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(54) ASSISTING HANDLE AND REFRIGERATOR HAVING SAME

(57) The present invention provides an assist handle and a refrigerator, the assist handle comprises: a handle bar disposed on the front side of the door body; a rotation shaft pivoted to the handle bar; a guide groove disposed in the door body and running through the door body; a push rod running through the guide groove, a distal end of the push rod being close to a cabinet of the refrigerator, and a proximal end of the push rod being close to a front end of the handle bar; and a resistance structure disposed on a side of the push rod and comprising a first tooth-like structure and a second tooth-like structure that mesh with each other, the first tooth-like structure being engaged with the push rod; wherein the handle bar rotates about the rotation shaft, the front end of the handle bar pushes against the proximal end of the push rod, the push rod slides in the guide groove, the distal end of the push rod pushes against the cabinet of the refrigerator, and the push rod drives the first tooth-like structure to move relative to the second tooth-like structure. The movement of the first tooth-like structure relative to the second tooth-like structure is used to form a rotation resistance, enhance the door-opening comfort, and reduce the noise caused by the return of the handle bar.

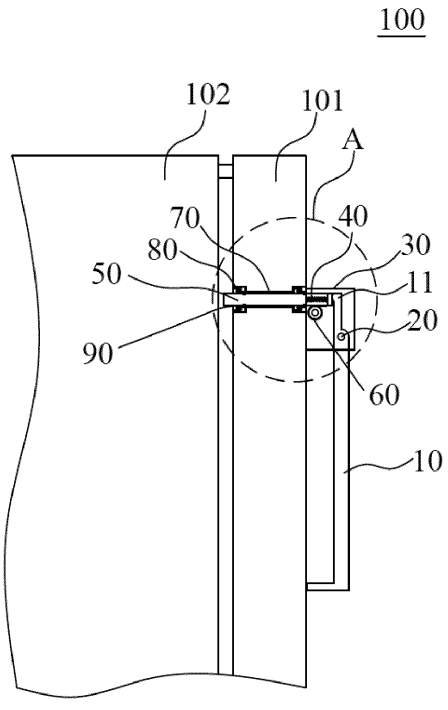

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of household refrigeration electrical appliance, and specifically to a handle for a refrigerator and a refrigerator having the handle.

BACKGROUND

[0002] In modern life, refrigerators are applied more and more widely, and almost become requisite household electrical appliance. The refrigerator is such an apparatus that it stores various food in a refrigerated state or a frozen state for a period of time in a preserved manner.

[0003] As technologies develop, functions of refrigerators become richer and richer, and the volume of refrigerators becomes bigger and bigger, so that door bodies of refrigerators become bigger and a large force usually needs to be applied on the handles on the door bodies of the refrigerators. Hence, the user's comfort in use is undesirable. On this basis, an assist handle disposed on the door body of the refrigerator is developed, enables the door body of the refrigerator to be opened with less force, and improves the user's comfort in use. Currently, the assist handles used have the following defects: 1) the assists handle is mounted on a side surface of a lateral edge of the door body, and the door body needs to be narrower than the width of the cabinet, which affects the appearance of the refrigerator; 2) the handle is mounted on the front of the door body, and the door body needs to be perforated, which causes problems such as leakage of cold and frosting.

SUMMARY

[0004] The invention provides an assist handle suitable for refrigerators, which does not affect the appearance of the refrigerators, and meanwhile can provide better comfort in use.

[0005] The present invention provides an assist handle mounted on a front side of a door body of a refrigerator, wherein the assist handle comprises:

a handle bar disposed on the front side of the door body;
a rotation shaft pivoted to the handle bar;
a guide groove disposed in the door body and running through the door body;
a push rod running through the guide groove, a distal end of the push rod being close to a cabinet of the refrigerator, and a proximal end of the push rod being close to a front end of the handle bar; and
a resistance structure disposed on a side of the push rod and comprising a first tooth-like structure and a second tooth-like structure that mesh with each other, the first tooth-like structure being engaged with the push rod;
wherein, the handle bar rotates about the rotation shaft, the front end of the handle bar pushes against the proximal end of the push rod, the push rod slides in the guide groove, the distal end of the push rod pushes against the cabinet of the refrigerator, and the push rod drives the first tooth-like structure to move relative to the second tooth-like structure.

