotatably connected to cabinet body.

[0004] A refrigerator is taken as an example to illustrate the deficiencies in the cooperation between the hinge assembly, the door body and the cabinet body. Under a condition of the door body is closed relative to the cabinet body, when a user pushes the door body to close toward the cabinet body, there will have a relatively large impact on the cabinet body. Besides, the door body is subjected to a reaction force from the cabinet body, which will affect the sealing effect between the door body and the cabinet body.

SUMMARY

[0005] An objective of the present application is to solve at least one of the problems existing in the related art. The present application provides a hinge assembly, which can provide assistance for the process of closing the door, and make the process of closing the door more stable.

[0006] The present application further provides a storage cabinet.

[0007] In a first aspect, the hinge assembly provided by an embodiment of the present application comprises:

a first hinge body, provided with either a hinge groove or a hinge shaft provided in the hinge groove, and further provided with either a limiting groove or a limiting shaft provided in the limiting groove; and a second hinge body, provided with another of either the hinge shaft or the hinge groove, and further provided with another of either the limiting shaft or the limiting groove; wherein the hinge shaft moving in the hinge groove to make the limiting shaft move along an extending direction of the limiting groove,

where a bottom wall of the limiting groove is provided with a first guide surface, the first guide surface gradually sinks along an extending direction from an open end to a closed end, and the limiting shaft abuts against the first guide surface to make the first hinge body or the second hinge body move up and down along the first guide surface.

[0008] The hinge assembly provided by embodiments of the present application comprises a first hinge body and a second hinge body. The first hinge body and the second hinge body are provided with a hinge shaft and a hinge groove, a limiting shaft and a limiting groove, which are matched with each other. A bottom wall of the limiting groove is provided with a first guide surface, and the first guide surface is an inclined surface. From an open end to a closed end of the first guide surface, that is, during the process from an open state to a closed state of the first hinge body and the second hinge body, the limiting shaft abuts against the first guide surface, and assists the first hinge body and the second hinge body to close under the cooperation of the first guide surface, and then the process of closing door body is more labor-saving, and the inclined first guide surface is also conducive to the sealing of the door body and the cabinet body. Meanwhile, the first guide surface increases a resistance during the process of opening the first hinge body and the second hinge body, which can reduce the impact from the process of opening the door body on the hinge assembly and improve the stability of the hinge assembly.

[0009] According to an embodiment of the present application, the bottom wall of the limiting groove is provided with a positioning surface, the positioning surface is connected to the open end of the first guide surface, the positioning surface extends in a horizontal direction, and the limiting shaft abuts against the positioning surface to make the first hinge body or the second hinge body move horizontally along the positioning surface.

[0010] According to an embodiment of the present application, the hinge groove is a long groove, the hinge shaft moves along an extending direction of the hinge groove, and the hinge groove comprises a first position and a second position at two ends of the hinge groove, wherein from the first position to the second position, the limiting shaft moves along the closed end to the open end; a bottom wall of the hinge groove is provided with a second guide surface, and the second guide surface gradually sinks along an extending direction from the second position to the first position, wherein the hinge shaft abuts against the second guide surface to move up and down along the second guide surface.

[0011] According to an embodiment of the present application, the hinge groove is a long groove, and the hinge groove has a first position near the limiting groove and a second position away from the limiting groove;

the limiting groove comprises a first groove portion

and a second groove portion which are communicated with each other, and the second groove portion extends in a direction away from the hinge groove relative to the first groove portion;

the hinge shaft moves from the second position to the first position, and the limiting shaft moves from the first groove portion to the second groove portion, to make the first hinge body and the second hinge body approach to each other; and
the hinge shaft moves from the first position to the second position, and the limiting shaft moves from the second groove portion to the first groove portion, to make the first hinge body and the second hinge body away from each other.

[0012] According to an embodiment of the present application, the hinge groove comprises a first moving portion and a first limiting portion which are communicated with each other, and the limiting groove comprises a second moving portion and a second limiting portion forming an included angle in an extending direction of the second moving portion;

the hinge shaft is adapted to moving relative to the first moving portion, to make the limiting shaft move along the extending direction of the second moving portion;

or,

the hinge shaft is located in the first limiting portion, and the limiting shaft is located in the second limiting portion, to make the first hinge body and the second hinge body fix with each other.

[0013] According to an embodiment of the present application, the first limiting portion protrudes in a direction away from the second moving portion, and the second limiting portion protrudes in a direction approaching to the first moving portion.

[0014] According to an embodiment of the present application, in the limiting groove, there is provided with an elastic limiting component configured for reducing a width of a preset position in the limiting groove, and the limiting shaft overcoming a resistance of the elastic limiting component to pass through the preset position.

[0015] According to an embodiment of the present application, the elastic limiting component comprises a first limiting body and a second limiting body which are provided opposite to each other, the first limiting body and the second limiting body limit an opening end and a closing end, the opening end opens toward an extending direction of the limiting groove and is located at the preset position, an opening width of the opening end is smaller than a width of the limiting shaft, the limiting shaft overcomes an elastic resistance of the opening end to pass through the preset position, and the limiting shaft is limited between the opening end and the closing end.

[0016] In a second aspect, the storage cabinet provided by an embodiment of the present application comprises

a cabinet body, a door body, and the hinge assembly described in the above-mentioned embodiments, where the hinge assembly connects a lower end of the door body to the cabinet body.

[0017] According to an embodiment of the present application, an upper end of the door body is connected to the cabinet body through the hinge assembly, and the limiting shaft at the upper end and the limiting shaft at the lower end abut against the bottom wall of the limiting groove respectively.

[0018] The above-mentioned one or more solutions in embodiments of the present application have at least one of the following effects.

[0019] The hinge assembly provided by an embodiment of the present application comprises a first hinge body and a second hinge body. The first hinge body and the second hinge body are provided with a hinge shaft and a hinge groove, a limiting shaft and a limiting groove, which are matched with each other. A bottom wall of the limiting groove is provided with a first guide surface, and the first guide surface is an inclined surface. From an open end to a closed end of the first guide surface, that is, during the process from an open state to a closed state of the first hinge body and the second hinge body, the limiting shaft abuts against the first guide surface, and assists the first hinge body and the second hinge body to close under the cooperation of the first guide surface, and then the process of closing the door body is more labor-saving, and the inclined first guide surface is also conducive to the sealing of the door body and the cabinet body. Meanwhile, the first guide surface increases a resistance during the process of opening the first hinge body and the second hinge body, which can reduce the impact of the process of opening the door body on the hinge assembly and improve the stability of the hinge assembly.

[0020] Further, an embodiment of the present application further provides a storage cabinet including a cabinet body and a door body. A lower end of the door body is connected to the cabinet body through the hinge assembly of the above-mentioned embodiments. During the process of opening and closing the door body relative to the cabinet body, a first guide surface can provide resistance of opening the door body and assistance of closing the door body, and then the process of closing the door body is more labor-saving and the process of opening the door body is more stable.

[0021] Additional aspects and advantages of the present application are set forth, in part, from the following description, and the part will become clear from the following description, or will be learned by practice of the present application.

BRIEF DESCRIPTION OF DRAWINGS

[0022] To more clearly illustrate embodiments of the present application or the solutions in the related art, accompanying drawings used in the description of the em-

bodiments or the related art are briefly introduced below. The drawings in the following description only show some embodiments of the present application. For those of ordinary skill in the art, other drawings can also be obtained based on these drawings without creative effort.

FIG. 1 is a structural diagram of an exploded state of a hinge assembly provided by an embodiment of the present application.

FIG. 2 is a structural diagram of an exploded state of the relative positional relationship between a limiting shaft and a bottom wall of a limiting groove of a hinge assembly provided by an embodiment of the present application.

FIG. 3 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where a first hinge body and a second hinge body are in a closed state, a hinge shaft is located at a first position of a hinge groove, and a limiting shaft is located in a second groove portion of a limiting groove and abuts against a first guide surface.

FIG. 4 is a partial enlarged structural diagram of A part in FIG. 3.

FIG. 5 is a sectional structural diagram of B-B part in FIG. 4.

FIG. 6 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where the difference from FIG. 3 is that a first hinge body and a second hinge body are in an open state, and a hinge shaft is located at a second position of a hinge groove, and a limiting shaft is located in a first groove portion of a limiting groove and abuts against a first guide surface.

FIG. 7 is a partial enlarged structural diagram of C part in FIG. 6.

FIG. 8 is a sectional structural diagram of D-D part in FIG. 7.

FIG. 9 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where the difference from FIG. 6 is that a first hinge body and a second hinge body are opened to a maximum angle, and a limiting shaft abuts against a positioning surface.

FIG. 10 is a partial enlarged structural diagram of E part in FIG. 9.

FIG. 11 is a sectional structural diagram off-F in FIG. 10.

FIG. 12 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where a first hinge body and a second hinge body are limited to a position where an opening angle is 90°, a hinge shaft is limited to a first limiting portion, and a limiting shaft is limited to a second

limiting portion.

FIG. 13 is a partial enlarged structural diagram of H part in FIG. 12

FIG. 14 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where a first hinge body and a second hinge body are capable of moving relative to each other, a hinge shaft is located at a first moving portion, and a limiting shaft is located at a second moving portion;

FIG. 15 is a partial enlarged structural diagram of I part in FIG. 14.

FIG. 16 is a structural diagram of an exploded state of an elastic limiting component provided in a limiting groove of a hinge assembly provided by an embodiment of the present application.

FIG. 17 is a structural diagram of an elastic limiting component of a hinge assembly provided in an embodiment of the present application.

FIG. 18 is a structural diagram of an end cover connected to a cabinet body and a door body of a hinge assembly provided by an embodiment of the present application; where a first hinge body and a second hinge body are in a closed state, a hinge shaft is at a first position, and a limiting shaft is located in a second groove portion of a limiting groove and is limited within an elastic limiting component.

FIG. 19 is a partial enlarged structural diagram of G part in FIG. 18.

[0023] Reference numerals: 100: first hinge body; 110: hinge shaft; 111: first lubricating shaft sleeve; 112: first through hole; 120: limiting shaft; 121: second lubricating shaft sleeve; 200: second hinge body; 210: hinge groove; 211: first moving portion; 212: first position; 213: second position; 214: first limiting portion; 215: second through hole; 220: limiting groove 221: first guide surface; 222: positioning surface; 223: second moving portion; 224: first groove portion; 225: second groove portion; 226: second limiting portion; 230: inserting groove; 300: elastic limiting component; 310: opening end; 320: closing end; 330: folded portion; 340: first limiting body; 350: second limiting body; 400: cabinet body; 500: end cover.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0024] The embodiments of the present application will be described in further detail below with reference to the drawings and embodiments. The following embodiments are intended to illustrate the present application, but not to limit the scope of the present application.

[0025] In the description of the present application, it should be noted that, the orientation or positional relations specified by terms such as "central", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer" and the like, are based on the orientation or positional relations shown in the

drawings, which is merely for convenience of description of the present application and to simplify description, but does not indicate or imply that the stated devices or components must have a particular orientation and be constructed and operated in a particular orientation, and thus it is not to be construed as limiting the present application. Furthermore, the terms "first", "second", "third" and the like are only used for descriptive purposes and should not be construed as indicating or implying a relative importance.

[0026] In the description of the present application, it should be noted that unless explicitly specified and defined otherwise, the terms "connected to" and "connected" shall be understood broadly, for example, it may be either fixedly connected or detachably connected, or can be integrated; it may be either mechanically connected, or electrically connected; it may be either directly connected, or indirectly connected through an intermediate medium. The specific meanings of the terms above in the present application can be understood by a person skilled in the art in accordance with specific conditions.

