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(54) **TARGET OBJECT MOVEMENT DEVICE**

(57) Provided is an object moving device including: at least one movement member 20; at least one guide member 30; cable 40; driving section 60; and holding structure 70. Movement member 20 is attached to a movement object. Guide member 30 guides movement member 20. Cable 40 is connected to movement member 20. Driving section 60 winds and unwinds cable 40 connected to driving section 60. Holding structure 70 holds

driving section 60 to guide member 30. Holding structure 70 holds driving section 60 in a state in which relative movement of driving section 60 relative to guide member 30 is allowed within a predetermined range along a thickness direction of guide member 30. Use of the object moving device makes adjustment of an attachment position easy.

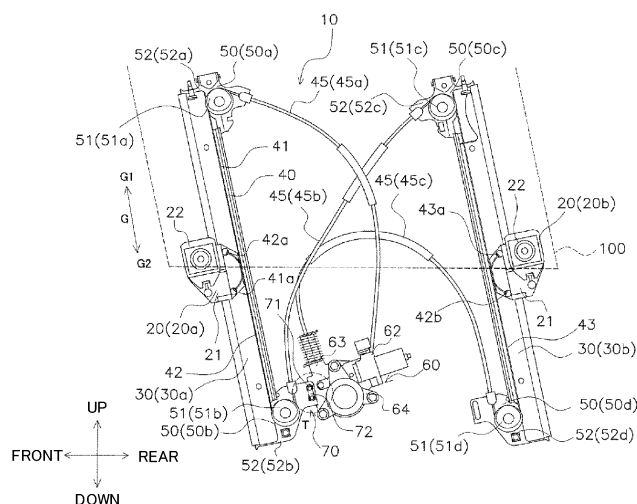


FIG. 1

Description

Technical Field

[0001] The present invention relates to an object moving device.

Background Art

[0002] A window regulator, which lifts a window glass up and down, is used to open and close a window of a vehicle (for example, see Patent Literature (hereinafter, referred to as "PTL") 1).

[0003] The window regulator indicated in PTL 1 includes a pair of carrier plates, a pair of guide rails, a cable, a direction-changing member, and a driving source. A driving force of the driving source causes the cable to be wound and unwound, thereby moving the pair of carrier plates via the cable, and lifting a window fixed to the carrier plates up and down.

Citation List

Patent Literature

[0004] PTL 1 Japanese Patent Application Laid-Open No. 2018-71235

Summary of Invention

Technical Problem

[0005] In the conventional configuration, however, the driving source is fixed to the guide rails, and thus it is difficult to perform position adjustment of the guide rails and the driving source when the window regulator described above is attached to a vehicle body.

[0006] An object of the present invention is to provide an object moving device, whereby adjustment of the attachment position of the object moving device is made easy.

Solution to Problem

[0007] Hereinafter, a plurality of aspects will be described as a solution to the problem. These aspects can be combined arbitrarily as needed.

[0008] An object moving device according to an aspect of the present invention includes: at least one movement member; at least one guide member; a cable; a driving section; and a holding structure. The movement member is attached to an object to be moved (hereinafter, referred to as "moving object"). The guide member guides the movement member. The cable is connected to the movement member. The driving section winds and unwinds the cable connected to the driving section. The holding structure holds the driving section to the guide member. The holding structure holds the driving section in a state

in which relative movement of the driving section relative to the guide member is allowed within a predetermined range along a thickness direction of the guide member.

[0009] As described above, the driving section is temporarily fixed to the guide member so as to be relatively movable relative to the guide member within the predetermined range along the thickness direction of the guide member. Thus, it is possible to adjust the position of the guide member in the thickness direction of the guide member even in a state in which the driving section is fixed, and it is therefore possible to adjust the attachment position of the object moving device easily.

[0010] For example, when the object moving device is attached to a vehicle body for use in raising and lowering a window of a vehicle, the guide member can be moved in the thickness direction thereof in a state in which the driving section is fixed to the vehicle body. Accordingly, the position of the window, which is attached to the movement member, can be adjusted to a position which sufficiently ensures that the window is sealed with a weather strip.

[0011] As described above, it is possible to adjust the attachment position of the window easily.

[0012] Further, the holding structure may regulate movement of the driving section in a width direction of the guide member in a state in which relative movement of the driving section relative to the guide member is allowed within a predetermined range in a direction along the guide member.

[0013] Thus, of relative positions of the driving section relative to the guide member, a relative position of the driving section relative to the guide member in the width direction of the guide member is substantially fixed, whereas a relative position of the driving section relative to the guide member in the direction along the guide member can be adjusted within the predetermined range. Accordingly, position adjustment can be made easier.

[0014] Further, two of the movement members may be provided apart from each other. Two of the guide members may be provided apart from each other such that relative positions of the two guide members relative to each other are changeable. The driving section may be held to one of the two guide members by the holding structure.

[0015] Thus, the object moving device can be applied as a window regulator for a sashless vehicle.

[0016] Further, a holding member to which the drive section is attached may be fixed to the guide member. The holding member may include a holding member-side holding element that forms one part of the holding structure. The driving section may include a driving section-side holding element that forms another part of the holding structure. One of the holding member-side holding element and the driving section-side holding element may be provided with a through-hole. Another of the holding member-side holding element and the driving section-side holding element may be provided with at least one insertion part that is inserted into the through-hole. The

insertion part may include a locking part and an intermediate part, where the locking part is provided in a leading end part of the insertion part and is insertable into the through-hole, and the intermediate part is provided on a rear end side of the insertion part than the leading end part of the insertion part. The holding member-side holding element may be restrained from being separated from the driving section-side holding element by engagement of the locking part with an edge part of the through-hole. The driving section may be temporarily held in a state in which relative movement of the driving section relative to the holding member is allowed by sliding of the intermediate part with the through-hole.

[0017] Thus, the driving section can be temporarily fixed to the guide member only by inserting the locking part into the through-hole, and it is therefore possible to hold the driving section to the guide member easily. Further, since the relative movement of the driving section relative to the holding member is allowed by the sliding of the intermediate part with the through-hole, position adjustment of the driving section and the guide member can be made easy.

[0018] Further, a plurality of the insertion parts may be provided, and relative movement of the driving section relative to the guide member may be restrained by a difference between a direction in which one of the plurality of insertion parts slides with the edge part of the through-hole and a direction in which another one of the plurality of insertion parts slides with the edge part of the through-hole.

[0019] Thus, relative movement of the driving section relative to the guide member in the width direction of the guide member is restrained, and it is therefore possible to fix a relative position of the driving section relative to the guide member in the width direction of the guide member when the object moving device is attached to a vehicle or the like.

Advantageous Effects of Invention

[0020] According to the present invention, it is possible to provide an object moving device, whereby adjustment of the attachment position of the object moving device is made easy.

Brief Description of Drawings

[0021]

FIG. 1 is a front view of a window regulator of Embodiment 1 according to the present invention;
FIG. 2 is a perspective view of a second member of a motor housing of the window regulator in FIG. 1;
FIG. 3 is a perspective view of a support member of the window regulator in FIG. 1;
FIG. 4 is an enlarged view of part S of the second member in FIG. 2;
FIG. 5 is an enlarged view of part T of the window

regulator in FIG. 1;

FIG. 6 is a perspective view for describing insertion of an insertion part into a through-hole in a holding structure in FIG. 1;

FIG. 7A to FIG. 7C are cross-sectional views for describing the insertion of the insertion part into the through-hole in FIG. 6;

FIG. 8A and FIG. 8B are diagrams for describing adjustment when the window regulator in FIG. 1 is attached to a door panel of a vehicle;

FIG. 9 is a front view of a window regulator of Embodiment 2 according to the present invention;

FIG. 10 is a perspective view of a second member of a motor housing of the window regulator in FIG. 9;
FIG. 11 is a perspective view of a support member of the window regulator in FIG. 9; and
FIG. 12 is an enlarged view of part V of the window regulator in FIG. 9.

20 Description of Embodiments

[0022] Hereinafter, embodiments according to the present invention will be described with reference to the accompanying drawings.

(Embodiment 1)

[0023] Hereinafter, Embodiment 1 according to the present invention will be described.

(Summary of Object Moving Device)

[0024] Object moving device 10 according to Embodiment 1 transmits a driving force to a movement member via a cable by winding and unwinding the cable with the driving force, and moves an object to be moved (hereinafter, referred to as "movement object"), which is attached to the movement member.

[0025] Object moving device 10 of the present embodiment is, for example, a window regulator that is attached to a door of a vehicle. In this case, movement object 100 is a window as an example. Note that, the object moving device is not limited to the window regulator, but may be a lift or the like that moves upward and downward.