[0006] As an optional embodiment of the present invention, one of the first tooth-like structure and the second tooth-like structure is a gear, and the other of the first tooth-like structure and the second tooth-like structure is a rack.

[0007] As an optional embodiment of the present invention, the resistance structure is disposed on the front side of the door body.

[0008] As an optional embodiment of the present invention, the assist handle further comprises an elastic member disposed in the push rod to provide an elastic force for returning the push rod, where the push rod comprises a first rod body and a second rod body, the elastic member is disposed between the first rod body and the second rod body, and both ends of the elastic member are respectively connected to the first rod body and the second rod body.

[0009] As an optional embodiment of the present invention, the elastic member is a spring.

[0010] As an optional embodiment of the present invention, the handle bar includes a handle portion and a lever portion, the handle portion and the lever portion are distributed on both sides of the rotation shaft, wherein a length of the handle portion is greater than a length of the lever portion, the handle portion is pulled to allow the handle bar to rotate about the rotation shaft as a whole, the lever portion pushes the first rod body, the first rod body compresses the elastic member, and the elastic member pushes against the second rod body to slide, to push against the cabinet of the refrigerator to thereby open the door.

[0011] As an optional embodiment of the present invention, the assist handle further comprises a base, the base is fitted on the front side of the door body, and the elastic member, the first rod body, the lever portion and the resistance structure are respectively received in the base.

[0012] As an optional embodiment of the present invention, the base is a box with an end open, and the opening of the box is attached to the front side of the door body.

[0013] As an optional embodiment of the present invention, the assist handle further comprises a guide sleeve and bellows, the guide sleeve is disposed in the guide groove and sleeved on the push rod, and the bellows are disposed between the guide sleeve and the push rod.

[0014] The present invention further provides a refrig-

erator comprising a door body, a cabinet and an assist handle, wherein the assist handle is disposed on a front side of the door body, and the assist handle is the assist handle as described above.

[0015] As compared with the prior art, the present invention provides the assist handle and the refrigerator, the assist handle comprises the resistance structure, and the resistance structure moves along with the push rod and generates a rotation resistance; when the user pulls the handle bar to open the door body, the rotation resistance enhances the door-opening comfort; when the handle bar returns, the rotation resistance reduces the noise caused by the return of the handle bar.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG. 1 is a cross-sectional view of a refrigerator mounted with an assist handle according to the present invention.

FIG. 2 is an enlarged schematic view of a region A in FIG. 1.

FIG. 3 is a top view of the refrigerator mounted with an assist handle according to the present invention with a top structure being removed.

DETAILED DESCRIPTION

[0017] The present invention will be described in detail in conjunction with embodiments shown in the figures. However, these embodiments are not intended to limit the present invention. Structural, methodological or functional variations made by those having ordinary skill in the art according to these embodiments are all comprised in the extent of protection of the present invention.

[0018] FIG. 1 is a cross-sectional view of a refrigerator mounted with an assist handle according to the present invention; FIG. 2 is an enlarged schematic view of a region A in FIG. 1; FIG. 3 is a top view of the refrigerator mounted with an assist handle according to the present invention with a top structure being removed.

[0019] As shown in FIG. 1 through FIG. 3, a refrigerator 100 comprises a door body 101 and a cabinet 102. The door body 101 is pivoted to a lateral edge of the cabinet 102 and may pivot relative to the cabinet 102 to close the cabinet 102, or the door body may open relative to the cabinet 102. The cabinet 102 comprises a plurality of compartments for storing items.