[0027] In the embodiments of the present application, unless otherwise expressly specified and defined, a first feature is "on" or "under" a second feature can refer to that the first feature is directly contacted with the second feature, or the first feature is indirectly contacted with the second feature through an intermediate medium. And further, the first feature is "on", "above" and "over" the second feature can refer to that the first feature is directly above or obliquely above the second feature, or simply refer to that the level height of the first feature is higher than that of the second feature. The first feature is "under", "below" and "beneath" the second feature can refer to that the first feature is directly below or obliquely below the second feature, or simply refer to that the level height of the first feature is lower than that of the second feature.

[0028] In the description of this specification, description with reference to the terms "one embodiment", "some embodiments", "an example", "specific example", "some examples" and the like, refers to that specific features, structures, materials or characteristics described in combination with an embodiment or an example are included in at least one embodiment or example according to the embodiments of the present application. In this specification, schematic representations of the above terms are not necessarily directed to a same embodiment or example. Furthermore, the particular features, structures, materials or characteristics described can be combined in any suitable manner in any one or more embodiments or examples. In addition, those skilled in the art may combine the different embodiments or examples described in this specification, as well as the features of the different embodiments or examples, without conflicting each other.

[0029] In a first aspect, as shown in FIG. 1 to FIG. 11, an embodiment of the present application provides a hinge assembly, including: a first hinge body 100 and a second hinge body 200 which is capable of opening and

closing relative to the first hinge body 100. When the first hinge body 100 is connected to a cabinet body 400 and the second hinge body 200 is connected to a door body, for example, the second hinge body 200 can be connected to the door body through an end cover 500 on the door body, the door body can be rotatably opened and closed relative to the cabinet body 400. The first hinge body 100 is not limited to being connected to the cabinet body 400, and can also be connected to a door frame, and then the door body can be rotatably opened and closed relative to the door frame. The following embodiments will be described by taking that the hinge assembly is used for connecting the door body and the cabinet body 400 as an example.

[0030] The first hinge body 100 is provided with one of a hinge groove 210 and a hinge shaft 110 provided in the hinge groove 210, and the first hinge body 100 is provided with one of a limiting groove 220 and a limiting shaft 120 provided in the limiting groove 220; the second hinge body 200 is provided with another of the hinge shaft 110 and the hinge groove 210, and the second hinge body 200 is provided with another of the limiting shaft 120 and the limiting groove 220. The hinge shaft 110 is adapted to moving in the hinge groove 210 to make the limiting shaft 120 move along an extending direction of the limiting groove 220. The movement of the hinge shaft 110 and the limiting shaft 120 realizes opening and closing adjustment of the first hinge body 100 and the second hinge body 200, and further realizes opening and closing adjustment of the door body relative to the cabinet body 400.

[0031] Referring to FIG. 1, the first hinge body 100 is provided with a hinge shaft 110 and a limiting shaft 120, and the second hinge body 200 is provided with a hinge groove 210 and a limiting groove 220; or the first hinge body is provided with the hinge shaft and the limiting groove (not shown in the figures), the second hinge body is provided with the hinge groove and the limiting shaft; or, the first hinge body is provided with the hinge groove and the limiting groove (not shown in the figures), the second hinge body is provided with the hinge shaft and the limiting shaft; or the first hinge body is provided with the hinge groove and the limiting shaft (not shown in the figures), and the second hinge body is provided with the hinge shaft and the limiting groove.

[0032] The above-mentioned combination of the first hinge body 100 and the second hinge body 200 has the same working mechanism. In this embodiment and the following embodiments, "the first hinge body 100 is provided with the hinge shaft 110 and the limiting shaft 120, and the second hinge body 200 is provided with the hinge groove 210 and the limiting groove 220" shown in FIG. 1 is used as an example for description.

[0033] A bottom wall of the limiting groove 220 is provided with a first guide surface 221, the first guide surface 221 gradually sinks along an extending direction from an open end to a closed end, and the direction from the open end to the closed end is namely the direction from an

open state to a closed state of the first hinge body 100 and the second hinge body 200. The limiting shaft 120 abuts against the first guide surface 221 to drive the first hinge body 100 or the second hinge body 200 to move up and down along the first guide surface 221.

[0034] In combination with the above, the cabinet body 400 is connected to the first hinge body 100 and the door body is connected to the second hinge body 200. In this embodiment and the following embodiments, the first hinge body 100 (limiting shaft 120) being fixed and the second hinge body 200 (limiting groove 220) moving up and down (that is, the cabinet body 400 remains fixed, and the door body moves up and down relative to the cabinet body 400) are used as an example for description.

[0035] The first guide surface 221 gradually sinks along the extending direction from the open end to the closed end, that is, the first guide surface 221 extends obliquely, and the first guide surface 221 extends along a direction from the open end to the closed end and away from the limiting shaft.

[0036] Referring to FIG. 3 to FIG. 8, when the door body is opened relative to the cabinet body 400, the limiting shaft 120 abuts against the first guide surface 221, the limiting shaft 120 remains fixed, and the limiting groove 220 ascends relative to the limiting shaft 120. During the ascending process of the limiting groove 220, the second hinge body 200 should overcome the resistance of its own gravity between the first guide surface 221 and the limiting shaft 120, to increase the resistance of opening the door body, which can reduce the impact of the process of opening the door body on the hinge assembly, and contribute to improve the stability of the hinge assembly. Referring to FIG. 3 to FIG. 8, when the door body is closed relative to the cabinet body 400, the limiting shaft 120 abuts against the first guide surface 221, the limiting groove 220 descends relative to the limiting shaft 120. During the descending process of the limiting groove 220, the gravity of the second hinge body 200 drives the second hinge body 200 to move in the direction of the closed state, which makes the process of closing the door body more labor-saving, and also contributes to ensure the sealing performance between the door body and the cabinet body 400; and when the slope of the first guide surface 221 is large enough, the door body can be automatically closed along the first guide surface 221.

[0037] The ascending and descending distances of the second hinge body 200 are relatively short, which has little influence on the relative position of the door body and the cabinet body 400. The ascending and descending distances are related to the slope of the first guide surface 221.

[0038] In the hinge assembly provided by the embodiment, by providing the first guide surface 221 in the limiting groove, it can be ensured that the door body is smoothly closed without additionally providing an attracting structure, the sealing performance between the door

body and the cabinet body 400 can be improved, the structure of the hinge assembly can be simplified and connecting components between the door body and the cabinet body 400 can be reduced.

[0039] In an embodiment, as shown in FIG. 2, FIG. 5, FIG. 8 and FIG. 11, the bottom wall of the limiting groove 220 is provided with a positioning surface 222, and the positioning surface 222 is connected to the open end of the first guide surface 221. The positioning surface 222 extends in a horizontal direction, and the limiting shaft 120 abuts against the positioning surface 222 to make the first hinge body 100 or the second hinge body 200 move horizontally along the positioning surface 222. The limiting shaft 120 moves relative to the positioning surface 222, and the height of the positioning surface 222 remains unchanged, then the door body no longer moves up and down relative to the cabinet body 400, and the resistance between the positioning surface 222 and the limiting shaft 120 helps the door body to hover relative to cabinet body 400.

[0040] The open state comprises a first open state and a second open state. From the closed state to the first open state, the limiting shaft 120 abuts against the first guide surface 221; and from the first open state to the second open state, the limiting shaft 120 abuts against the positioning surface 222.

[0041] From the closed state to the second open state, the limiting shaft 120 first contacts the first guide surface 221, and during the movement along the first guide surface 221, the second hinge body 200 ascends relative to the closed state, that is, the door body ascends and opens relative to the cabinet body 400; the limiting shaft 120 moves to the position where it is separated from the first guide surface 221 and abuts against the positioning surface 222, the height of the second hinge body 200 remains unchanged, and the limiting shaft 120 and the limiting groove 220 only move relative to the extending direction of the limiting groove 220, and at this time, the door body keeps moving horizontally and continues to open, and no longer ascends. From the second open state to the closed state, the limiting shaft 120 first moves horizontally along the positioning surface 222, and then moves to abut against the first guide surface 221, and the second hinge body 200 descends, to make the door body descend relative to the cabinet body 400, and the door body slides down along the first guide surface 221 by its own gravity, which contributes to the process of closing the door body, to make the process of closing the door body more labor-saving.

[0042] The opening angle of the first open state is smaller than the opening angle of the second open state, and the boundary between the first opening state and the second opening state can be selected as required, for example, the opening angle of the boundary is 60° or 90°. The second opening state comprises a maximum opening angle. The horizontal direction refers to the direction perpendicular to the height of the cabinet body 400 when the door body is installed on the cabinet body

400, to ensure that the door body can be opened and closed stably.

[0043] In an embodiment, the hinge groove 210 is a long groove, the hinge shaft 110 is adapted to moving along an extending direction of the hinge groove 210, and the hinge groove 210 has a first position 212 and a second position 213 at two ends of the hinge groove 210. The limiting shaft 120 moves along the closed end to the open end from the first position 212 to the second position 213. A bottom wall of the hinge groove 210 is provided with a second guide surface (not shown in the figures, but the shape of the first guide surface 221 can be referred to), and the second guide surface gradually sinks along the extending direction from the second position to the first position, and the hinge shaft 110 abuts against the second guide surface to move up and down along the second guide surface. When the limiting shaft 120 and the limiting groove 220 move up and down relative to each other, the hinge shaft 110 and the hinge groove 210 also move relative to each other and accordingly move up and down relative to each other, and then the hinge shaft 110 and the bottom wall of the hinge groove 210 are kept in contact and supported, and the forces on the first hinge body 100 and the second hinge body 200 are more balanced.

[0044] When the hinge shaft 110 moves along the extending direction of the hinge groove 210, the limiting groove 220 and the limiting shaft 120 move synchronously, to ensure the relative positional relationship between the hinge shaft 110, the hinge groove 210, the limiting shaft 120 and the limiting groove 220. The hinge groove 210 is a long groove, which can be matched with limiting grooves 220 having different shapes, to make that there is a relative movement of back and forth, left and right between the first hinge body 100 and the second hinge body 200, and then the door body moves back and forth, left and right relative to the cabinet body 400, which can overcome the interference problem between the door body and fixed structure such as the cabinet body 400 or a wall body. The long groove can be an oblong groove, which is adapted to matching with a cylindrical hinge shaft 110.

[0045] The hinge groove 210 can also be a cylindrical groove. The hinge shaft 110 only rotates relative to the hinge groove 210. The limiting shaft 120 cooperates with the limiting groove 220 to adjust the process of opening and closing the door body.

[0046] In the above-mentioned embodiments, the first guide surface 221, the positioning surface 222 and the second guide surface can all be plane surface or curved surface, where the plane surface has simple structure, and the curved surface can be adapted to the shape of ends of a second lubricating shaft sleeve 121 and a first lubricating shaft sleeve 111 in the following embodiments, to further guide and limit the limiting shaft 120 and the hinge shaft 110.

[0047] In an embodiment, as shown in FIG. 4, FIG. 7 and FIG. 10, the hinge groove 210 is a long groove, and

the hinge groove 210 has a first position 212 near the limiting groove 220 and a second position 213 away from the limiting groove 220. The limiting groove 220 comprises a first groove portion 224 and a second groove portion 225 which are connected with each other, and the second groove portion 225 extends in a direction away from the hinge groove 210 relative to the first groove portion 224. The hinge shaft 110 moves from the second position 213 to the first position 212, and the limiting shaft 120 moves from the first groove portion 224 to the second groove portion 225, to make the first hinge body 100 and the second hinge body 200 approach to each other. The hinge shaft 110 moves from the first position 212 to the second position 213, and the limiting shaft 120 moves from the second groove portion 225 to the first groove portion 224, to make the first hinge body 100 and the second hinge body 200 away from each other.