[0026] FIG. 1 illustrates a configuration of object moving device 10. FIG. 1 illustrates a window regulator installed on a front door of a vehicle or the like. For convenience, the left direction on the paper surface corresponds to forward, the right direction on the paper surface corresponds to rearward, and the up-down direction on the paper surface corresponds to an up-down direction. Further, the front side of the paper surface is an inner-side direction of the vehicle, and the depth side of the paper surface is an outer-side direction of the vehicle. Note that, the directions are not limited.

[0027] Object moving device 10 of the present embodiment includes movement member 20, guide member 30, cable 40, driving section 60, and holding structure 70.

(Movement Member 20)

[0028] Movement member 20 is attached to movement object 100. Movement member 20 is moved by a driving force of driving section 60, which is transmitted via cable 40. Movement member 20 moves along guide member 30. Here, length direction G of guide member 30 (which can also be said to be "direction along guide member 30") is indicated. Further, an upward direction of length direction G is indicated by G1, and a downward direction of length direction G is indicated by G2.

[0029] Two movement members 20 may be provided apart from each other. The placement direction of movement members 20 is provided in a direction substantially perpendicular to a movement direction of movement object 100. It is possible to move the movement object stably by fixing movement object 100 with the two movement members arranged in the direction substantially perpendicular to the movement direction of movement object 100.

[0030] Movement member 20 of the present embodiment is a carrier plate to which movement object 100 is fixed. Object moving device 10 illustrated in FIG. 1 is a window regulator of a sashless type, and thus two movement members 20 are provided in parallel at a predetermined interval in the front-rear direction. However, two movement members 20 are not necessarily provided, and only one movement member 20 may be provided, for example. Note that, when it is necessary to describe two movement members 20 while making a distinction therebetween, movement member 20 on the front side illustrated in FIG. 1 is indicated as movement member 20a, and movement member 20 on the rear side illustrated in FIG. 1 is indicated as movement member 20b.

[0031] Movement member 20 includes sliding part 21 and fixing part 22. Sliding part 21 engages with guide member 30 in a width direction of guide member 30 (which substantially coincides with the front-rear direction indicated in FIG. 1), and slides in the direction along the guide member (direction G). Sliding part 21 can be configured as a groove into which a protrusion of a guide rail is fitted, for example. Fixing part 22 fixes movement object 100. In a case where movement object 100 (indicated by a dotted line) is a window, fixing part 22 fastens movement object 100 via a glass holder. Note that, the configuration of movement member 20 is not limited to the configuration thereof in the present embodiment, and the shape of movement member 20 may vary depending on movement object 100.

(Guide Member)

[0032] Guide member 30 guides movement member 20 in the movement direction. Guide member 30 is disposed substantially along the direction in which movement object 100 is moved.

[0033] Two guide members 30 may be provided apart from each other such that relative positions of two guide

members 30 relative to each other are changeable. Two guide members 30 are provided apart from each other in the width direction of guide members 30 (the left-right direction in FIG. 1). By configuring that the relative positions of two guide members 30 relative to each other are changeable, it is possible to adjust the positions of guide members 30 when guide members 30 are attached to an attachment object (for example, a vehicle). Guide members 30 can be fixed to the attachment object by e.g. a fastening member such as a bolt. At this time, the relative positions of guide members 30 relative to each other are adjusted. Note that, the inner-outer direction in FIG. 1 corresponds to a thickness direction of guide member 30.

[0034] In the window regulator illustrated in FIG. 1, guide member 30 is a guide rail.

[0035] Guide member 30 guides movement member 20 along length direction G of guide member 30. Further, the example indicated in FIG. 1 is a window regulator of a sashless type, and thus two guide members 30 are provided in parallel at a predetermined interval in the front-rear direction. However, two guide members 30 are not necessarily provided, and only one guide member 30 may be provided, for example. Note that, when it is necessary to describe two guide members 30 while making a distinction therebetween, guide member 30 on the front side illustrated in FIG. 1 is indicated as guide member 30a, and guide member 30 on the rear side illustrated in FIG. 1 is indicated as guide member 30b.

[0036] Two guide members 30 are fixed to the door of the vehicle, which is an example of the attachment object, and are arranged apart from each other. Guide member 30 includes a locked part that engages with sliding part 21 of movement member 20. An example of the locked part is a protrusion extending in the direction along the guide member (direction G).

(Cable)

[0037] Cable 40 is connected to movement member 20. Cable 40 is connected to movement member 20 and driving section 60 that winds and unwinds cable 40. Driving section 60 is driven to wind and unwind cable 40, and thereby movement member 20 to which cable 40 is connected moves along guide member 30. Cable 40 is at least partially routed along guide member 30. The portion of cable 40 along guide member 30 is connected to movement member 20.

[0038] An extending direction of cable 40 is changed by direction-changing part 50, and cable 40 is connected to driving section 60 and movement member 20. The configuration of direction-changing part 50 is not particularly limited as long as direction-changing part 50 is capable of changing the direction of cable 40.

[0039] Cable 40 is a cord-like body made of, for example, a metal wire or the like.

[0040] Cable 40 is connected to movement member 20 such that a driving force of driving section 60 is transmitted. The extending direction of cable 40 is changed

by a total of four direction-changing parts 50 provided in upper and lower parts of each of two guide members 30.

[0041] Direction-changing part 50 includes direction-changing member 51 and support member 52 that supports the direction-changing member. Direction-changing member 51 changes the extending direction of cable 40. Support member 52 is fixed to guide member 30, and supports direction-changing member 51 such that the extending direction of cable 40 is changeable. Direction-changing member 51 is, for example, a pulley. Cable 40 is wound around direction-changing member 51, and the extending direction of cable 40 is changed.

[0042] When it is necessary to describe four direction-changing parts 50 while making a distinction therebetween, direction-changing part 50, direction-changing member 51, and support member 52 in an upper part of guide member 30a on the front side illustrated in FIG. 1 are indicated as direction-changing part 50a, direction-changing member 51a, and support member 52a, respectively. Direction-changing part 50, direction-changing member 51, and support member 52 in a lower part of guide member 30a on the front side illustrated in FIG. 1 are indicated as direction-changing part 50b, direction-changing member 51b, and support member 52b, respectively. Direction-changing part 50, direction-changing member 51, and support member 52 in an upper part of guide member 30b on the rear side illustrated in FIG. 1 are indicated as direction-changing part 50c, direction-changing member 51c, and support member 52c, respectively. Direction-changing part 50, direction-changing member 51, and support member 52 in a lower part of guide member 30b on the rear side illustrated in FIG. 1 are indicated as direction-changing part 50d, direction-changing member 51d, and support member 52d, respectively.

[0043] Direction-changing part 50a changes the direction of cable 40, which extends upward from an end of cable 40, from upward to downward. The end of cable 40 is connected to driving section 60. Direction-changing part 50b changes the extending direction of cable 40, which is changed downward by direction-changing part 50a, upward.

[0044] Direction-changing part 50c changes the extending direction of cable 40, which is changed upward by direction-changing part 50b, downward. Direction-changing part 50d changes the extending direction of cable 40, which is changed downward by direction-changing part 50c, upward. An end of cable 40 of which the upwardly extending direction is changed is connected to driving section 60.

[0045] Cable 40 is partially disposed along guide member 30a between direction-changing part 50a and direction-changing part 50b. The portion of cable 40, which is disposed along guide member 30a, is connected to movement member 20a. Further, cable 40 is partially disposed along guide member 30b between direction-changing part 50c and direction-changing part 50d. The portion of cable 40, which is disposed along guide mem-

ber 30b, is connected to movement member 20b.

[0046] Cable 40 includes raising cable 41, intermediate cable 42, and lowering cable 43.

[0047] Raising cable 41 is connected to movement member 20a and driving section 60. One cable end of raising cable 41 engages with a drum member of driving section 60. Raising cable 41 is wound around direction-changing member 51a of direction-changing part 50a in the middle of raising cable 41. Cable end 41a, which is the other cable end of raising cable 41, engages with movement member 20a.

[0048] Intermediate cable 42 is connected to movement member 20a and movement member 20b. Cable end 42a, which is one cable end of intermediate cable 42, engages with movement member 20a. Intermediate cable 42 is sequentially wound around direction-changing members 51b and 51c of direction-changing parts 50b and 50c in the middle of intermediate cable 42. Cable end 42b, which is the other cable end of intermediate cable 42, engages with movement member 20b.

[0049] Lowering cable 43 is connected to movement member 20b and driving section 60. Cable end 43a, which is one cable end of lowering cable 43, is attached to movement member 20b. Lowering cable 43 is wound around direction-changing member 51d of direction-changing part 50d in the middle of lowering cable 43. The other cable end (not illustrated) of lowering cable 43 engages with the drum member of the driving section.