[0020] A front side of the door body 101 is provided with an assist handle. The assist handle comprises a handle bar, a rotation shaft 20, a guide groove 90, a push rod 50, and a resistance structure 60. The handle bar is pivoted to the rotation shaft 20, the guide groove 90 run through the door body 101, the push rod 50 is slidably disposed in the guide groove 90, and the resistance structure 60 is located on one side of the push rod 50; when the handle bar pivots about the rotation shaft 20 and pushes against a proximal end of the push rod 50 to make the push rod 50 to slide in the guide groove 90, a distal end of the push rod 50 pushes against the cabinet 102 to open the door body 101. The resistance structure 60 comprises a first tooth-like structure 61 and a second tooth-like structure 62 that mesh with each other. The first tooth-like structure 61 engages one side of the push rod 50 and may move along with the push rod 50, so that the first tooth-like structure 61 moves relative to the second tooth-like structure 62 to form a certain rotation resistance which is used to improve the comfort of the user pulling the handle bar to open the door and reduce the noise caused by the return of the handle bar.

[0021] In the present invention, a side of the door body 101 close to the user is defined as "a front side", and the other side away from the user is defined as "a rear side"; an end of the push rod 50 close to the user is defined as a proximal end, and the end far away from the user is defined as a distal end.

[0022] As shown in FIG. 1 and FIG. 2, the handle bar is disposed on the front side of the door body 101 and pivoted to the rotation shaft 20 so that the handle bar can pivot about the rotation shaft 20. The handle bar comprises an integrally formed handle portion 10 and a lever portion 11. The handle portion 10 and the lever portion 11 are respectively located on both sides of the rotation shaft 20. In other words, a rotation shaft hole (not shown) provided on the handle bar divides the handle bar into the handle portion 10 and the lever portion 11, and the rotation engages in the rotation shaft hole, wherein a length of the handle portion 10 is greater than the length of the lever portion 11. When the user pulls the handle portion 10 to turn the handle bar, the handle portion 10 has a larger moment arm, thereby ensuring that the user may turn the handle bar with a smaller force, and achieving a force-saving effect. A protrusion 12 is disposed at a top of the level portion 11 and abuts against the front end of the push rod 50.

[0023] In the present embodiment, the rotation shaft 20 is for example fixed in a base 30 on the front side of the door body 101. The base 30 is a box with an end open. The opening of the box engages on the surface of the front side of the door body 101, and is not limited thereto. In other embodiments of the present invention, the rotation shaft is arranged at a connection between the handle portion and the lever portion on the handle bar, a rotation shaft hole corresponding to the rotation shaft on the handle bar is arranged in the base, and the rotation shaft on the handle bar is inserted into the rotation shaft hole so that the handle bar pivots around the rotation shaft.

[0024] The base 30 encapsulates the lever portion 11 of the assist handle, the rotation shaft 20, a portion of the push rod 50 and an elastic member 40 therein, so that the refrigerator 100 has a good appearance.

[0025] As shown in FIG. 2, the push rod 50 comprises a first rod body 51 and a second rod body 52. The first rod body 51 and the second rod body 52 are connected

by the elastic member 40. The elastic member 40 is for example a spring. An end of the spring is sleeved around a post on the first rod body 51, the other end of the spring is sleeved around another post on the rod body 52, and post on the first rod body 51 is opposite to the another post on the second rod body 52. In other embodiments of the present invention, the elastic member may also be a metal elastic sheet, the metal elastic sheet is arranged between the first rod body and the second rod body, both ends of the metal elastic sheet are respectively welded or adhered on a surface of the first rod body and another surface of the second rod body, and the surface is opposite to the another surface.

[0026] The elastic member 40 provides an elastic force for returning the handle bar. Specifically, the user applies a force to pull the handle portion 10, so that the handle portion 10 and the lever portion 11 rotate counterclockwise about the rotation shaft 20, and the protrusion 12 of the lever portion 11 pushes against the front end of the first rod body 51, the first rod body 51 compresses the elastic member 40, the elastic member 40 acts on the front end of the second rod body 52 so that the second rod body 52 moves in the guide groove 90, and the distal end of the second rod body 52 extends out of the opening at the distal end of the guide groove 90 and pushes against the cabinet 102 to open the door body 101 relative to the cabinet 102. In the process of opening the door body 101, the elastic member 40 is compressed to be in a compressed state. After the door body 101 is opened, the distal end of the second rod body 52 abuts against the cabinet 102, and the user no longer applies a force to the handle portion 10, and then the force applied to the elastic member 40 is removed. At this time, the elastic member 40 in the compressed state returns to an extended state to generate an elastic force, the elastic force acts on the first rod body 51, the first rod body 51 pushes the protrusion 12 of the level portion 11 to move towards the user, the lever portion 11 rotates clockwise about the rotation shaft 20, and the handle portion 10 rotates clockwise together and then returns back.