[0048] When the cabinet body 400 and the door body are closed to each other, the limiting shaft 120 is located in the second groove portion 225, and the hinge shaft 110 is located at the first position 212 in the limiting groove 220. The first hinge body 100 and the second hinge body 200 are approached to each other, to reduce the distance between the door body and the cabinet body, and then facilitate the sealing of the door body and the cabinet body. Referring to the states shown in FIG. 4 and FIG. 7, the door body is opened at a predetermined angle relative to the cabinet body 400, the first hinge body 100 is away from the second hinge body 200, and at this time, the limiting shaft 120 moves from the second groove portion 225 to the first groove portion 224, and the hinge shaft 110 moves from the first position 212 to the second position 213, which increase the distance between the door body and the cabinet body, and can avoid interference between the door body and the cabinet body. Referring to the states shown in FIG. 7 to FIG. 10, the door body is opened to a maximum angle relative to the cabinet body 400, the first hinge body 100 is kept away from the second hinge body 200, and the hinge shaft 110 can be adjusted rotatably at the second position 213 to drive the limiting shaft 120 to move in an arc-shaped path in the first groove portion 224. When the limiting shaft 120 moves from contacting with the first guide surface 221 to contacting with the positioning surface 222, the first hinge body 100 and the second hinge body 200 can hover under the resistance of the positioning surface 222, to reduce the impact force from the door body on the hinge assembly during the opening process of the second hinge body 200 relative to the first hinge body 100, and contribute to improve the stability and service life of the hinge assembly.

[0049] When the hinge assembly provided by this embodiment is applied between the door body and the cabinet body 400 of a refrigeration equipment (such as a refrigerator), the distance between the door body and the cabinet body 400 is relatively small when the door body is closed, to make the thickness of the door seal between the door body and the cabinet body 400 be reduced. By

reducing the thickness of the door seal, the thermal conductivity of the door seal is reduced, and by canceling the magnetic strip in the door seal or changing the magnetic strip in the door seal, such as reducing the filler in the magnetic strip, the thermal conductivity of the magnetic strip can be reduced, and the heat preservation and thermal insulation effects of the door seal can also be improved, which can improve the thermal preservation performance of the refrigeration equipment and reduce the energy consumption of the refrigeration equipment.

[0050] The first groove portion 224 and the second groove portion 225 forming an included angle means that the center line of the first groove portion 224 and the center line of the second groove portion 225 form an included angle. The size of the included angle between the first groove portion 224 and the second groove portion 225 is related to the distance between the first position 212 and the second position 213. When the hinge shaft 110 is located at the first position 212, it is necessary to ensure that the limiting shaft 120 is located in the second groove portion 225. When the hinge shaft 110 is located at the second position 213, it is necessary to ensure that the limiting shaft 120 is located in the first groove portion 224. Referring to FIG. 4, FIG. 7 and FIG. 10, the first position 212 and the second position 213 are two opposite ends of the limiting groove 220 respectively. It should be noted that when the hinge groove comprises the first moving portion 211 and the first limiting portion, the first position 212 and the second position 213 are two ends of the first moving portion 211 respectively.

[0051] In an embodiment, as shown in FIG. 12 to FIG. 15, the hinge groove 210 comprises a first moving portion 211 and a first limiting portion 214 which are communicated with each other, and the limiting groove 220 comprises a second moving portion 223 and a second limiting portion 226 forming an included angle with an extending direction of the second moving portion 223. The hinge shaft 110 is adapted to moving relative to the first moving portion 211, to make the limiting shaft 120 move along the extending direction of the second moving portion 223; or the hinge shaft 110 is located in the first limiting portion 214, and the limiting shaft 120 is located in the second limiting portion 226, to make the first hinge body 100 and the second hinge body 200 be fixed with each other. The hinge shaft 110 and the limiting shaft 120 can be positioned through the first limiting portion 214 and the second limiting portion 226, to realize that the door body can hover relative to the cabinet body 400.

[0052] Referring to FIG. 12 and FIG. 13, when it is needed to limit the door body to a preset opening angle, the hinge shaft 110 moves from the first moving portion 211 to the first limiting portion 214. At this time, the limiting shaft 120 moves from the second moving portion 223 to the second limiting portion 226, to prevent the hinge shaft 110 from moving, and also prevent the limiting shaft 120 from moving. Then the door body is limited under the joint action of the first limiting portion 214 and the second limiting portion 226, to make the first hinge body 100 and

the second hinge body 200 be fixed with each other, and the door body be kept at the preset opening angle. Referring to FIG. 14 and FIG. 15, when it is needed to adjust the preset opening angle of the door body or it is needed to close the door body to the cabinet body 400, the door body needs to move again, and the hinge shaft 110 needs to move from the first limiting portion 214 to the first moving portion 211. At this time, the limiting shaft 120 moves from the second limiting portion 226 to the second moving portion 223, and then the hinge shaft 110 can move in the first moving portion 211, and the limiting shaft 120 can move in the second moving portion 223, which make the first hinge body 100 and the second hinge body 200 can rotate relative to each other, and make the door body can be rotatably adjusted relative to the cabinet body 400.

[0053] The second limiting portion 226 and the extending direction of the second moving portion 223 form an included angle, that is, an included angle is formed between the contour line of the second limiting portion 226 and the contour line of the second moving portion 223, and then the limiting shaft 120 cannot move along the second moving portion 223 after the limiting shaft 120 enters the second limiting portion 226. The extending direction of the limiting groove 220 can be the length direction of the groove, that is, the direction perpendicular to the axial direction of the limiting shaft 120. The range of the preset opening angle is between the closed state (open 0°) and the maximum opening angle. In general, the preset opening angle is smaller than the maximum opening angle.

[0054] In the hinge assembly provided by this embodiment, the first limiting portion 214 cooperates with the second limiting portion 226 to limit the positions of the first hinge body 100 and the second hinge body 200, to make the door body can hover relative to the cabinet body 400 at the position where the door body is opened at the preset angle position. It can be selected according to needs, and can also prevent the door body from opening to the maximum opening angle, which can reduce the impact force of the door body on the hinge assembly, improve the safety and service life of the hinge assembly, reduce the design strength requirement of the hinge assembly, contributes to reduce the cost of the hinge assembly. Moreover, when the door body hovers at the preset opening angle, it is convenient for picking up and placing items at a fixed position, which is more convenient to use.

[0055] The hinge groove 210 and the limiting groove 220 in this embodiment can be used in cooperation with the positioning surface 222 in the above-mentioned embodiments, to make the door body hover at different positions.

[0056] In an embodiment, as shown in FIG. 12 to FIG. 15, the first limiting portion 214 protrudes in a direction away from the second moving portion 223, and the second limiting portion 226 protrudes in a direction approaching to the first moving portion 211. The first limiting portion 214 is connected to the second position 213 of

the first moving portion 211 and extends away from the first moving portion 211, and then when the hinge shaft 110 enters the first limiting portion 214, the first hinge body 100 is further away from the second hinge body 200, that is, the distance between the door body and the cabinet body 400 is further increased, to avoid interference between the door body and the cabinet body 400. For example, when the door body is pulled outward, the hinge shaft 110 enters the first limiting portion 214, and the limiting shaft 120 enters the second limiting portion 226, then the door body and the cabinet body 400 are relatively fixed, and the door body hovers.

[0057] The second limiting portion 226 protrudes toward the direction approaching the first moving portion 211. For example, the second limiting portion 226 is formed on a side wall of the second moving portion 223 approaching the first moving portion 211.

[0058] The second limiting portion can also be formed on a side wall of the second moving portion away from the first moving portion (not shown in the figures). At this time, the position of the first limiting portion changes accordingly to ensure the relative positional relationship between the limiting shaft and the hinge shaft. At this time, when the door body is pushed inward, the hinge shaft enters the first limiting portion, the limiting shaft enters the second limiting portion, and the distance between the door body and the cabinet body is reduced. This embodiment is suitable for the case that there are sufficient distance between the door body and the cabinet body.

[0059] In an embodiment, there is provided with one first limiting portion, and a plurality of second limiting portions are provided in the extending direction of the second moving portion (not shown in the figures), and then the first hinge body and the second hinge body can be positioned at a plurality of angle positions, and the door body can hover at a plurality of angle positions. Where the plurality of second limiting portions are all corresponding to the one first limiting portion, the limiting shaft can be located in any second limiting portion, and the hinge shaft is located in the first limiting portion. The structure is simple, and it can simplify the structure of the hinge assembly.

[0060] Referring to FIG. 12 to FIG. 15, there is provided with one first limiting portion 214 and one second limiting portion 226 may also be provided, and then the first hinge body 100 and the second hinge body 200 can only be positioned at one angle position, that is, the door hovers at an angle position. Referring to FIG. 12 and FIG. 13, the door hovers at a position of opening 90°.

[0061] An embodiment of the elastic limiting component 300 will be provided below.

[0062] In an embodiment, as shown in FIG. 16 to FIG. 19, in the limiting groove 220, there is provided with an elastic limiting component 300 configured for reducing the width of a preset position in the limiting groove 220, and the limiting shaft 120 is adapted to overcoming a resistance of the elastic limiting component 300 to pass through the preset position.

[0063] The elastic limiting component 300 reduces the width of the preset position in the limiting groove 220. At the preset position, the elastic limiting component 300 provides a resistance for the limiting shaft 120 to continue to move, and then the limiting shaft 120 needs to overcome the resistance of the elastic limiting component 300 to pass through the preset position. The setting of the elastic limiting component 300 enables the limiting shaft 120 to decelerate and to be limited to one side of the preset position. The elastic limiting component 300 is provided in the limiting groove 220, and then a traditional self-locking structure (such as a stop structure) can be omitted between the cabinet body 400 and the door body, to reduce the manufacturing cost.

[0064] In the closed state of the door body, the limiting shaft 120 is located at a first end of the limiting groove 220, and when the door body is opened to the maximum angle, the limiting shaft 120 is located at a second end of the limiting groove 220.

[0065] When the elastic limiting component 300 is provided near the first end of the limiting groove 220, when the door body is closed to the cabinet body 400, the limiting shaft 120 can only move to the first end after passing through the preset position. When passing through the preset position, the elastic resistance of the elastic limiting component 300 can reduce the rotation speed of the door body, thereby reducing the impact force of the door body on the cabinet body 400. In addition, the elastic limiting component 300 can also limit the limiting shaft 120 at the first end, and the elastic limiting component 300 prevents the limiting shaft 120 from moving in the direction in which the door body is opened, to realize a self-locking function.

[0066] When the elastic limiting component 300 is provided near the second end of the limiting groove 220, when the door body is opened relative to the cabinet body 400, the limiting shaft 120 can only move to the second end after passing through the preset position. When the limiting shaft 120 passes through the preset position, the elastic resistance of the elastic limiting component 300 can reduce the rotation speed of the door body, thereby reducing the impact force on the hinge assembly during the process of opening the door body, and improving the safety and structural stability of the hinge assembly. In addition, the elastic limiting component 300 can also limit the limiting shaft 120 at the second end, and the elastic limiting component 300 can prevent the limiting shaft 120 from moving in the direction in which the door body is closed, and then the door body is kept at the maximum opening angle to avoid shaking of the door body.

[0067] The elastic limiting component 300 is near the first end or the second end of the limiting groove 220, and it is needed to ensure that the limiting shaft 120 can be accommodated in the first end or the second end. When the limiting shaft 120 is sleeved with the second lubricating shaft sleeve 121 provided by the following embodiments, the first end or the second end needs to be able to accommodate the second lubricating shaft sleeve

121. Where the extending direction of the limiting groove 220 can be the length direction of the groove, that is, the direction perpendicular to the axial direction of the limiting shaft 120. The width of the preset position in the limiting groove 220 refers to the distance perpendicular to the length direction of the groove. The width of the limiting shaft 120 is the maximum distance along the width direction of the limiting groove 220. When the limiting shaft 120 is a cylindrical shaft, the width of the limiting shaft 120 is the diameter of the cylinder.

[0068] The elastic limiting component 300 can also be provided at other positions in the limiting groove 220 to limit the limiting shaft 120 to a plurality of positions within the limiting groove 220, and then the door body can remain fixed relative to the cabinet body 400 at a plurality of opening angles. That is, one or more of the above-mentioned preset positions can be set in the limiting groove 220, and the preset positions can be selected according to needs.