[0050] Cable 40 is partially inserted through outer casing 45. Outer casing 45 is divided into three outer casings. Raising cable 41 is inserted through outer casing 45a between direction-changing part 50a and driving section 60. Further, intermediate cable 42 is inserted through outer casing 45b between direction-changing part 50b and direction-changing part 50c. Lowering cable 43 is inserted through outer casing 45c between direction-changing part 50d and driving section 60.

(Driving Section)

[0051] Driving section 60 winds and unwinds cable 40 connected to driving section 60. Driving section 60 generates a driving force that causes movement member 20 to move. Driving section 60 includes a motor, the drum member, and a motor housing. The motor generates a driving force. The drum member rotates by driving of the motor. Cable 40 is connected to the drum member such that cable 40 can be wound and unwound by the rotation of the drum member. Motor housing 61 houses the motor and the drum member. Driving section 60 is connected to cable 40. In the present embodiment, each cable end of raising cable 41 and lowering cable 43 is connected to a drum of driving section 60, and thereby cable 40 is wound and unwound by the rotation of the drum.

[0052] Cable 40 is inserted into the inside of motor housing 61 through first insertion part 62 and second insertion part 63 that are formed in motor housing 61. First insertion part 62 and second insertion part 63 are

insertion holes formed in motor housing 61.

[0053] An end of raising cable 41, in which the end is opposite to cable end 41a thereof, is inserted into first insertion part 62, and is connected to the drum member. An end of lowering cable 43, in which the end is opposite to cable end 43a thereof, is inserted into second insertion part 63, and is connected to the drum member.

[0054] Motor housing 61 includes first member 64 illustrated in FIG. 1, and second member 65 illustrated in FIG. 2. FIG. 2 is a perspective view of second member 65 of motor housing 61. In FIG. 2, the outer-side direction and the inner-side direction are indicated with arrows. The outer-side direction corresponds to the front side of the paper surface in FIG. 1, and the inner-side direction corresponds to the depth side of the paper surface in FIG. 1.

[0055] The motor and the drum member are housed by first member 64 and second member 65. First member 64 is a portion of motor housing 61 on the front side (outer side) of the paper surface illustrated in FIG. 1. Second member 65 illustrated in FIG. 2 is a portion of motor housing 61 on the depth side (inner side) of the paper surface in FIG. 1. FIG. 2 illustrates first formation part 66 and second formation part 67 of second member 65. First formation part 66 forms an inner-side portion of first insertion part 62. Second formation part 67 forms an inner-side portion of second insertion part 63.

(Holding Structure)

[0056] Holding structure 70 holds driving section 60 to guide member 30. The configuration of holding structure 70 is not limited as long as holding structure 70 is capable of holding driving section 60 to guide member 30. Holding structure 70 may be provided in driving section 60 and guide member 30, and driving section 60 may be held to guide member 30 directly. The holding herein means temporary fixing, and at least allows movement of driving section 60 relative to guide member 30 within a predetermined range along the thickness direction of guide member 30.

[0057] Further, driving section 60 may be held to guide member 30 via a holding member. In this case, it may be configured such that holding structure 70 is provided in the holding member and driving section 60, the holding member is fixed to guide member 30, and driving section 60 is held to the holding member, and thereby driving section 60 is held to guide member 30. Further, it may also be configured such that holding structure 70 is provided in the holding member and guide member 30, holding structure 70 is fixed to driving section 60, and the holding member is held to guide member 30, and thereby driving section 60 is held to guide member 30. The holding member may be direction-changing part 50 described above, or may be e.g. a bracket provided separately from direction-changing part 50. The holding member may be connected to driving section 60 and guide member 30, respectively.

[0058] In the present embodiment, holding structure 70 illustrated in FIG. 1 holds driving section 60 to guide member 30. In the window regulator illustrated in FIG. 1 as an example of object moving device 10, holding structure 70 is provided in driving section 60 and direction-changing member 51. In the window regulator illustrated in FIG. 1, support member 52b of direction-changing part 50b is used as an example of the holding member. Note that, the example of the holding member is not limited to support member 52b, but may be support member 52c attached to guide member 30b. Driving section 60 may be held to one of two guide members 30 by holding structure 70. The holding member that forms holding structure 70 is a member to which driving section 60 for being fixed to guide member 30 is attached. The holding member that forms holding structure 70 is, for example, a bracket that is fixed to guide member 30.

[0059] Holding structure 70 holds driving section 60 in a state in which relative movement of driving section 60 relative to guide member 30 is allowed within a predetermined range along the thickness direction of guide member 30. In a case where support member 52b as an example of the holding member is fixed to guide member 30, holding structure 70 holds driving section 60 in a state in which relative movement of driving section 60 relative to guide member 30 is allowed within a predetermined range along a thickness direction of support member 52b. Thus, driving section 60 is relatively movable relative to guide member 30 within the predetermined range along the thickness direction of guide member 30.

[0060] Further, holding structure 70 regulates movement of driving section 60 in the width direction of guide member 30 in a state in which relative movement of driving section 60 relative to guide member 30 is allowed within a predetermined range in direction G along guide member 30. Note that, the regulation of the movement of driving section 60 in the width direction of guide member 30 allows e.g. rattling due to tolerances.

[0061] Hereinafter, a specific example of such a configuration will be described.

[0062] FIG. 3 is a perspective view of support member 52b. As illustrated in FIG. 3, support member 52b is a plate-like member, and is fixed to the lower part of guide member 30a.

[0063] Support member 52b includes attachment part 101, holding part 102, and shaft hole 103. Attachment part 101 is attached to guide member 30a. Support member 52b may be fixed to guide member 30a by a fastening member such as a bolt, or may be attached to guide member 30a by welding or the like. A rotation shaft of direction-changing member 51a is inserted into shaft hole 103, and shaft hole 103 rotatably supports direction-changing member 51a. Holding part 102 holds driving section 60. Holding part 102 is a portion of support member 52b, in which the portion protrudes toward the inner side between guide members 30.

[0064] Holding structure 70 includes driving section-side holding element 71 and holding member-side hold-

ing element 72. In the present embodiment, holding member-side holding element 72 includes through-hole 81 as illustrated in FIG. 3, and driving section-side holding element 71 includes insertion part 82 as illustrated in FIG. 2. However, the configurations of driving section-side holding element 71 and holding member-side holding element 72 are not limited thereto, and the member in which the through-hole is provided and the member in which the insertion part is provided may be reversed. Driving section-side holding element 71 and holding member-side holding element 72 are only required to be capable of causing driving section 60 to be held to guide member 30.

[0065] FIG. 4 is an enlarged view of part S of FIG. 2. As illustrated in FIG. 4, insertion part 82 includes locking part 91 and intermediate part 92. Locking part 91 is provided in leading end part 93, and is insertable into through-hole 81.

[0066] In the present embodiment, insertion part 82 is formed to extend from second member 65 toward the outer-side direction (in a direction of the front side of the paper surface in FIG. 1). Insertion part 82 includes columnar part 94, and a pair of locking parts 91 formed so as to protrude from a side surface of columnar part 94. Locking parts 91 are provided at a leading end of columnar part 94. In columnar part 94, notch 95 is formed from the leading end of columnar part 94 toward intermediate part 92. The pair of locking parts 91 is formed so as to face each other with notch 95 therebetween. Leading end part 93 is formed of the leading end of columnar part 94 and locking parts 91. Intermediate part 92 is a portion of columnar part 94 on a root side of insertion part 82 than locking parts 91.

[0067] FIG. 5 is an enlarged view of part T of FIG. 1. As illustrated in FIG. 5, two insertion parts 82 are arranged so as to be along guide member 30. Further, in the present embodiment, locking parts 91 of two insertion parts 82 protrude from columnar parts 94 so as to be parallel to each other. Further, two insertion parts 82 are arranged such that notches 95 face each other.

[0068] On the other hand, through-hole 81 of holding member-side holding element 72 is formed in support member 52b. As illustrated in FIG. 3, through-hole 81 is formed as a long hole. This long hole is formed along direction G along guide member 30. Further, the width of through-hole 81 in a direction perpendicular to direction G is set to be substantially the same length as the diameter of insertion part 82.

[0069] FIG. 6 illustrates a state in which insertion part 82 of driving section-side holding element 71 is inserted into through-hole 81 of holding member-side holding element 72. When driving section 60 is held to support member 52b by holding structure 70, two insertion parts 82 are inserted through through-hole 81 of support member 52b.

[0070] FIG. 7A to FIG. 7C are schematic cross-sectional views illustrating an insertion operation of insertion part 82 into through-hole 81. As illustrated in FIG. 7A and

FIG. 7B, when insertion part 82 is inserted into through-hole 81, inclined surfaces 91a of locking parts 91, in which each inclined surface 91a is on a side of a leading end of each locking part 91, abut on an edge of through-hole 81. When insertion part 82 is further inserted, portions 93a of leading end part 93, in which portions 93a are on sides of both ends of notch 95, are pushed by the edge of through-hole 81 along inclined surfaces 91a, and narrow in arrow directions (see the arrows in FIG. 7B). Thus, locking parts 91 can be inserted into through-hole 81, further intermediate part 92 of insertion part 82 slides with through-hole 81, and insertion part 82 is inserted into through-hole 81 as illustrated in FIG. 7C.