[0027] In addition, the door body 101 is closed on the cabinet 102, the cabinet 102 pushes against the distal end of the second rod body 52, and the second rod body 52 compresses the elastic member 40 so that the portion of the second rod body 52 extending out of the guide groove 90 retracts back into the interior of the guide groove 90.

[0028] In the present embodiment, the first rod body 51 and the elastic member 40 are located on the front side of the door body 101, and the second rod body 52 is located in the guide groove 90, but the arrangement is not limited to this. In other embodiments of the present invention, the first rod body, the elastic member and the second rod body may be simultaneously disposed in the guide groove.

[0029] Further referring to FIG. 1 and FIG. 2, in order to improve the comfort of the assist handle, the assist handle further comprises a resistance structure 60 which is disposed on one side of the push rod 50 to provide resistance. The resistance structure 60 comprises a first tooth-like structure 61 and a second tooth-like structure 62 meshing with each other. The first tooth-like structure 61 is disposed on one side of the first rod body 51 and fixedly connected to the first rod body 51, and may move along with the first rod body 51; the second tooth-like structure 62 is located below the first tooth-like structure 61. In the present embodiment, the first tooth-like structure 61 is for example a rack, the second tooth-like structure 62 is for example a gear, and the gear meshes with a distal end of the rack. When the first rod body 51 moves towards the rear side of the door body 101, the rack moves towards the rear side of the door body along with the first rod body 51, and the gear rotates counterclockwise to mesh with a proximal end of the rack; when the first rod body 51, driven by the elastic piece 40, moves toward the front side of the door body 101, the rack moves towards the front side of the door body 101 along with the first rod body 51, and the gear rotates clockwise to gradually mesh with the distal end of the rack.

[0030] The rotation of the lever portion 11 and the elastic force provided by the elastic piece 40 enable the first rod body 51 to move reciprocally, and then the rack moves reciprocally along with the first rod body 51. Hence, during the reciprocal movement of the rack, the gear moves clockwise or counterclockwise on the surface of the rack, and the rotation of the gear provides an appropriate rotation resistance. On the one hand, while the handle portion 10 is pulled to open the door body 101, the rotation resistance reduces a movement rate of the first rod body 51 of the push rod 50 so that the second rod body 52 moves slowly along the guide groove 90 to gradually push against the cabinet 102, and the door body 101 gradually opens to improve the user's door-opening comfort; on the other hand, after the door body 101 is opened, the first lever body 51 moves toward the front side of the door body 101 under the action of the elastic member 40, the rotation resistance may slow down the movement rate of the first lever body 51 so that the lever portion 11 slowly pivots to return, and the handle portion 10 does not impinge on the front side of the door body 101, thereby reducing the noise caused by the return of the handle bar.

[0031] In the present embodiment, the first tooth-like structure 61 and the second tooth-like structure 62 are disposed on the front side of the door body 101, and the first tooth-like structure 61 engages on the first rod body 51 and moves along with the first rod body 51, but the arrangement is not limited to this. In other embodiments of the present invention, the first tooth-like structure and the second tooth-like structure may be disposed in the interior of the door body, and the first tooth-like structure engages on the second rod body.

[0032] Further referring to FIG. 1 and FIG. 2, in order to avoid the problems such as cold leakage and frosting caused by the guide groove 90 on the door body 101, the guide groove 90 is provided with a guide sleeve 70

and a pair of bellows 80, wherein the guide sleeve 70 is received in the guide groove 90, and the second rod body 52 runs through the guide sleeve 70; the pair of bellows 80 are located at the openings at both ends of the guide groove 90, outer sides of the pair of bellows 80 are respectively connected to inner walls at both ends of the guide sleeve 70, and inner sides of the pair of bellows 80 are respectively sleeved on the outer surface of the proximal end and the outer surface of the distal end of the second rod body 52. That is, the pair of bellows 80 may be regarded as being filled between the ends of the second rod body 52 and the ends of the guide sleeve 70 respectively so that the space between the pair of bellows 80 is a sealed space, and the sealed space may function for heat preservation and heat insulation.