[0069] In an embodiment, as shown in FIG. 16 to FIG. 19, the elastic limiting component 300 comprises a first limiting body 340 and a second limiting body 350 which are provided opposite to each other, the first limiting body 340 and the second limiting body 350 limit an opening end 310. The opening end 310 opens toward an extending direction of the limiting groove 220 and is located at the preset position, the opening width of the opening end 310 is smaller than the width of the limiting shaft 120, and the limiting shaft 120 will pass the preset position after overcoming the elastic resistance of the opening end 310. The limiting shaft 120 passes through the preset position by spreading the width of the opening end 310. After the limiting shaft 120 passes through, the first limiting body 340 and the second limiting body 350 restore.

[0070] The first limiting body 340 and the second limiting body 350 are provided opposite to each other. When the limiting shaft 120 passes through the preset position, two sides of the limiting shaft 120 are stressed, and the limiting shaft 120 is more uniformly stressed; the elastic limiting component 300 is also stressed on two sides symmetrically, and the elastic limiting component 300 is also more uniformly stressed, which contributes to ensure the service life of the elastic limiting component 300 and the limiting shaft 120.

[0071] Referring to FIG. 18 and FIG. 19, after the door body and the cabinet body 400 are closed, the opening end 310 limits the limiting shaft 120 to play the role of self-locking the door body and the cabinet body 400. The opening end 310 can also be provided at other positions in the limiting groove 220, to limit the door body at different positions, and it can be selected according to needs.

[0072] In an embodiment, as shown in FIG. 17, the first limiting body 340 is connected to the second limiting body 350 to limit a closing end 320. The limiting shaft 120 is adapted to being limited between the closing end 320 and the opening end 310, and the closing end 320 is set at an end of the limiting groove 220. The closing end 320 limits the limiting shaft 120 at the end of the limiting groove

220. Even if the limiting groove 220 is provided with an opening, the closing end 320 can limit the limiting shaft 120 therein. When the elastic limiting component 300 is located at the second end of the limiting groove 220, the closing end 320 can limit the maximum opening angle of the first hinge body 100 and the second hinge body 200.

[0073] It should be noted that the space between the closing end 320 and the opening end 310 should be able to accommodate the limiting shaft 120. The shape of the closing end 320 is adapted to the shape of the limiting shaft 120, to ensure that the limiting shaft 120 can be stably limited within the elastic limiting component 300.

[0074] In an embodiment, the first limiting body and the second limiting body limit two opening ends (not shown in the figures), and the limiting shaft is adapted to being limited between the two opening ends. At this time, the elastic limiting component can be located at any position in the limiting groove, and the two opening ends can limit the limiting shaft from two directions. During the process of closing the door body to the cabinet body and opening the door body relative to the cabinet body, the elastic limiting component can limit the limiting shaft.

[0075] When the position of the opening end corresponds to the position at which the door body is opened at the preset angle relative to the cabinet body, the limiting shaft enters the elastic limiting component through the opening end, and the elastic limiting component limits the limiting shaft within it, so that the door body keep opening at the preset angle.

[0076] The range of the preset angle is between the maximum angle and 0°. In general, the maximum angle is set to 120°.

[0077] One or more elastic limiting components 300 in the above embodiments may be provided in the limiting groove 220, and the limiting groove 220 can be provided with elastic limiting components 300 of different structures. For example, two ends of the limiting groove 220 are respectively provided with elastic limiting components 300 having closing end 320; elastic limiting components having two opening ends are respectively provided in the limiting groove at positions corresponding to 60° and 90° opening of the door.

[0078] In an embodiment, the elastic limiting component 300 is integrally formed by a flake material. If the elastic limiting component 300 is made of plastic, rubber or the like, it can be formed by integral injection molding. If the elastic limiting component 300 is made of metal, it can be formed by bending, which is easy to process and the processing method can be adjusted according to the material. Referring to FIG. 17, the elastic limiting component 300 is provided with an opening end 310 and a closing end 320, and is integrally formed, which has a simple structure and is convenient to be assembled.

[0079] When the first limiting body and the second limiting body of the elastic limiting component limit two opening ends, the first limiting body and the second limiting body can be independent components, which are processed independently. At this time, the first limiting body and the

second limiting body can also be fixedly connected, for example, by a connecting plate or a connecting bar provided on a bottom wall of the limiting groove.

[0080] In an embodiment, as shown in FIG. 16, the elastic limiting component 300 is detachably connected to the limiting groove 220, which facilitates the replacement of the elastic limiting component 300 and is easy to be installed.

[0081] In an embodiment, as shown in FIG. 16 and FIG. 17, a side wall of the limiting groove 220 is provided with an inserting groove 230, and the elastic limiting component 300 is provided with a folded portion 330. The folded portion 330 is inserted into the inserting groove 230. The elastic limiting component 300 can be fixed to the first hinge body 100 or the second hinge body 200 by inserting, which has simple fixing method and is convenient for disassembly and assembly.

[0082] Referring to FIG. 16, FIG. 18 and FIG. 19, the inserting groove 230 communicates with the limiting groove 220 to facilitate processing. It should be noted that, the inserting groove 230 and the limiting groove 220 need to be provided on the first hinge body 100 or the second hinge body 200 simultaneously, but the inserting groove 230 is not limited to communicate with the limiting groove 220. The inserting groove 230 can also be independent from the limiting groove 220. For example, the folded portion 330 of the elastic limiting component 300 is folded from top to bottom. At this time, the inserting groove 230 is provided on the periphery of the limiting groove 220, which is convenient for the folded portion 330 to be inserted and fixed downward.

[0083] The fixing method of the elastic limiting component 300 and the limiting groove 220 is not limited to being fixed by the inserting groove 230, but can also be fixed by clamping or magnetic attraction, etc. If the elastic limiting component 300 is fixed by magnetic attraction, the limiting shaft 120 is set to be made of a ferromagnetic material, and the magnetic field attraction can further limit the position of the limiting shaft 120, to ensure that the limiting shaft 120 is accurately positioned at the preset position.

[0084] It should be noted that the elastic limiting component and the limiting groove can also be integrally and fixedly connected. At this time, the elastic limiting component can be made of elastic sheets, elastic blocks and other structures, and the elastic sheets and elastic blocks can be attached to an inner wall of the limiting groove, which plays the role of reducing the width of the limiting groove, and has simple structure. The material of the elastic sheet and the elastic block can be rubber, flexible plastic and other materials.

[0085] The elastic limiting component 300 in the above embodiments can be used in combination with the first limiting portion 214 and the second limiting portion 226 in the above embodiments, to limit the door body to different angle positions. When the elastic limiting component 300 cooperates with the positioning surface, it contributes to the stable limiting of the limiting shaft.

[0086] Referring to FIG. 12 to FIG. 19, the elastic limiting component 300 can be provided at an end of the limiting groove 220, and the second limiting portion 226 is provided at the position where the door body is opened by 90°, which can ensure that the door body can hover at multi-angles, and can also simplify the structure of the hinge assembly.

[0087] In an embodiment, as shown in FIG. 4, FIG. 7 and FIG. 10, the hinge shaft 110 is provided with a first through hole 112 penetrating along the axial direction of the hinge shaft 110, and in the hinge groove 210, there is provided with a second through hole 215 penetrating along the axial direction of the hinge groove 210. The first through hole 112 communicates with the second through hole 215, and the first through hole 112 is adapted to moving in the second through hole 215. The cooperation of the first through hole 112 and the second through hole 215 can facilitate wiring. Wires pass through the first through hole 112 and the second through hole 215, and is adapted to moving in the hinge groove 210 along with the first through hole 112. The first through hole 112 is located in the second through hole 215, that is, the cross-sectional area of the second through hole 215 covers the moving range of the first through hole 112, which ensures that the first through hole 112 is always located in the second through hole 215, to prevent the wire in the first through hole 112 from hitting the edge of the second through hole 215 and being worn.

[0088] When the hinge assembly provided by this embodiment is used to connect the door body and the cabinet body 400, there is a need to install a display control box and a display control board on the door body or the cabinet body 400. The display control box and the display control board are connected through wires, and the wiring can be routed through the first through hole 112 and the second through hole 215.

[0089] In an embodiment, as shown in FIG. 1 and FIG. 2, a first anti-friction component is provided between the hinge shaft 110 and the hinge groove 210, which can reduce friction between the hinge shaft 110 and the hinge groove 210, and can make the movement of the hinge shaft 110 in the hinge groove 210 be more flexible.

[0090] In an embodiment, the first anti-friction component is configured as a first lubricating shaft sleeve 111 sleeved on the outside of the hinge shaft 110. The first lubricating shaft sleeve 111 is sleeved on the outside of the hinge shaft 110 to completely surround the hinge shaft 110, which can ensure the lubricating effect between the hinge groove 210 and the hinge shaft 110 to reduce friction. The first lubricating shaft sleeve 111 can be made of selflubricating material, which can simplify the structure of the first lubricating shaft sleeve 111.

[0091] Or the first anti-friction component is configured as a first rolling ball connected to the hinge shaft 110, and the first rolling ball can be provided at an end of the hinge shaft 110, to make the first rolling ball is in contact with the bottom wall of the hinge groove 210; the first rolling ball can also be provided on a side wall of the

hinge shaft 110, to make the first rolling ball is in contact with a side wall of the hinge groove 210. By providing the first rolling ball, the friction between the hinge shaft 110 and the hinge groove 210 can be reduced. The first rolling ball is connected to the hinge shaft 110 in a rolling manner, and the installation method of the first rolling ball is similar to a rolling ball at an end of a ballpoint pen or a rolling ball in a bearing.

[0092] In an embodiment, a second anti-friction component is provided between the limiting shaft 120 and the limiting groove 220. The second anti-friction component lubricates the limiting shaft 120 and the limiting groove 220. The structure and working mechanism of the second anti-friction component are similar to those of the first anti-friction component. Reference may be made to the first anti-friction component in the above-mentioned embodiments, which will not be repeated here.

[0093] In an embodiment, the second anti-friction component is configured as a second lubricating shaft sleeve 121 sleeved on the outside of the limiting shaft 120, or the second anti-friction component is configured as a second rolling ball connected to the limiting shaft 120. The lubricating mechanism of the second lubricating shaft sleeve 121 is the same as that of the first lubricating shaft sleeve 111, which will not be repeated here, and can be referred to the first lubricating shaft sleeve 111 in the above-mentioned embodiment; the lubricating mechanism of the second rolling ball is the same as that of the first rolling ball, which will not be repeated here, and can be referred to the first rolling ball in the above-mentioned embodiment.

[0094] It should be noted that, referring to FIG. 1 and FIG. 2, the first anti-friction component and the second anti-friction component may be provided simultaneously.

[0095] Referring to FIG. 1 and FIG. 2, when the hinge shaft 110 is provided on the cabinet body 400 of the refrigeration equipment, and the hinge groove 210 is provided on the door body of the refrigeration equipment, the first hinge body 100, the hinge shaft 110 and the limiting shaft 120 are generally made of metal, and the material of the second hinge body 200 is generally plastic, and then side walls of the hinge groove 210 and the limiting groove 220 are made of plastic. The hinge shaft 110 and the limiting shaft 120 made of metal material directly contact with the side walls of the hinge groove 210 and the limiting groove 220 made of plastic material, which has relatively large friction force, and is easy to be worn. After providing the first lubricating shaft sleeve 111 and the second lubricating shaft sleeve 121, the wear can be effectively reduced, and the movement process of the hinge shaft 110 and the limiting shaft 120 is more flexible.

[0096] It should be noted that when the second through hole 215 is provided in the hinge groove 210, the first anti-friction component cannot be set as the first rolling ball in contact with the bottom wall of the hinge groove 210, and the first anti-friction component can be the first lubrication shaft sleeve 111 or the first rolling ball in con-

tact with the side wall of the hinge groove 210. When the second through hole 215 is provided in the hinge groove 210, the bottom wall of the hinge groove 210 will not be provided with a second guide surface.