[0071] Thus, in a state in which driving section 60 is held to support member 52b by holding structure 70, a portion of insertion part 82, in which the portion protrudes from through-hole 81, is provided with locking parts 91 that can be locked to edge part 81a of through-hole 81. Accordingly, even when driving section 60 moves relative to support member 52b such that insertion part 82 can come off from through-hole 81, locking parts 91 abut on edge part 81a of through-hole 81, and thus it is possible to prevent insertion part 82 from coming off from through-hole 81.

[0072] Further, two insertion parts 82 disposed over a predetermined length in direction G along guide member 30 are inserted into through-hole 81, and thereby driving section 60 can be held to support member 52b.

[0073] Further, relative movement of driving section 60 relative to guide member 30, especially in the width direction of guide member 30, is restrained by a difference between a direction in which one of two insertion parts 82 slides with edge part 81a of through-hole 81 and a direction in which another one of two insertion parts 82 slides with edge part 81a of through-hole 81.

[0074] Further, since two insertion parts 82 abut on edge part 81a of through-hole 81, it is possible to regulate movement of driving section 60 relative to support member 52b in a rotation direction (see arrow P in FIG. 5) on a plane substantially perpendicular to the thickness direction of guide member 30.

[0075] Note that, the configuration of insertion part 82 is not limited to two insertion parts 82 as in the present embodiment, but may have a plate shape in which two insertion parts 82 are connected therebetween. Further, the configuration of insertion part 82 is not limited to two insertion parts 82, but three or more insertion parts 82 may be provided.

[0076] Further, length W1 between locking part 91 of insertion part 82 to the root thereof is longer than thickness W2 of through-hole 81, and thus driving section 60 including insertion parts 82 can move relative to support member 52b along a thickness direction of through-hole 81 by W3 as illustrated in FIG. 7C. This thickness direction of through-hole 81 coincides with the thickness direction of guide member 30 and, in the present embodiment, coincides with the inner-outer direction.

[0077] Further, as illustrated in FIG. 6, length L1 of

through-hole 81 in direction G along guide member 30 is shorter than length L2 of the pair of insertion parts 82 in direction G along guide member 30. Accordingly, driving section 60 including insertion parts 82 is movable relative to support member 52b, in which through-hole 81 is formed, in direction G along guide member 30 by length L3.

[0078] Note that, the shape of insertion part 82 may not be limited to that as in the embodiment described above. For example, the columnar part may be formed of a bolt, and the locking part may be formed of a nut. In this case, the bolt may be passed through through-hole 81, and then the nut may be fitted into the bolt.

[0079] FIG. 8A and FIG. 8B are diagrams for describing an operation when object moving device 10 of the present embodiment is attached to door 200 of the vehicle body.

[0080] As illustrated in FIG. 8A, object moving device 10 is disposed between inner-side panel 201 and outer-side panel 202 of door 200. Object moving device 10 is attached to inner-side panel 201. Guide member 30 and driving section 60 (which is not illustrated in FIG. 8A and FIG. 8B) of object moving device 10 are attached to inner-side panel 201 separately.

[0081] Here, the position of guide member 30 in the thickness direction of guide member 30 (inner-outer direction) is adjusted such that a window, which is movement object 100, is inserted between each pair of weather strips 203 arranged upside and downside. At this time, since driving section 60 is movable relative to guide member 30 in the thickness direction of guide member 30 by distance W3 (see FIG. 7C), it is possible to adjust the position of guide member 30 in the thickness direction of guide member 30 in a state in which driving section 60 is fixed to inner-side panel 201, for example. Note that, guide member 30 is attached to inner-side panel 201 at upper and lower parts of guide member 30 by bolt member 204 or the like, and is configured such that the position of guide member 30 in the thickness direction of guide member 30 (inner-outer direction) is adjustable.

[0082] Thus, it is possible to facilitate adjustment of the attachment position of object moving device 10 in accordance with the positions of weather strips 203.

(Embodiment 2)

[0083] Next, Embodiment 2 according to the present invention will be described.

[0084] Object moving device 10' in Embodiment 2 will be described. As illustrated in FIG. 9, a distance between guide members 30 is narrow, and thus driving section 60' of object moving device 10' in the present embodiment is fixed below guide members 30. Object moving device 10' in Embodiment 2 is a window regulator as an example, but has a narrow width, and therefore can be used for a rear window. Object moving device 10 in Embodiment 1 described above, on the other hand, can be used for a front window due to a wide distance between guide members 30.

[0085] Note that, in Embodiment 2, configurations similar to those in Embodiment 1 will be denoted with the same reference signs, and descriptions thereof will be omitted.

[0086] In object moving device 10' in Embodiment 2, the position and structure of holding structure 70' are different from those in Embodiment 1.

[0087] Holding structure 70' holds driving section 60' to guide member 30. Holding structure 70' is provided in support member 52 (52d') and driving section 60'. Holding structure 70' includes driving section-side holding element 71' and holding member-side holding element 72'. Driving section-side holding element 71' is provided in driving section 60'. Driving section 60' is formed substantially symmetrically with driving section 60. In the same manner as driving section 60, driving section 60' includes motor housing 61, first insertion part 62, second insertion part 63, first member 64, and second member 65. In Embodiment 2, unlike Embodiment 1, driving section 60' is held to guide member 30b, and thus the routing of cable 40 is different from that in Embodiment 1.

[0088] Driving section-side holding element 71' is provided in driving section 60'. In the same manner as in Embodiment 1, driving section-side holding element 71' includes two insertion parts 82.

[0089] Holding member-side holding element 72' is provided in support member 52d'. Support member 52d' is provided in direction-changing part 50' (50d'). FIG. 11 is a perspective view of support member 52d'. Unlike support member 52d in Embodiment 1, support member 52d' extends downward from a lower part of guide member 30b along direction G along guide member 30b as illustrated in FIG. 9. Support member 52d' includes attachment part 101, shaft hole 103, and holding part 102. Attachment part 101 is attached to the lower part of guide member 30b. Shaft hole 103 is disposed on an inner side of attachment part 101 between guide members 30, a rotation shaft of direction-changing member 51d is inserted into shaft hole 103, and shaft hole 103 rotatably supports direction-changing member 51d. Holding part 102 is a portion which is a lower part of support member 52d' and which protrudes toward the inner side between guide members 30.

[0090] Holding member-side holding element 72' includes two through-holes 81' formed in holding part 102 of support member 52d'. Two through-holes 81' are formed in a long hole shape along length direction G of guide member 30, and are parallel to each other. Further, the width of through-hole 81' is substantially the same length as the diameter of insertion part 82. Note that, in the present embodiment, two through-holes 81' are not arranged on a straight line along length direction G, but are arranged with deviation. However, two through-holes 81' may be arranged on a straight line.

[0091] FIG. 12 is an enlarged view of part V in FIG. 9. As illustrated in FIG. 12, two insertion parts 82 are inserted into two through-holes 81', respectively. Locking part 91 of insertion part 82 is locked to edge part 81a' of

through-hole 81', and thereby insertion part 82 is prevented from coming off from through-hole 81'.

[0092] As described above, movement of driving section 60' relative to guide member 30 along the width direction of guide member 30 is regulated by insertion of insertion part 82 into each of two through-holes 81'.

[0093] Further, since the length of through-hole 81' in length direction G of guide member 30 is formed to be longer than the length of insertion part 82 in length direction G of guide member 30, driving section 60' can move relative to support member 52d' along direction G by distance L4 that is a difference between the length of through-hole 81' and the length of insertion part 82 in length direction G of guide member 30. Further, although not illustrated, since the length of insertion part 82 between the root thereof and locking part 91 is formed to be longer than the thickness of through-hole 81' as illustrated in FIG. 7C, driving section 60' can move relative to support member 52d' along the thickness direction of through-hole 81'.

[0094] As described in the above embodiments, driving section 60 or 60' is temporarily fixed to guide member 30 so as to be relatively movable relative to guide member 30 within a predetermined range along the thickness direction of guide member 30. Thus, it is possible to adjust the position of guide member 30 in the thickness direction of guide member 30 even in a state in which driving section 60 or 60' is fixed, and it is therefore possible to adjust the attachment position of object moving device 10 or 10' easily.

[0095] For example, when object moving device 10 or 10' is attached to a vehicle body for use in lifting and lowering a window of a vehicle, guide member 30 can be moved in the thickness direction thereof (inner-outer direction) in a state in which driving section 60 or 60' is fixed to the vehicle body. Accordingly, the position of the window, which is attached to movement member 20, can be adjusted to a position which sufficiently ensures that the window is sealed with weather strip 203. Thus, it is possible to adjust the attachment position of the window easily.