[0033] In addition, the bellows 80 near the rear side of the door body 101 is filled between the distal end of the guide sleeve 70 and the distal end of the second rod body 52, and may block the overflow of the cold air through the guide groove 90 of the door body 101 when the door body 101 closes the cabinet 102, thereby avoiding the frosting at the assist handle of the door body.

[0034] In addition, the door body 101 comprises a first housing, a thermal insulation layer and a second housing. The thermal insulation layer is disposed between the first housing and the second housing. The guide groove 90 sequentially penetrates the first housing, the thermal insulation layer and the second housing, wherein the guide sleeve 70 is filled in the guide groove 90, a proximal end of the guide sleeve 70 is connected with the first housing, and a distal end of the guide sleeve 70 is connected with the second housing.

[0035] The present invention further provides a refrigerator 100 comprising the door body 101 and the cabinet 102, wherein the door body 101 may be opened or closed relative to the cabinet 102, and the front side of the door body 101 is provided with the assist handle as stated above.

[0036] In summary, the present invention provides the assist handle and the refrigerator, the assist handle comprises the resistance structure, and the resistance structure moves along with the push rod and generates a rotation resistance; when the user pulls the handle bar to open the door body, the rotation resistance enhances the door-opening comfort; when the handle bar returns, the rotation resistance reduces the noise caused by the return of the handle bar.

[0037] It should be understood that although the description is described according to the embodiments, not every embodiment only comprises one independent technical solution, that such a description manner is only for the sake of clarity, that those skilled in the art should take the description as an integral part, and that the technical solutions in the embodiments may be suitably combined to form other embodiments understandable by those skilled in the art.

[0038] The detailed descriptions set forth above are merely specific illustrations of feasible embodiments of the present invention, and are not intended to limit the scope of protection of the present invention. All equivalent embodiments or modifications that do not depart from the art spirit of the present invention should fall within the scope of protection of the present invention.

Claims

1. An assist handle mounted on a front side of a door body of a refrigerator, wherein the assist handle comprises:

   a handle bar disposed on the front side of the door body;
   a rotation shaft pivoted to the handle bar;
   a guide groove disposed in the door body and running through the door body;
   a push rod running through the guide groove, a distal end of the push rod being close to a cabinet of the refrigerator, and a proximal end of the push rod being close to a front end of the handle bar; and
   a resistance structure disposed on a side of the push rod and comprising a first tooth-like structure and a second tooth-like structure that mesh with each other, the first tooth-like structure being engaged with the push rod;
   wherein, the handle bar rotates about the rotation shaft, the front end of the handle bar pushes against the proximal end of the push rod, the push rod slides in the guide groove, the distal end of the push rod pushes against the cabinet of the refrigerator, and the push rod drives the first tooth-like structure to move relative to the second tooth-like structure.

2. The assist handle according to claim 1, wherein one of the first tooth-like structure and the second tooth-like structure is a gear, and the other of the first tooth-like structure and the second tooth-like structure is a rack.

3. The assist handle according to claim 2, wherein the resistance structure is disposed on the front side of the door body.

4. The assist handle according to claim 1, wherein the assist handle further comprises an elastic member disposed in the push rod to provide an elastic force for returning the push rod, where the push rod comprises a first rod body and a second rod body, the elastic member is disposed between the first rod body and the second rod body, and both ends of the elastic member are respectively connected to the first rod body and the second rod body.

5. The assist handle according to claim 4, wherein the

elastic member is a spring.

6. The assist handle according to claim 4, wherein the handle bar includes a handle portion and a lever portion, the handle portion and the lever portion are distributed on both sides of the rotation shaft, wherein a length of the handle portion is greater than a length of the lever portion, the handle portion is pulled to allow the handle bar to rotate about the rotation shaft as a whole, the lever portion pushes the first rod body, the first rod body compresses the elastic member, and the elastic member pushes against the second rod body to slide, to push against the cabinet of the refrigerator to thereby open the door.