[0097] In the above embodiments, the bottom wall of the limiting groove can be integrally formed with the second hinge body, and the bottom wall of the limiting groove can also be detachably connected to the limiting groove, such as a wedge-shaped block provided in the limiting groove, so that the shape of the bottom wall of the limiting groove can be adjusted as required.

[0098] In a second aspect, referring to FIG. 1 to FIG. 19, embodiments of the present application provide a storage cabinet including a cabinet body 400, a door body, and the hinge assembly provided by the above embodiments. The hinge assembly connects a lower end of the door body to the cabinet body 400. The storage cabinet in this embodiment comprises the hinge assembly in the above-mentioned embodiments, and has all the above-mentioned beneficial effects, which will not be repeated here.

[0099] The lower end of the door body is connected to the cabinet body 400 through the hinge assembly. During the process of closing the door body, the gravity of the door body will assist the door body to close to the cabinet body 400, so that the process of closing the door body is more labor-saving, and the sealing effect between the door body and the cabinet body 400 is better.

[0100] The storage cabinets can be refrigeration equipment such as refrigerators, freezers, fresh-keeping cabinets, cold chain compartments or the like. The storage cabinets can also be display cabinets, cupboard or the like, and the storage cabinets can also be household appliances such as microwave ovens and dishwashers. The storage cabinet may also be other structures having the cabinet body 400 and the door body connected by hinge assembly, which will not be listed one by one here.

[0101] In an embodiment, an upper end of the door body is connected to the cabinet body 400 through the hinge assembly, and the limiting shaft 120 at the upper end and the limiting shaft 120 at the lower end abut against the bottom wall of the limiting groove 220 respectively. That is, the upper and lower ends of the door body are connected to the cabinet body 400 through the hinge assembly in the above embodiments, the limiting shaft 120 at the lower end of the door body and the limiting groove 220 support and assist with each other, and the limiting shaft 120 at the upper end of the door body and the limiting groove 220 limit with each other, to ensure stable opening and closing of the door body, prevent the door body from moving up and down, and contribute to improve the stability of the process of opening and closing the door body.

[0102] The upper end of the door body can also be connected to the cabinet body 400 through hinges of other structures. For example, the overall structure of the limiting groove 220 is the same as that in the above-mentioned embodiments, the difference is that the bot-

tom wall of the limiting groove 220 is not in contact with the limiting shaft. The bottom wall of the limiting groove 220 provides space for the lifting movement of the door body, to ensure that the door body can move up and down, the structure of the hinge is simpler, and it is convenient to distinguish the hinge assembly at the upper end of the door body and the hinge assembly at the lower end, and the installation operation is simple and accurate..

[0103] When the storage cabinet in this embodiment is a refrigerator, the cabinet body 400 can be connected to one door body, such as a single-door refrigerator; the cabinet body 400 can be connected to two side-to-side door bodies, such as a side-by-side refrigerator; the cabinet body 400 can be provided with a plurality of door bodies juxtaposed up and down, such as a multi-door refrigerator; and the cabinet body 400 can be connected to four crossdistributed door bodies, such as a cross-side door refrigerator.

[0104] In an embodiment, the first hinge body 100 and the cabinet body 400 are integrally formed or the first hinge body 100 is detachably connected to the cabinet body 400; and/or the second hinge body 200 and the door body are integrally formed or the second hinge body 200 is detachably connected to the door body. The connection method of the first hinge body 100 and the second hinge body 200 is simple and can be selected according to needs, and has a wide range of applications.

[0105] Referring to FIG. 3, FIG. 6, FIG. 9, FIG. 12, FIG. 14 and FIG. 18, the first hinge body 100 is detachably connected to the cabinet body 400 through fasteners such as bolts, screws or the like, which is easy to disassemble, assemble and replace. The second hinge body 200 is integrally formed with the end cover 500 on the door body, which has simple structure, and can reduce the number of components, thereby reducing the assembly workload. The second hinge body 200 can also be a block-shaped structure fixed on the end cover 500 of the door body, which is convenient for disassembly and assembly.

[0106] The upper and lower ends of the door body are connected to the first hinge body 100 of the cabinet body 400 through the second hinge body 200 to ensure the stability of the door body. It should be noted that the contour shapes of the first hinge bodies 100 at the upper and lower ends of the cabinet body 400 may vary according to different positions, but it is necessary to ensure the relative positional relationship between the limiting shaft 120, the limiting groove 220, the hinge shaft 110 and the hinge groove 210.

[0107] The above embodiments are only used to illustrate the present application, but not to limit the present application. Although the present application has been described in detail with reference to the embodiments, those of ordinary skill in the art should understand that various combinations, modifications or equivalent replacements to the solutions of the present application will not depart from the scope of the solutions of the present

application, and should be covered within the scope of the claims of this application.

5 Claims

1. A hinge assembly, **characterized by** comprising:

a first hinge body, being provided with either a hinge groove or a hinge shaft provided in the hinge groove, and the first hinge body further being provided with either a limiting groove or a limiting shaft provided in the limiting groove; and a second hinge body, being provided with another of either the hinge shaft or the hinge groove, and the second hinge body further being provided with another of either the limiting shaft or the limiting groove; wherein the hinge shaft moving in the hinge groove to make the limiting shaft move along an extending direction of the limiting groove,

wherein a bottom wall of the limiting groove is provided with a first guide surface, the first guide surface gradually sinks along an extending direction from an open end to a closed end, and the limiting shaft abuts against the first guide surface to make the first hinge body or the second hinge body move up and down along the first guide surface.

2. The hinge assembly according to claim 1, **characterized in that** the bottom wall of the limiting groove is provided with a positioning surface, the positioning surface is connected to the open end of the first guide surface, the positioning surface extends in a horizontal direction, the limiting shaft abuts against the positioning surface to make the first hinge body or the second hinge body move horizontally along the positioning surface.

3. The hinge assembly according to claim 1, **characterized in that** the hinge groove is a long groove, the hinge shaft moves along an extending direction of the hinge groove, and the hinge groove comprises a first position and a second position at two ends of the hinge groove), wherein from the first position to the second position, the limiting shaft moves along the closed end to the open end; a bottom wall of the hinge groove is provided with a second guide surface, and the second guide surface gradually sinks along an extending direction from the second position to the first position, wherein the hinge shaft abuts against the second guide surface to move up and down along the second guide surface.

4. The hinge assembly according to claim 1, **characterized in that** the hinge groove is a long groove, and the hinge groove comprises a first position near

the limiting groove and a second position away from the limiting groove;

the limiting groove comprises a first groove portion and a second groove portion which are communicated with each other, and the second groove portion extends, relative to the first groove portion, in a direction away from the hinge groove;

the hinge shaft moves from the second position to the first position, and the limiting shaft moves from the first groove portion to the second groove portion, so as to make the first hinge body and the second hinge body approach to each other; and

the hinge shaft moves from the first position to the second position, and the limiting shaft moves from the second groove portion to the first groove portion, so as to make the first hinge body and the second hinge body away from each other.

5. The hinge assembly according to claim 1, **characterized in that** the hinge groove comprises a first moving portion and a first limiting portion which are communicated with each other, and the limiting groove comprises a second moving portion and a second limiting portion, wherein the second limiting portion forming an included angle with the second moving portion in an extending direction of the second moving portion;

the hinge shaft moves relative to the first moving portion, so as to make the limiting shaft move along the extending direction of the second moving portion;

or,

the hinge shaft is located in the first limiting portion, and the limiting shaft is located in the second limiting portion, so as to make the first hinge body and the second hinge body fix with each other.

6. The hinge assembly of claim 5, **characterized in that** the first limiting portion protrudes in a direction away from the second moving portion, and the second limiting portion protrudes in a direction approaching to the first moving portion.

7. The hinge assembly according to any one of claims 1 to 6, **characterized in that** an elastic limiting component is provided in the limiting groove, wherein the elastic limiting component reducing a width of a preset position in the limiting groove, and the limiting shaft overcoming a resistance of the elastic limiting component to pass through the preset position.

8. The hinge assembly according to claim 7, **characterized in that** the elastic limiting component comprises a first limiting body and a second limiting body which are provided opposite to each other, the first limiting body and the second limiting body limit an opening end and a closing end, wherein the opening end opens toward the extending direction of the limiting groove and is located at the preset position, an opening width of the opening end is smaller than a width of the limiting shaft, the limiting shaft overcomes an elastic resistance of the opening end to pass through the preset position, and the limiting shaft is limited between the opening end and the closing end.

terized in that the elastic limiting component comprises a first limiting body and a second limiting body which are provided opposite to each other, the first limiting body and the second limiting body limit an opening end and a closing end, wherein the opening end opens toward the extending direction of the limiting groove and is located at the preset position, an opening width of the opening end is smaller than a width of the limiting shaft, the limiting shaft overcomes an elastic resistance of the opening end to pass through the preset position, and the limiting shaft is limited between the opening end and the closing end.

9. A storage cabinet, **characterized by** comprising a cabinet body, a door body and a hinge assembly according to any one of claims 1 to 8, wherein a lower end of the door body is connected to the cabinet body through the hinge assembly.

10. The storage cabinet according to claim 9, **characterized in that** an upper end of the door body is connected to the cabinet body through the hinge assembly, and a limiting shaft at the upper end and a limiting shaft at the lower end respectively abut against a bottom wall of a limiting groove.