[0096] Further, of relative positions of driving section 60 or 60' relative to guide member 30, a relative position of driving section 60 or 60' relative to guide member 30 in the width direction of guide member 30 is substantially fixed, whereas a relative position of driving section 60 or 60' relative to guide member 30 in direction G along guide member 30 can be adjusted within the predetermined range. Accordingly, position adjustment can be made easier.

[0097] Further, as indicated in the above embodiments, object moving device 10 or 10' can be applied as a window regulator for a sashless vehicle.

[0098] Further, driving section 60 or 60' can be temporarily fixed to guide member 30 only by inserting locking part 91 into through-hole 81 or 81', and it is therefore possible to hold driving section 60 or 60' to guide member 30 easily. Further, since the relative movement of driving

section 60 or 60' relative to support member 52b or 52d' (an example of the holding member) is allowed by the sliding of intermediate part 92 with through-hole 81 or 81', position adjustment of driving section 60 or 60' and guide member 30 can be made easy.

[0099] Further, relative movement of driving section 60 or 60' relative to guide member 30 in the width direction of guide member 30 is restrained, and it is therefore possible to fix a relative position of driving section 60 or 60' relative to guide member 30 in the width direction of guide member 30 when object moving device 10 or 10' is attached to a vehicle or the like.

Industrial Applicability

[0100] The object moving device of the present invention exhibits an effect of making adjustment of the attachment position of the object moving device easy, and is useful as, for example, a window regulator or the like.

Reference Signs List

[0101]

- 10 : Object moving device
- 20 : Movement member
- 30 : Guide member
- 40 : Cable
- 60 : Driving section
- 70 : Holding structure

Claims

1. An object moving device, comprising:

at least one movement member attached to a movement object;
at least one guide member that guides the movement member;
a cable connected to the movement member;
a driving section that winds and unwinds the cable connected to the driving section; and
a holding structure that holds the driving section to the guide member, wherein
the holding structure holds the driving section in a state in which relative movement of the driving section relative to the guide member is allowed within a predetermined range along a thickness direction of the guide member.

2. The object moving device according to claim 1, wherein

the holding structure regulates movement of the driving section in a width direction of the guide member in a state in which relative movement of the driving section relative to the guide member is allowed within a predetermined range in a direction along the guide member. 5

3. The object moving device according to claim 1 or 2, wherein: 10

two of the movement members are provided apart from each other,
two of the guide members are provided apart from each other such that relative positions of the two guide members relative to each other are changeable, and 15
the driving section is held to one of the two guide members by the holding structure.

4. The object moving device according to any one of claims 1 to 3, wherein: 20

a holding member is fixed to the guide member, the holding member being a member to which the driving section is attached, 25
the holding member includes a holding member-side holding element that forms one part of the holding structure,
the driving section includes a driving section-side holding element that forms another part of the holding structure, wherein 30
one of the holding member-side holding element and the driving section-side holding element is provided with a through-hole,
another of the holding member-side holding element and the driving section-side holding element is provided with at least one insertion part that is inserted into the through-hole, wherein 35
the insertion part includes a locking part and an intermediate part, the locking part being provided in a leading end part of the insertion part and being insertable into the through-hole, the intermediate part being provided on a rear end side of the insertion part than the leading end part of the insertion part, and 40
the holding member-side holding element is restrained from being separated from the driving section-side holding element by engagement of the locking part with an edge part of the through-hole, and 45
the driving section is temporarily held in a state in which relative movement of the driving section relative to the holding member is allowed by sliding of the intermediate part with the through-hole. 50 55

5. The object moving device according to claim 4, wherein:

a plurality of the insertion parts is provided, and relative movement of the driving section relative to the guide member is restrained by a difference between a direction in which one of the plurality of insertion parts slides with the edge part of the through-hole and a direction in which another one of the plurality of insertion parts slides with the edge part of the through-hole.