7. The assist handle according to claim 6, wherein the assist handle further comprises a base, the base is fitted on the front side of the door body, and the elastic member, the first rod body, the lever portion and the resistance structure are respectively received in the base.

8. The assist handle according to claim 1, wherein the base is a box with an end open, and the opening of the box is attached to the front side of the door body.

9. The assist handle according to claim 1, wherein the assist handle further comprises a guide sleeve and bellows, the guide sleeve is disposed in the guide groove and sleeved on the push rod, and the bellows are disposed between the guide sleeve and the push rod.

10. A refrigerator comprising a door body, a cabinet and an assist handle, wherein the assist handle is disposed on a front side of the door body, and the assist handle is the assist handle according to any of claims 1-9.

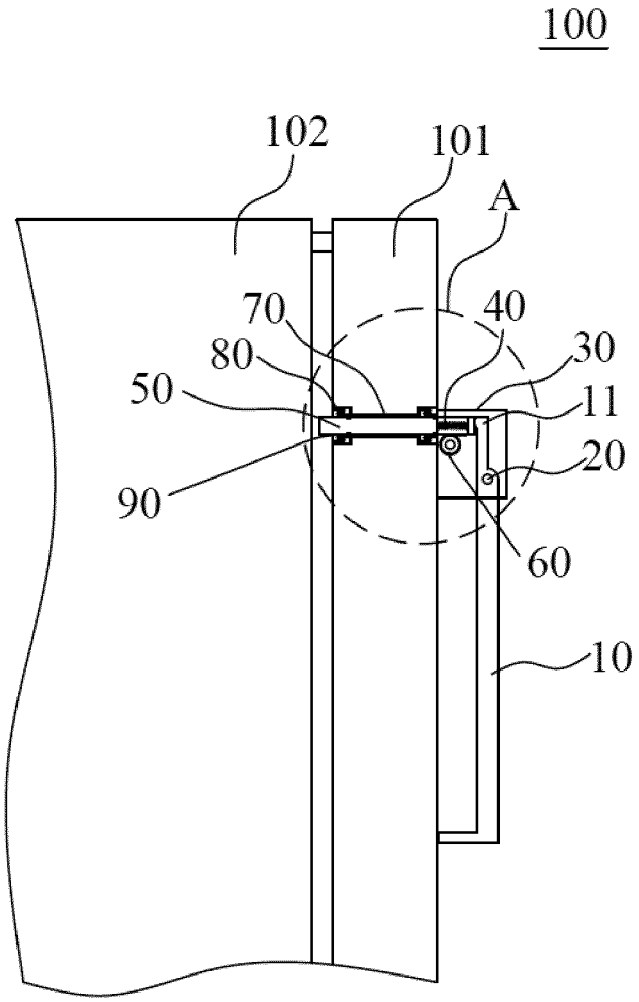

FIG. 1

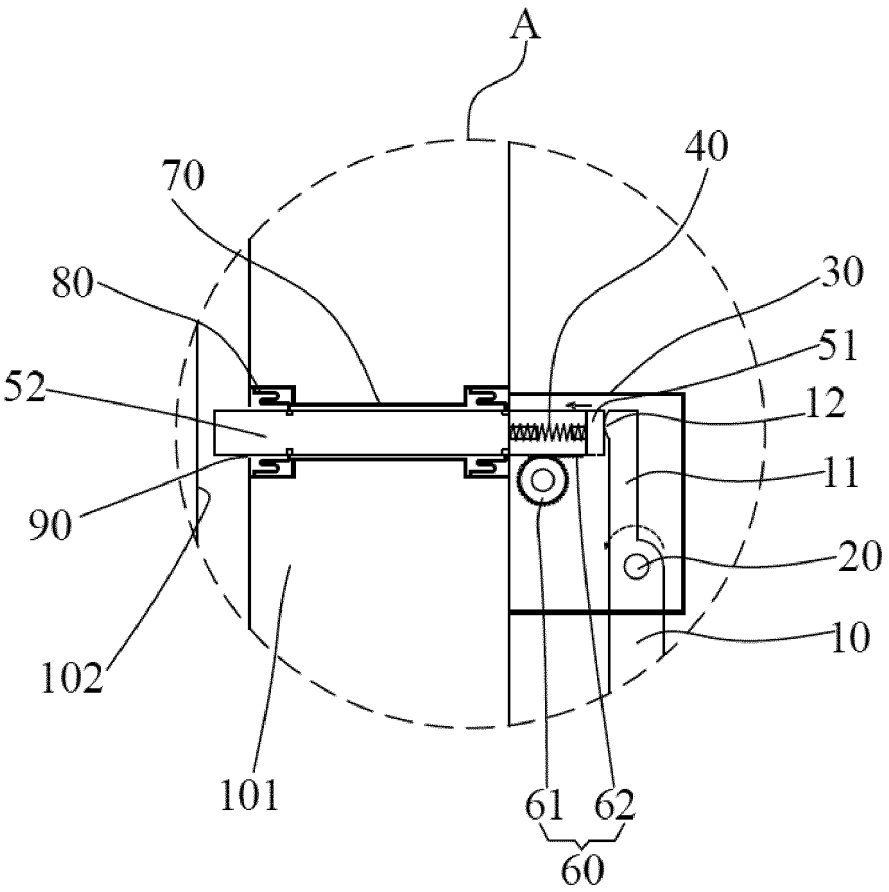

FIG. 2

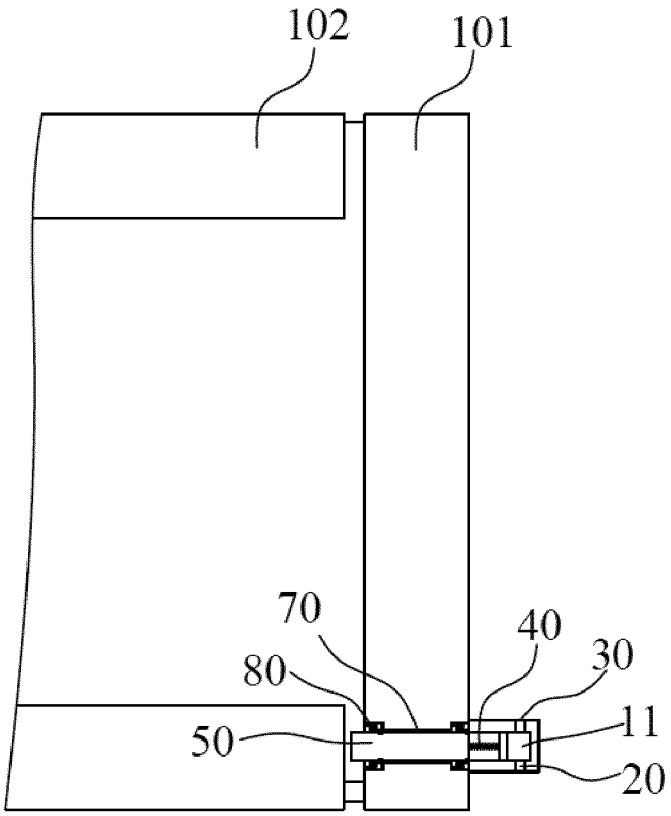

FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/111174

A. CLASSIFICATION OF SUBJECT MATTER

F25D 23/02(2006.01)i; E05B 1/00(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)

F25D 23, E05B 1

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)

CNABS, CNKI, CNTXT, VEN: 冰箱, 把手, 助力, 门, 推杆, 轴, 槽, 齿, refrigerator, fridge, handle, door, push, pole, rod, pivot, shaft, slot, groove, teeth, tooth, rack

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 2005057106 A1 (ARCELIK ANONIM SIRKETI et al.) 23 June 2005 (2005-06-23) description, page 2 line 9 to page 3 line 26, figures 1-4	1-10
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A	CN 207881327 U (JIANGSU LEILI MOTOR CO., LTD.) 18 September 2018 (2018-09-18) entire document	1-10
A	CN 108457549 A (HEFEI MEILING CO., LTD.) 28 August 2018 (2018-08-28) entire document	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"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	Date of mailing of the international search report
31 March 2020	**09 April 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/111174

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/111174

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