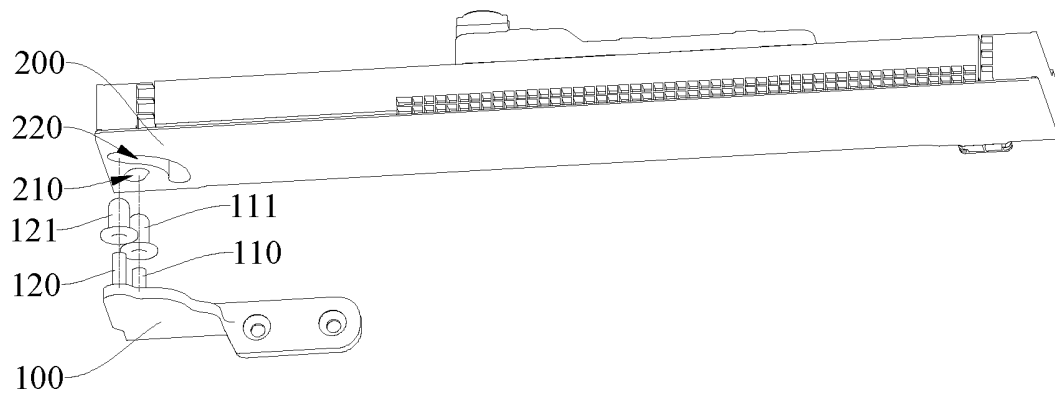


FIG. 1

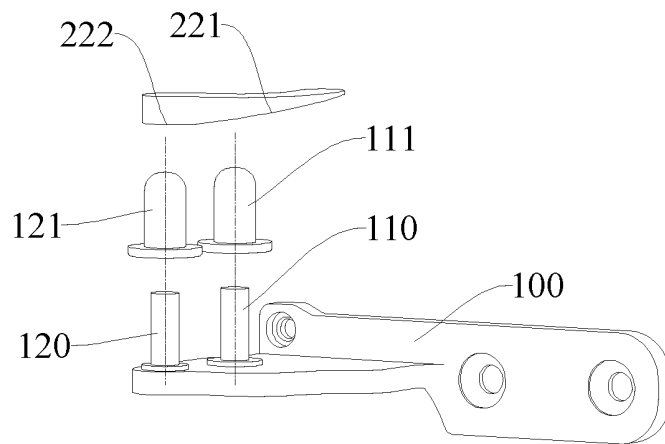


FIG. 2

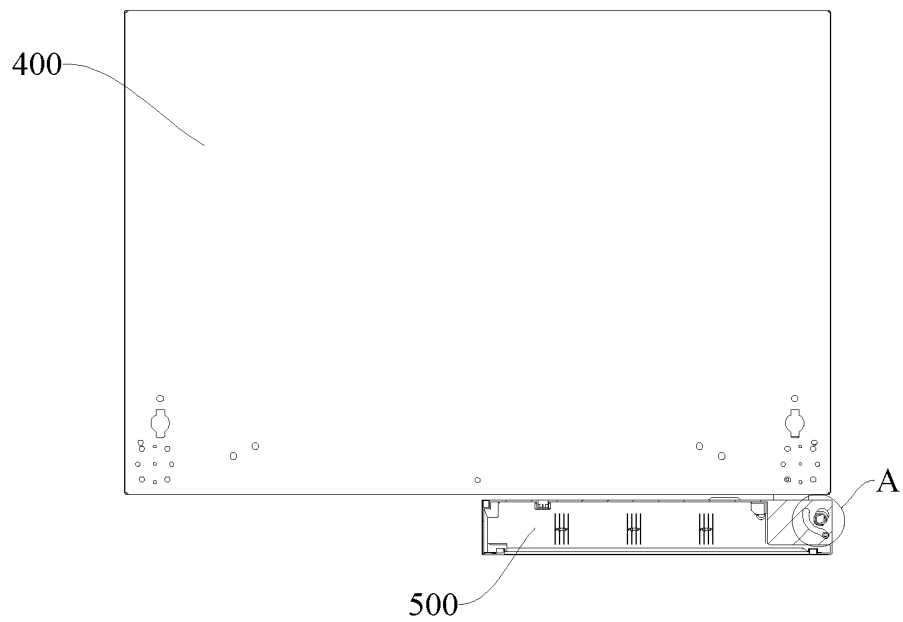


FIG. 3

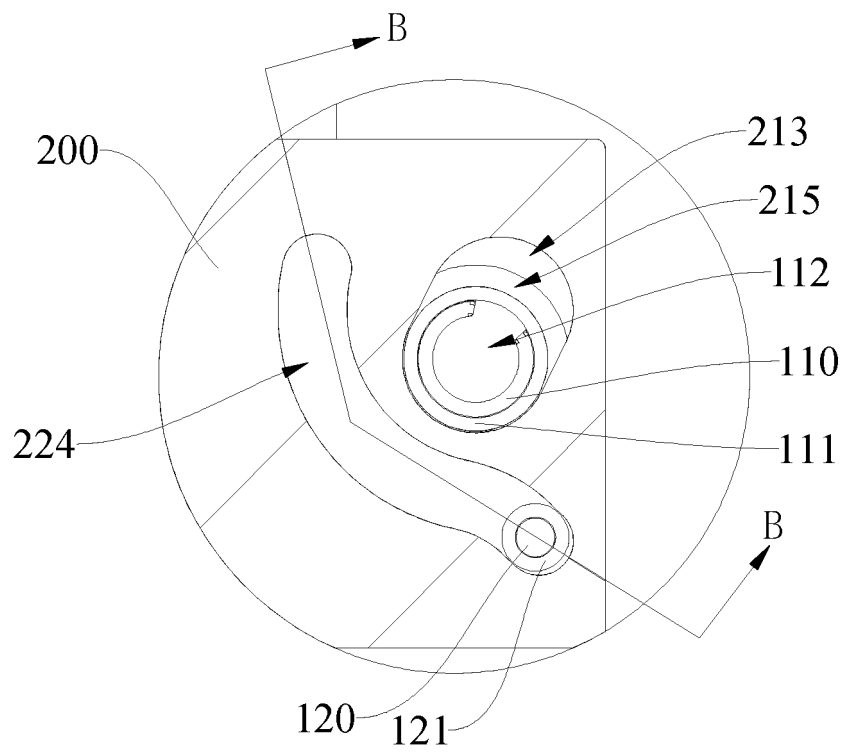


FIG. 4

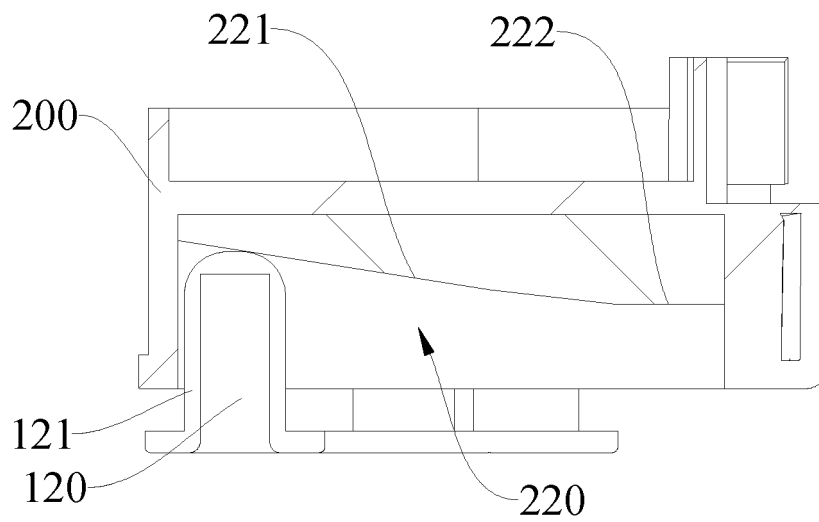


FIG. 5

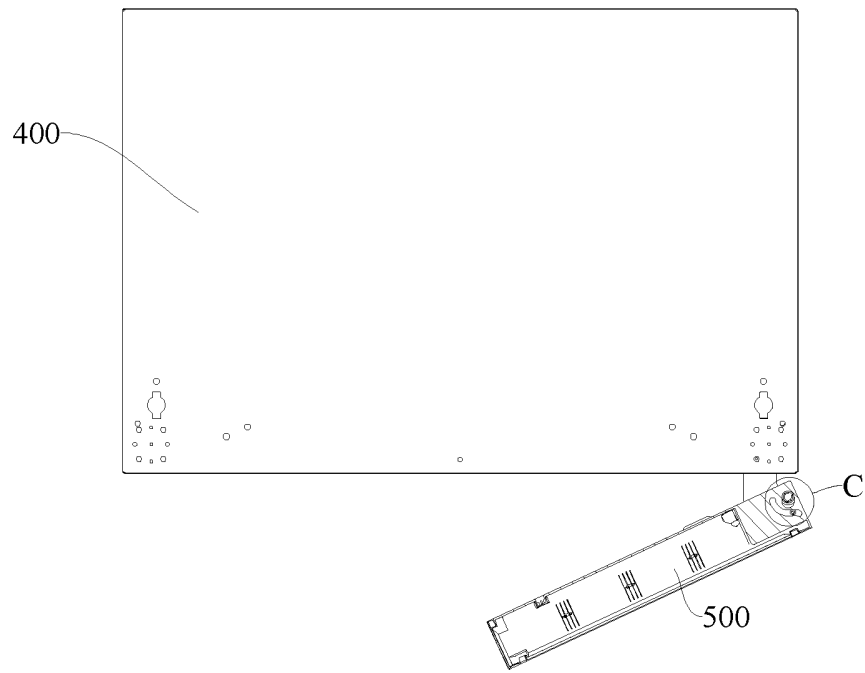


FIG. 6

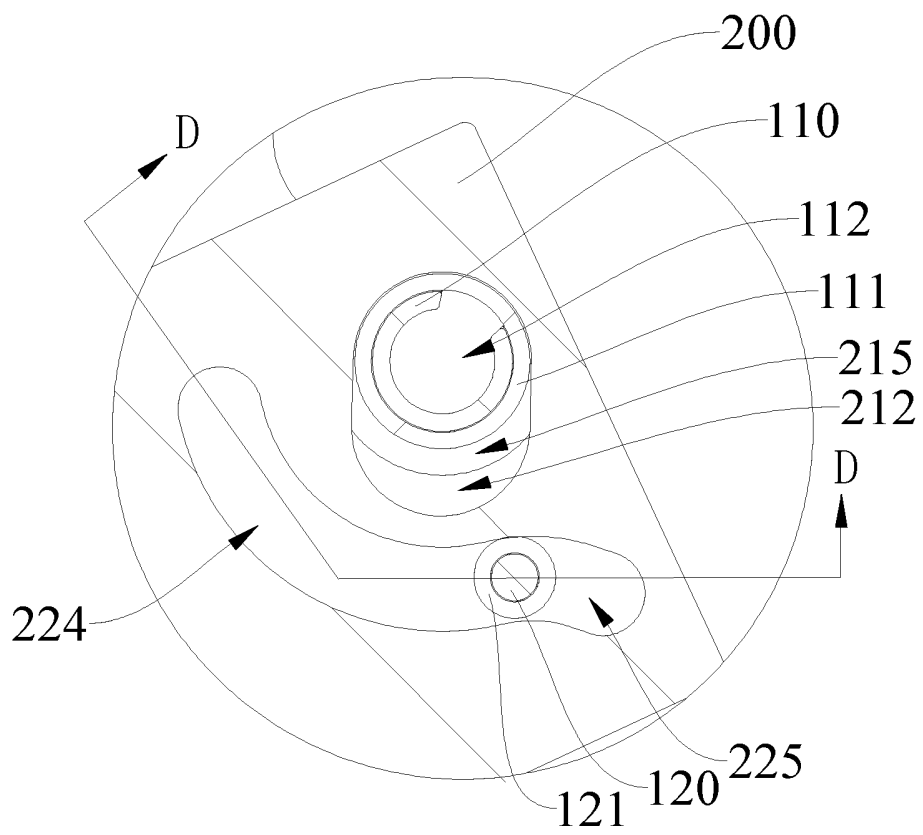


FIG. 7

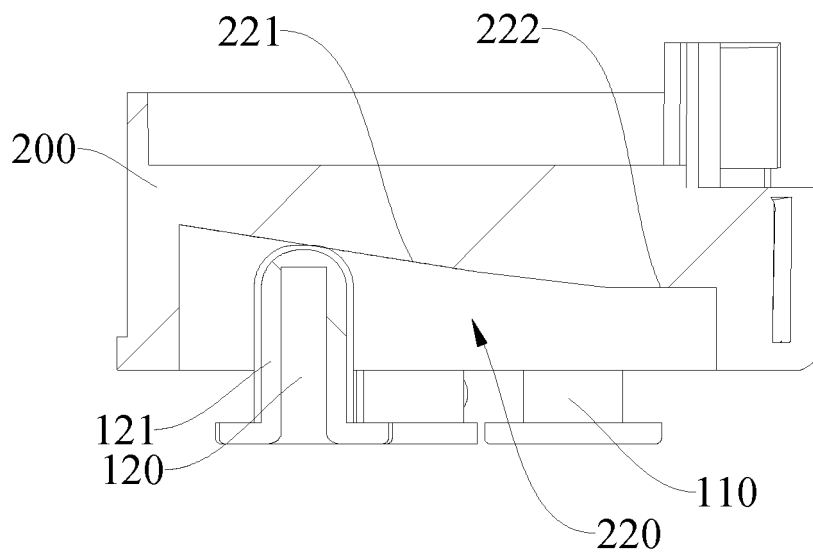


FIG. 8

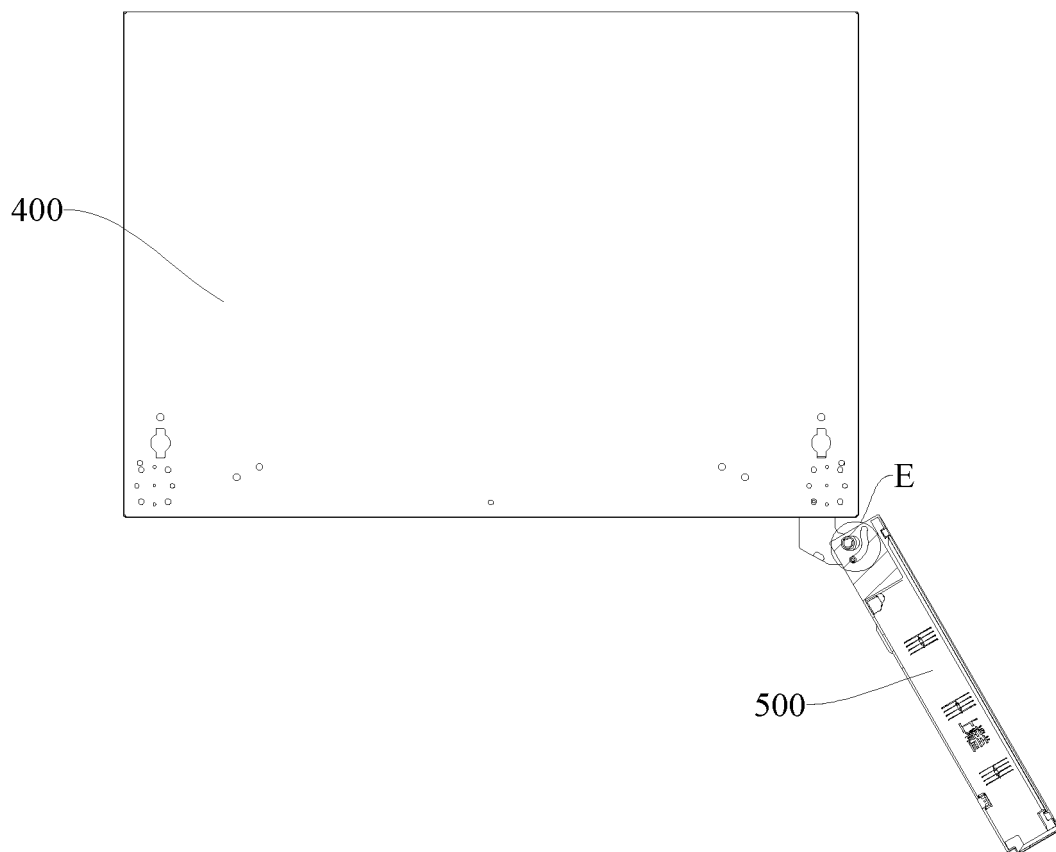


FIG. 9

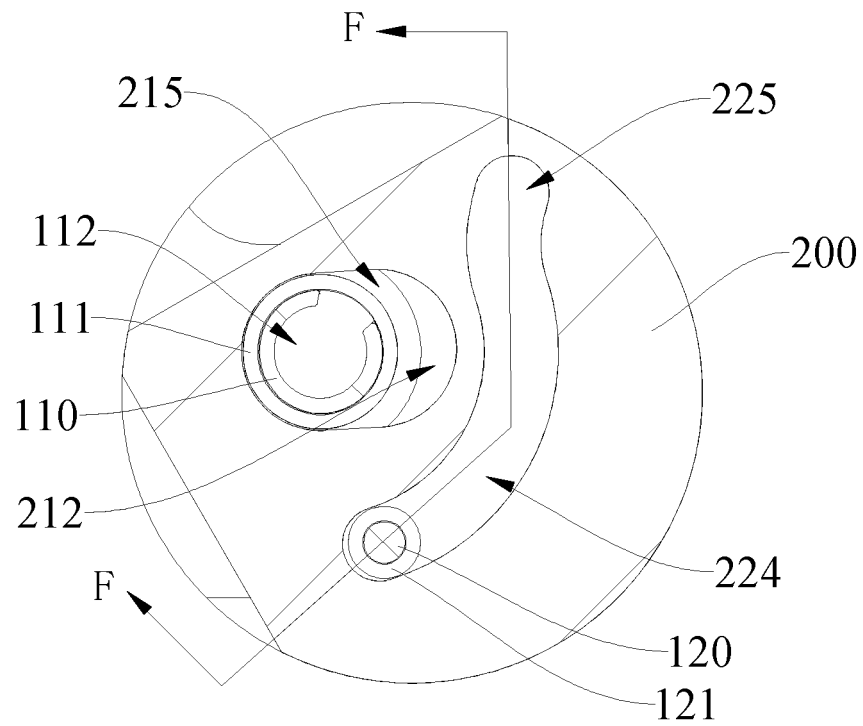


FIG. 10

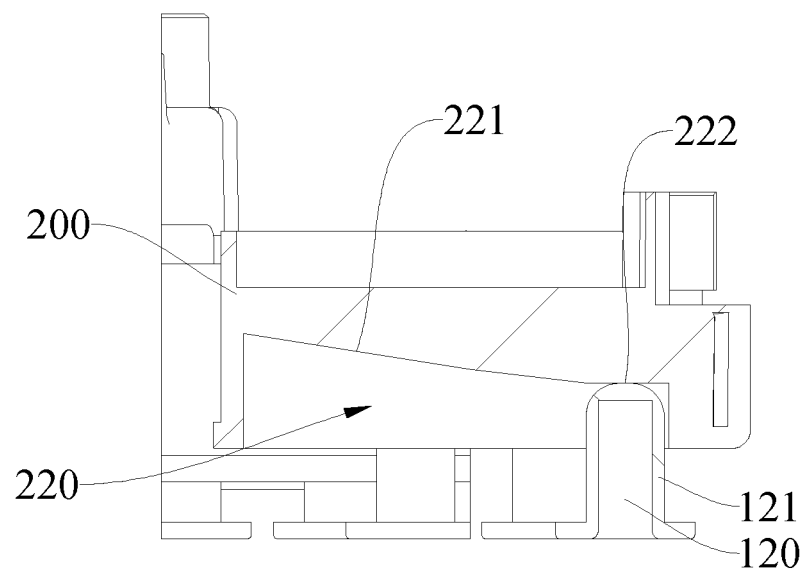


FIG. 11

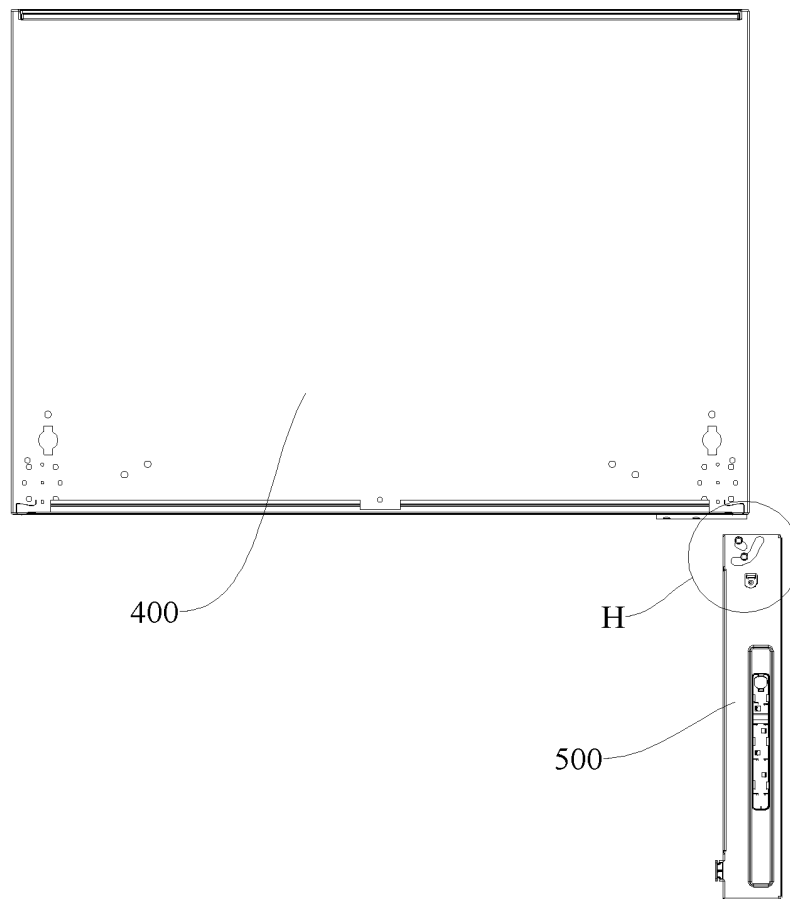


FIG. 12

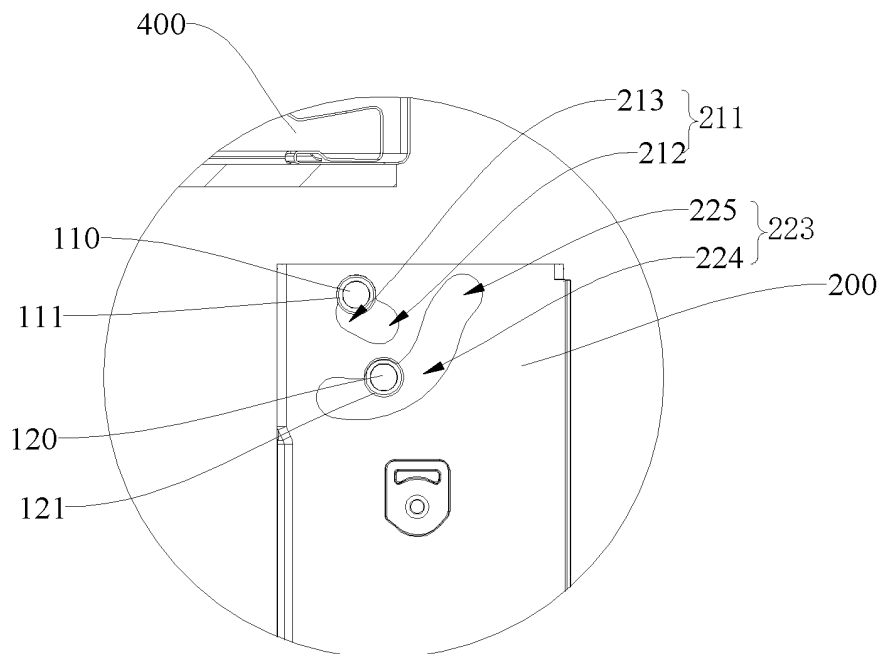


FIG. 13

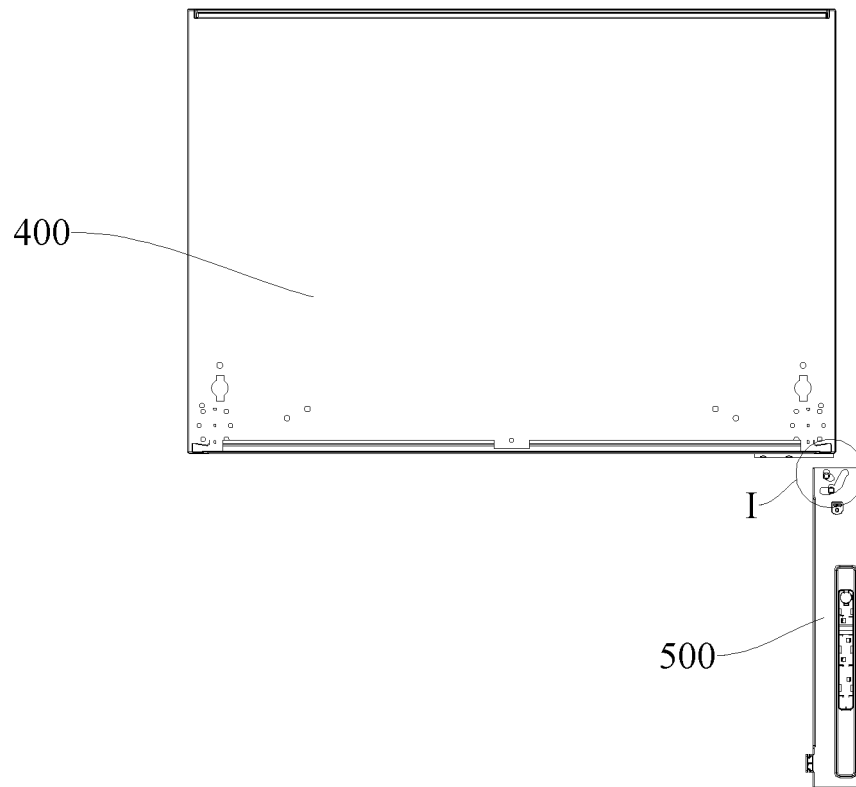


FIG. 14

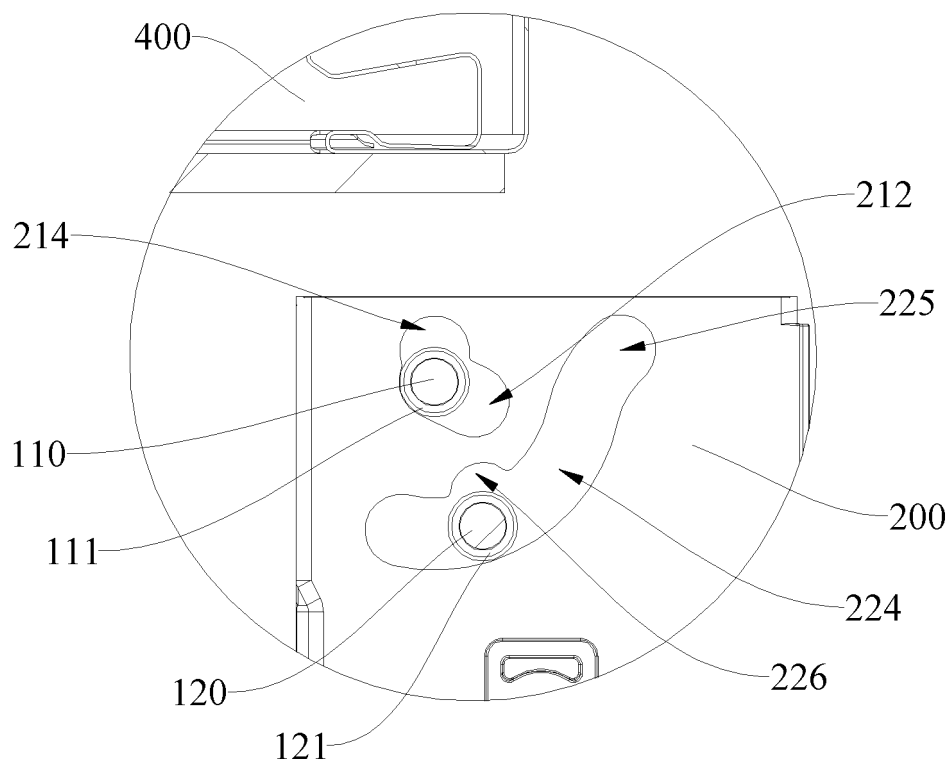


FIG. 15

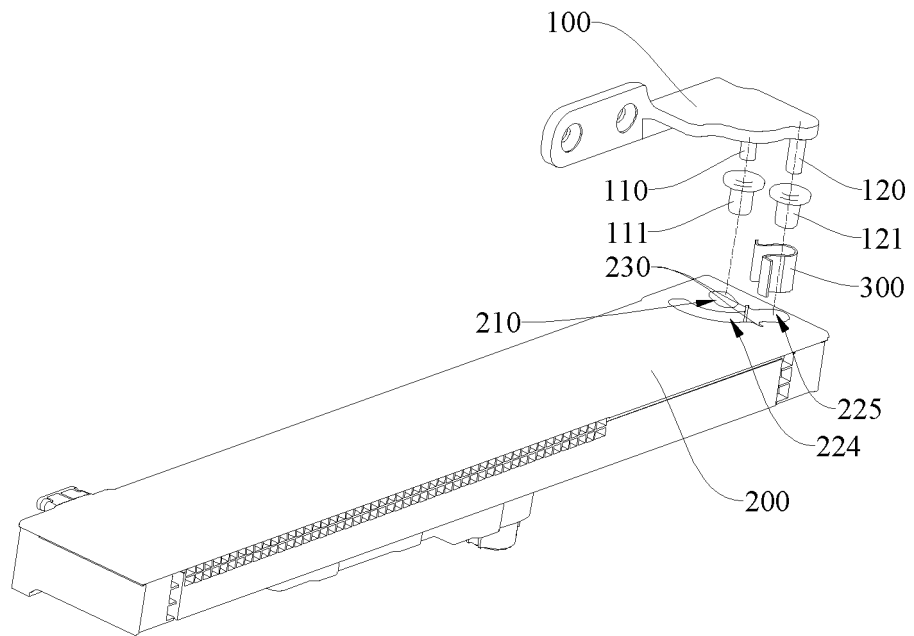


FIG. 16

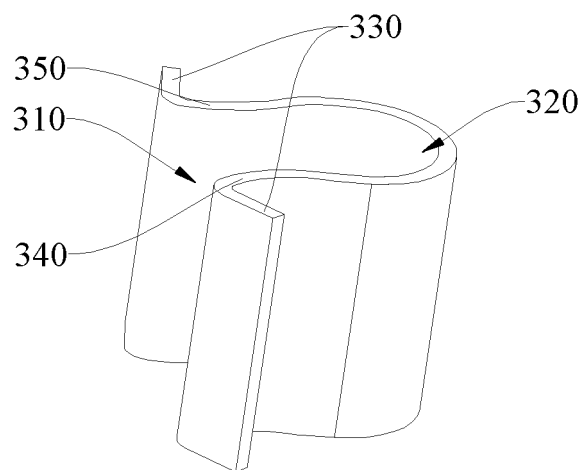


FIG. 17

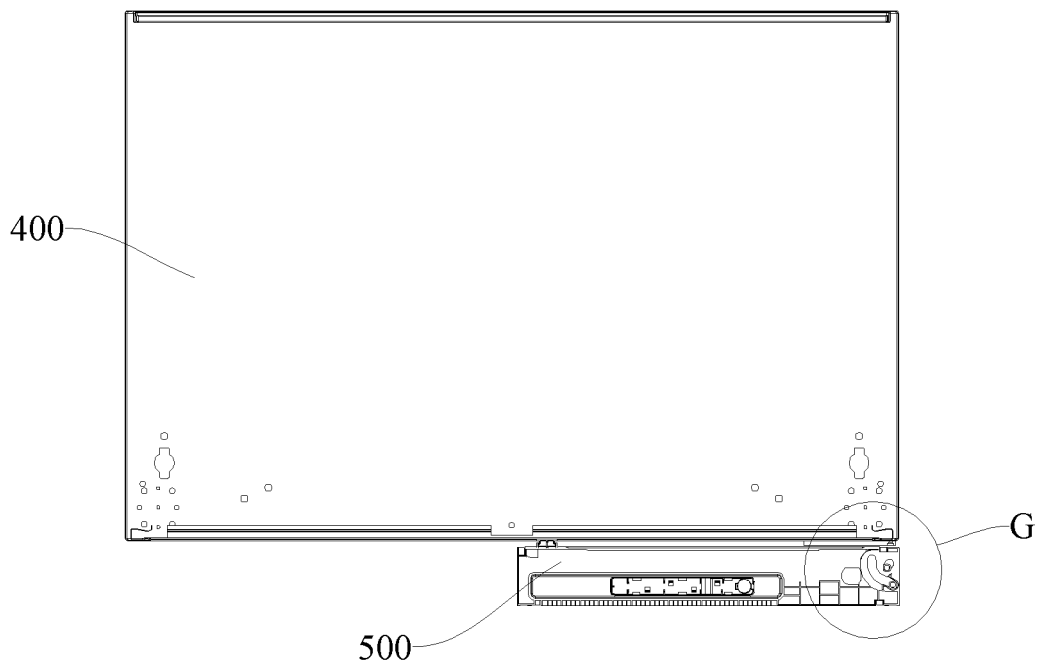


FIG. 18

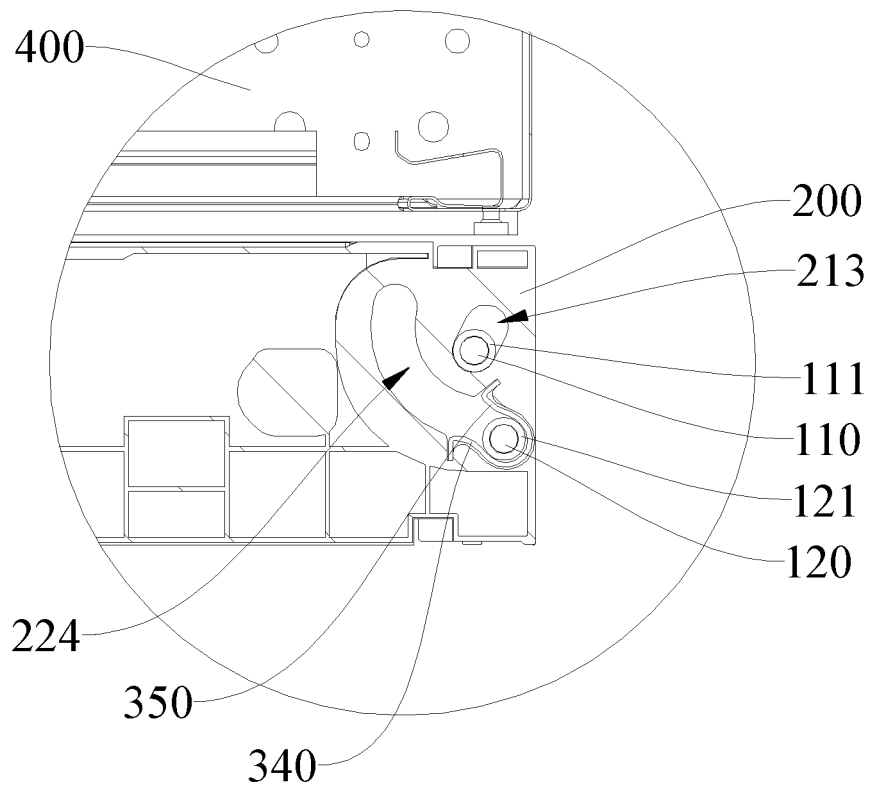


FIG. 19

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/112815