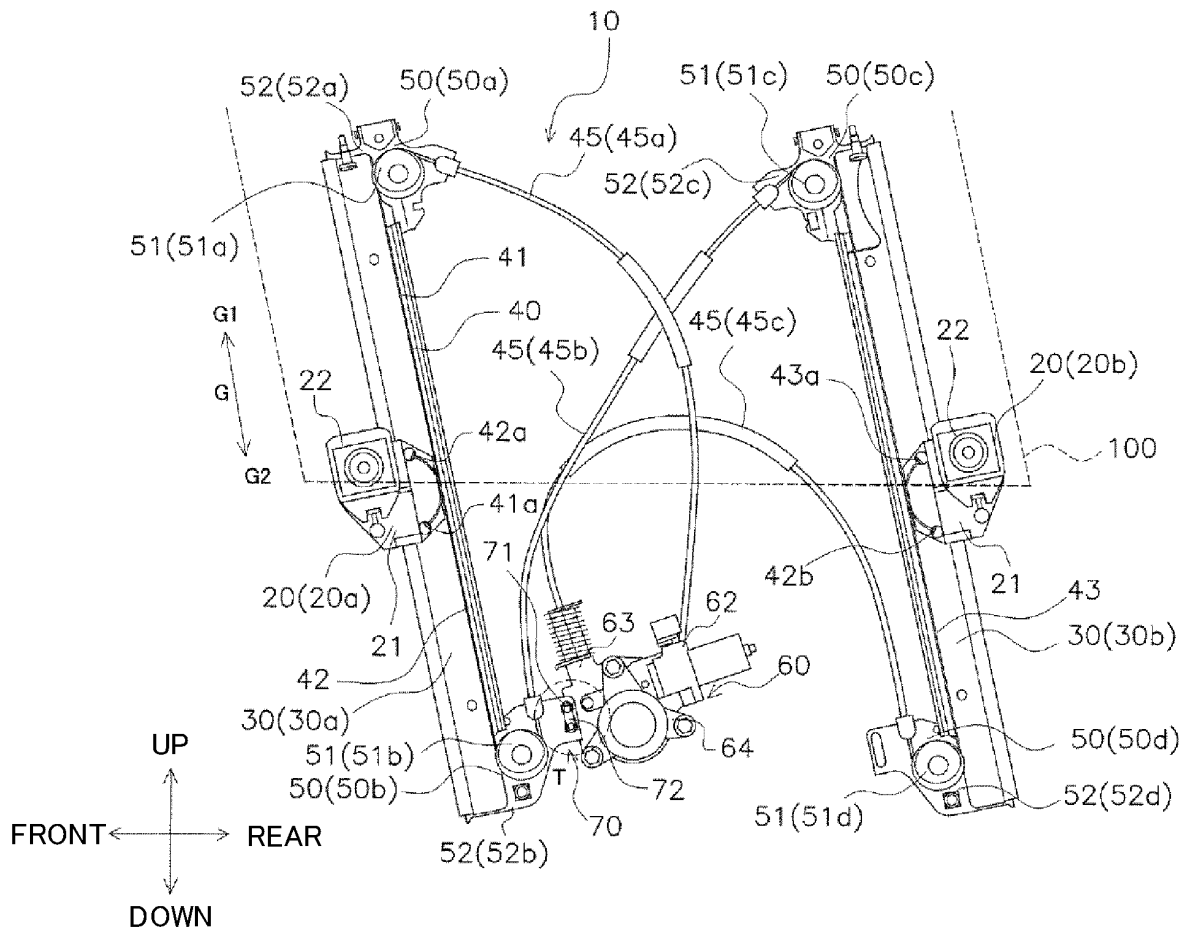


FIG. 1

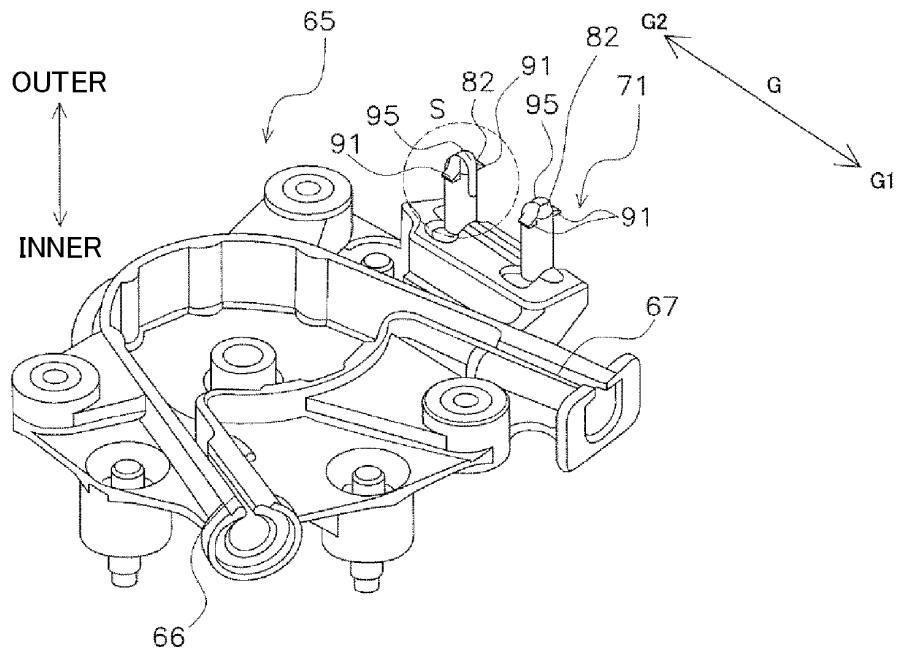


FIG. 2

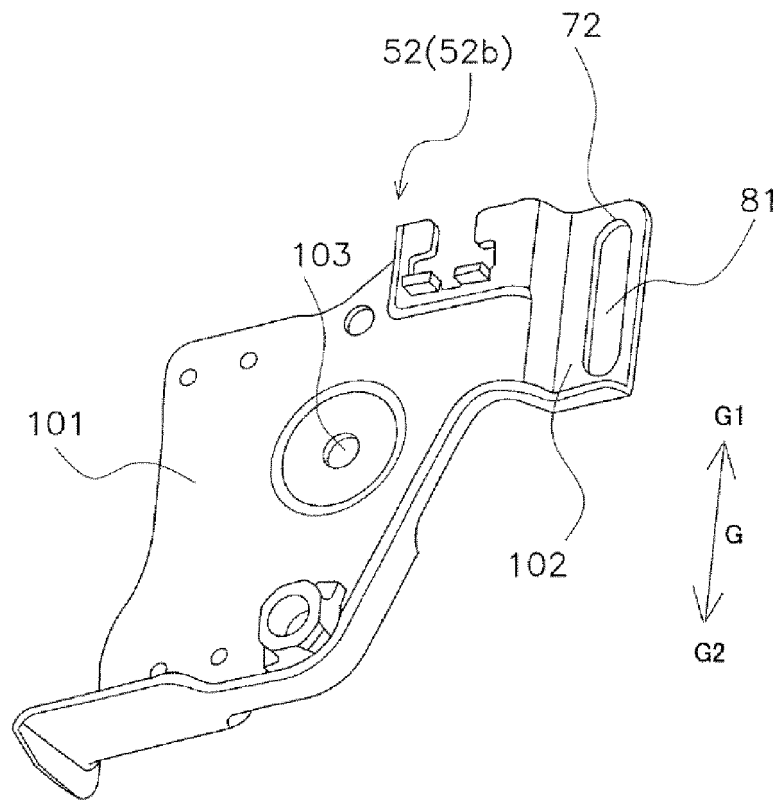


FIG. 3

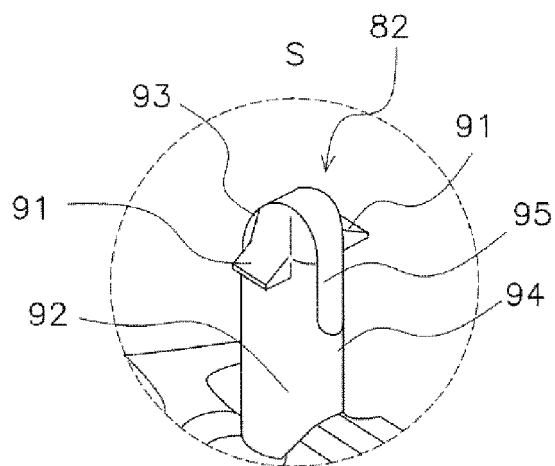


FIG. 4

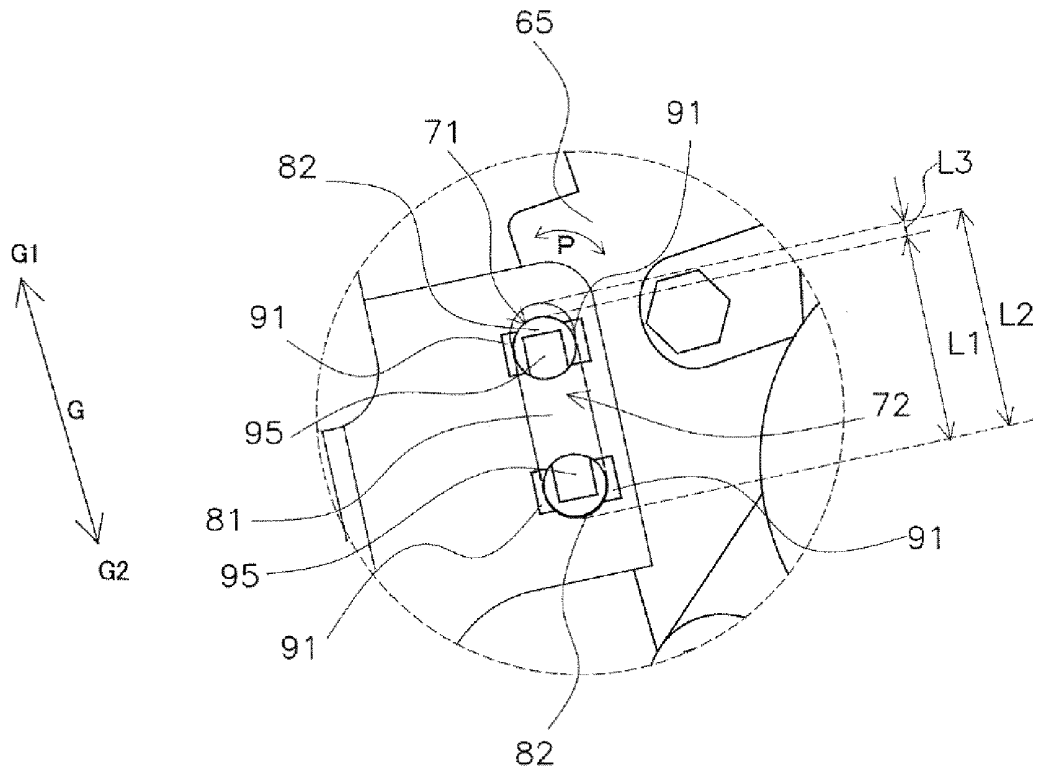


FIG. 5

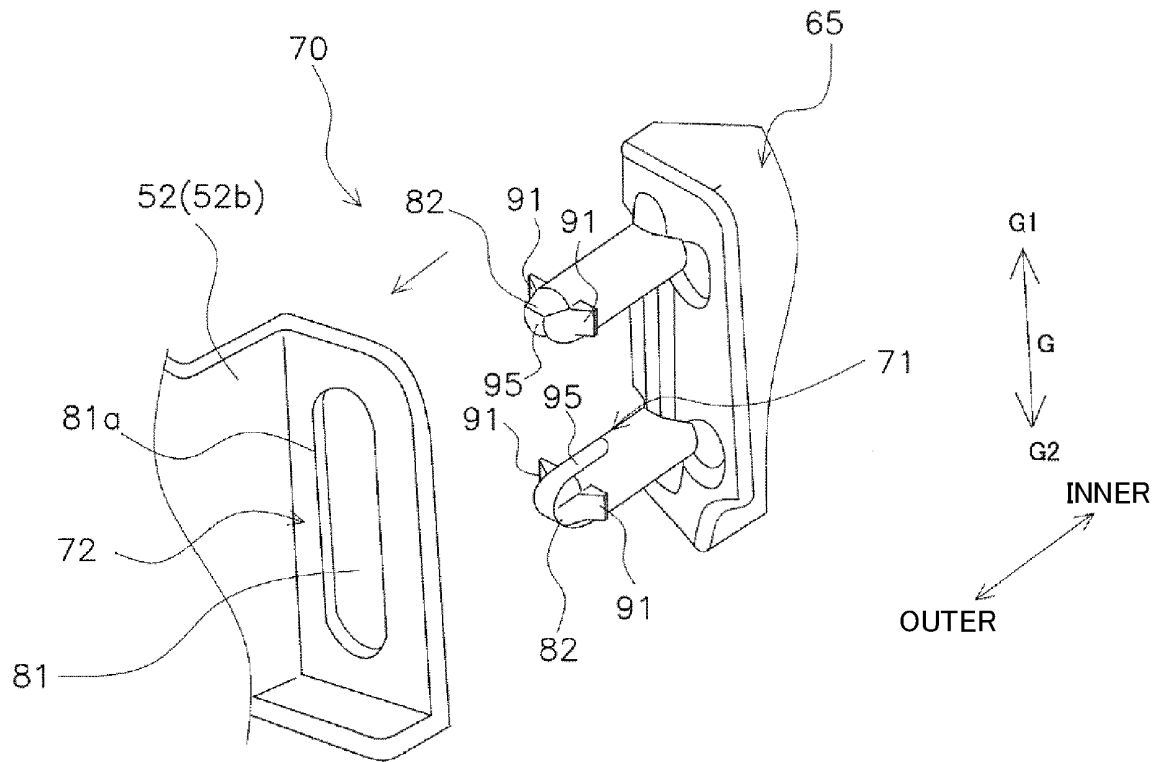


FIG. 6

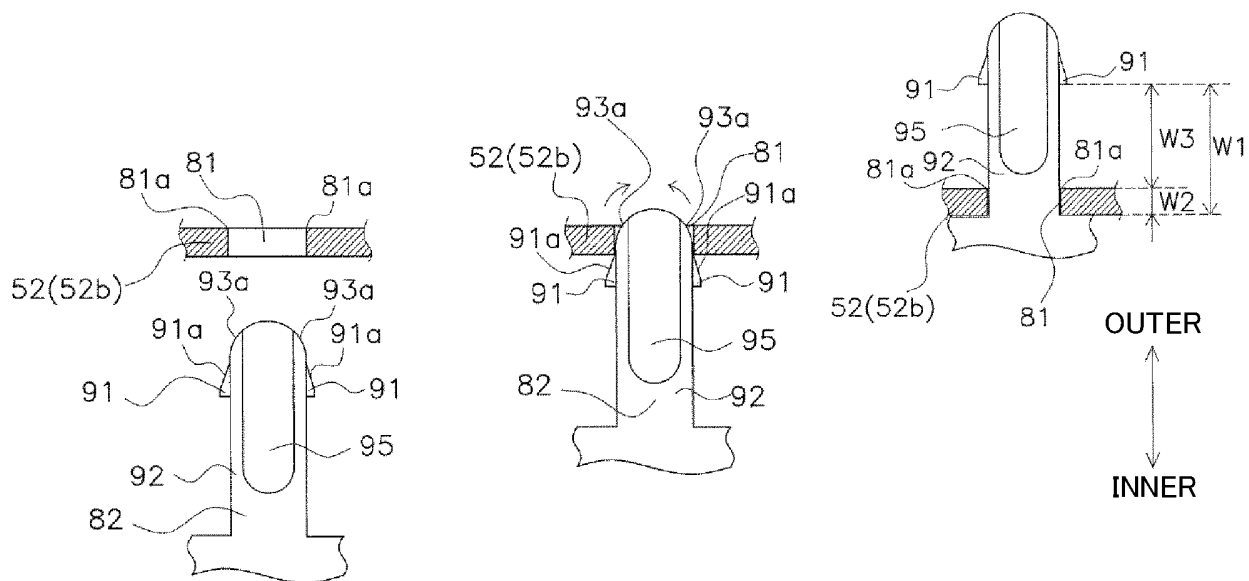


FIG. 7A

FIG. 7B

FIG. 7C

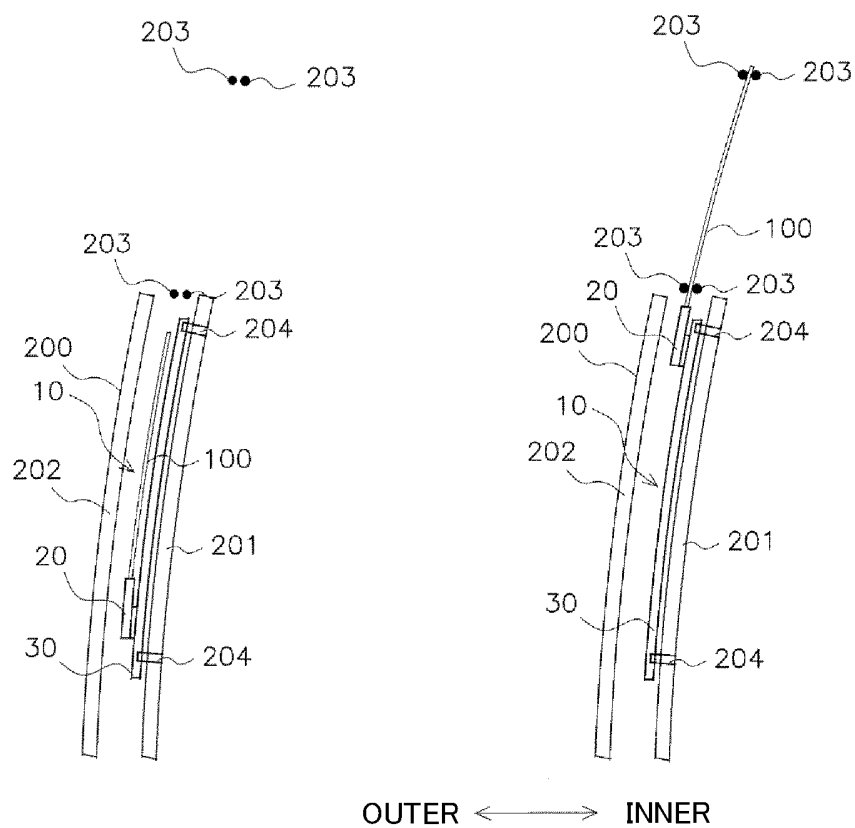


FIG. 8A

FIG. 8B

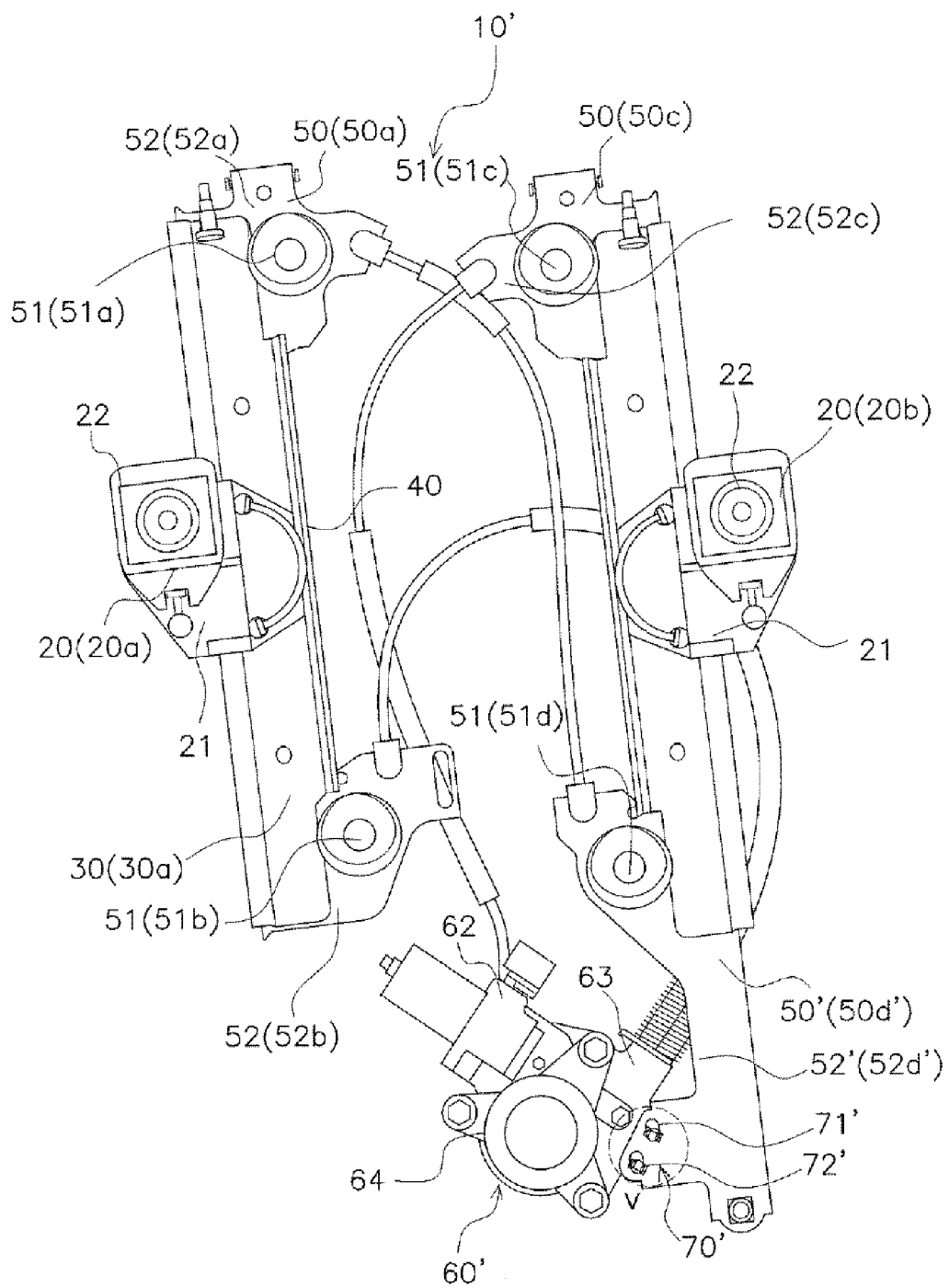


FIG. 9

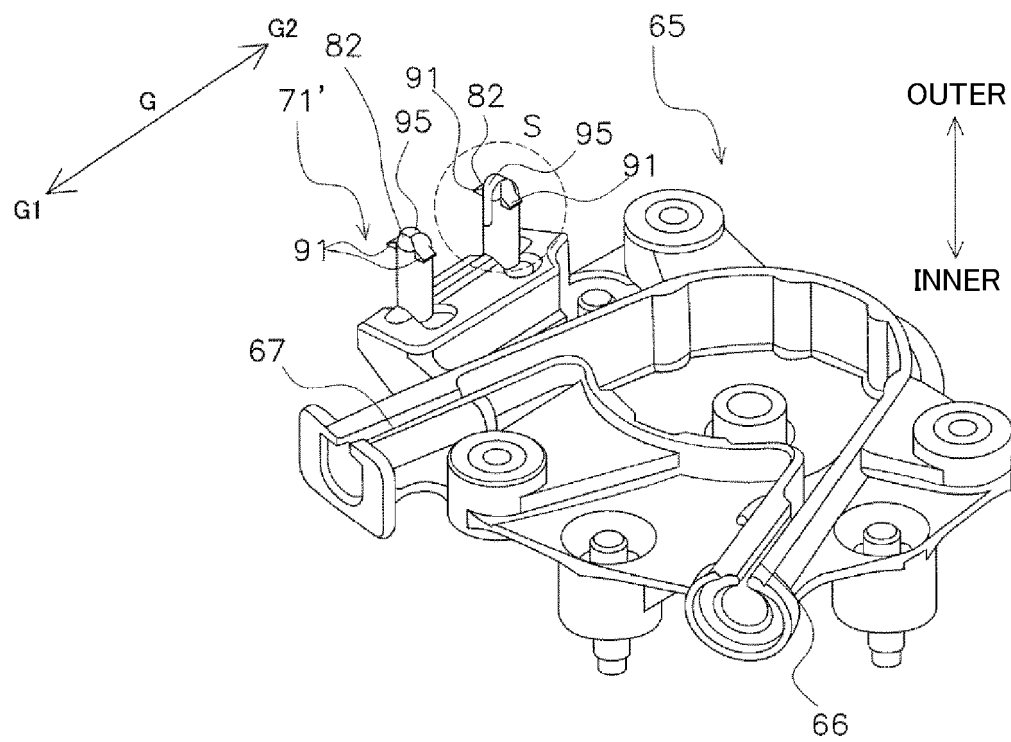


FIG. 10

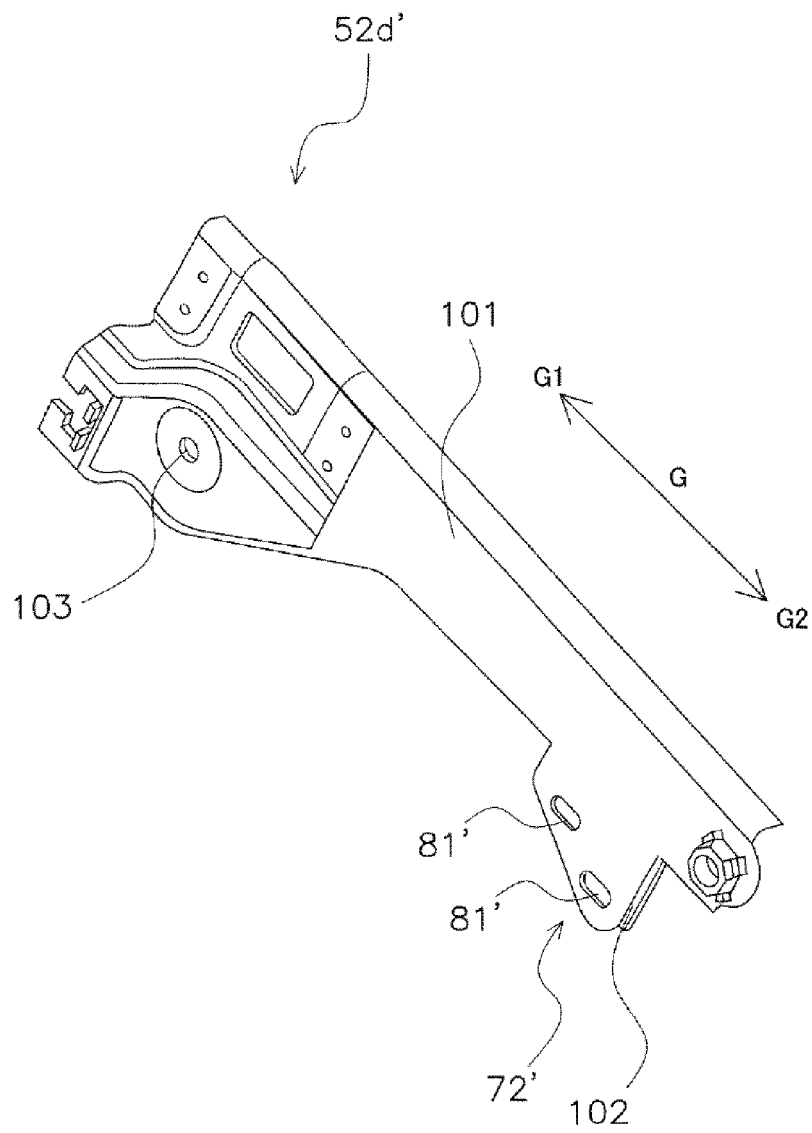


FIG. 11

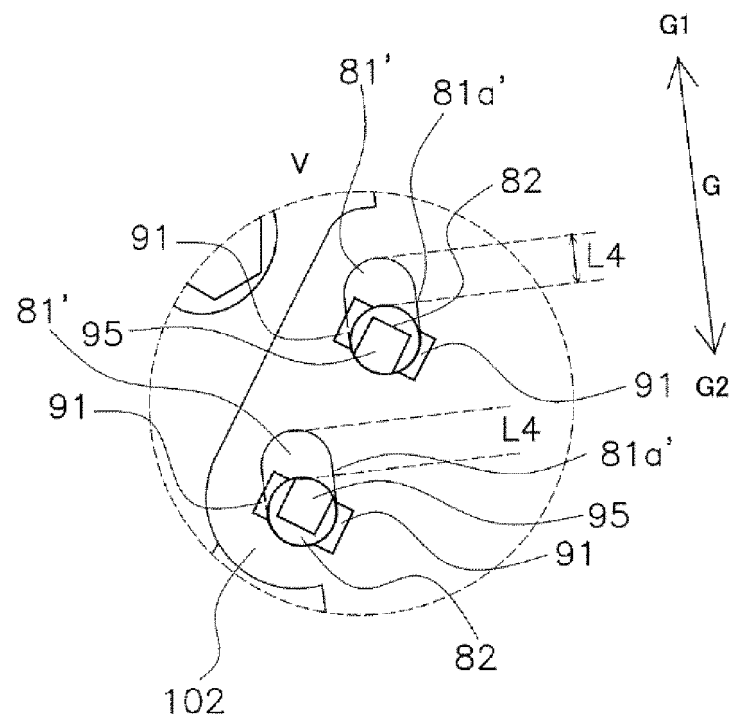


FIG. 12

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/017934

A. CLASSIFICATION OF SUBJECT MATTER

E05F 11/38 (2006.01) i; E05F 11/48 (2006.01) i; E05F 15/689 (2015.01) i; B60J 1/17 (2006.01) i

FI: E05F11/48 D; E05F15/689; B60J1/17 A; E05F11/38 G

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)

E05F11/38; E05F11/48

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 4213458 B2 (SHIROKI CORPORATION) 21.01.2009 (2009-01-21) entire text, all drawings	1-5
A	JP 2003-214028 A (SHIROKI CORPORATION) 30.07.2003 (2003-07-30) entire text, all drawings	1-5
A	JP 2011-144627 A (BROSE FAHRZEUGTEILE GMBH & CO KG HALNSTADT) 28.07.2011 (2011-07-28) entire text, all drawings	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

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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

22 July 2020 (22.07.2020)

Date of mailing of the international search report

04 August 2020 (04.08.2020)

Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/JP2020/017934

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
JP 4213458 B2	21 Jan. 2009	(Family: none)	
JP 2003-214028 A	30 Jul. 2003	(Family: none)	
JP 2011-144627 A	28 Jul. 2011	DE 202010001159 U1	
		entire text, all drawings	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2018071235 A [0004]