A. CLASSIFICATION OF SUBJECT MATTER

E05D 3/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05D, F25

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

SIPOABS, DWPI, CNABS, CNTXT, CNKI: 铰链, 合页, 槽, 轴, 限位, 导向, 升降, hinge, groove, slot, shaft, pin, limit, guide, lift

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 111749565 A (HEFEI MIDEA REFRIGERATOR CO., LTD. et al.) 09 October 2020 (2020-10-09) entire document	1-10
A	CN 110243127 A (QINGDAO HAIER CO., LTD.) 17 September 2019 (2019-09-17) entire document	1-10
A	CN 102003861 A (SANYO ELECTRIC CO., LTD.) 06 April 2011 (2011-04-06) entire document	1-10
A	CN 110924778 A (HISENSE (SHANDONG) REFRIGERATOR CO., LTD.) 27 March 2020 (2020-03-27) entire document	1-10
A	CN 111119625 A (QINDAO HAIER REFRIGERATOR CO., LTD. et al.) 08 May 2020 (2020-05-08) entire document	1-10
A	CN 104514453 A (TAIZHOU LG ELECTRONICS REFRIGERATOR CO., LTD.) 15 April 2015 (2015-04-15) entire document	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

13 September 2021

Date of mailing of the international search report

23 September 2021

Name and mailing address of the ISA/CN

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Authorized officer

Facsimile No. (86-10)62019451

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/112815

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2013067688 A1 (KIM DOO HA et al.) 21 March 2013 (2013-03-21) entire document	1-10
A	JP 2009097812 A (MITSUBISHI ELECTRIC CORP.) 07 May 2009 (2009-05-07) entire document	1-10

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2021/112815

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		CN 107288466 B	02 July 2019
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Information on patent family members

International application No.

PCT/CN2021/112815

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				KR	20130029903	A	26 March 2013
				KR	101295735	B1	12 August 2013
JP	2009097812	A	07 May 2009	None			

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REFERENCES CITED IN THE DESCRIPTION

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