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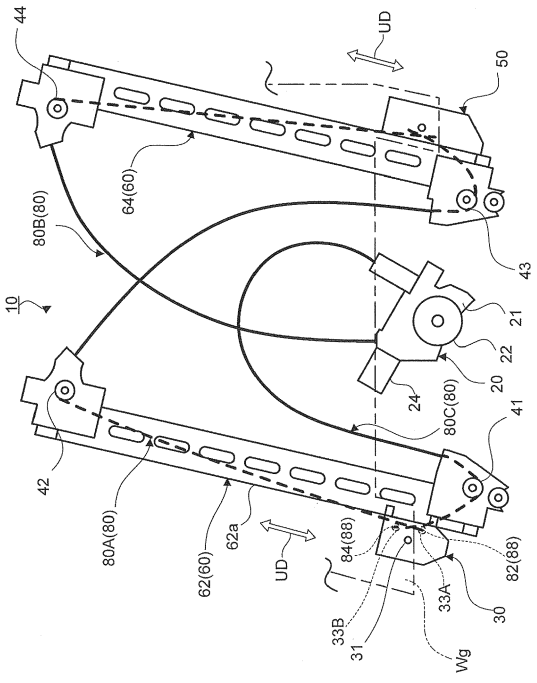
(54) OBJECT MOVING DEVICE AND WINDOW GLASS LIFTING DEVICE

(57) To easily mount a member that prevents direct contact between dissimilar metals.

An object moving device (10) including a driving unit (20), a carrier plate (30) including a mounting portion (31) to which a moving object (Wg) is mounted and a metal body (34), a guide member (60) configured to guide the carrier plate (30), a driving force transmitting member (80) connected to the carrier plate (30) and configured to transmit a driving force of the driving unit (20) to the carrier plate (30), and a fitting member (90) to be fit in the carrier plate (30). The driving force transmitting member (80) includes a metal portion (88) to be indirectly engaged with the metal body (34), and the fitting member (90) includes an electrolytic corrosion suppressing portion (92) that is engaged with the metal portion (88) to be interposed between the metal body (34) and the metal portion (88) to suppress electrolytic corrosion, and a fitting portion (94) to be fit in the carrier plate (30).

Fig.1



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Description

Technical Field

[0001] The present invention relates to an object moving device and a window glass lifting device.

Background Art

[0002] In an object moving device that moves an object such as a window glass, a carrier plate is mounted to the object in order to transmit a driving force. For example, in a case where a member that transmits the driving force is a cable, a metal-made end member provided in an end portion of the cable is brought engaged with the carrier plate (carrier piece) mounted to the object, and the cable is moved by a driving unit such as a motor, thereby the object is moved (for example, Patent Literature 1).

Citation List

Patent Literature

[0003] Patent Literature 1: JP 2013-079518 A

Summary of Invention

Technical Problem

[0004] A resin or a metal is used as a material for the carrier plate used for such an object moving device. However, for a heavy object, a metal is used as the material to secure strength. However, in a case where different types of metals from each other are used for the member that transmits the driving force to the carrier plate and for the carrier plate, connection between the member that transmits the driving force and the carrier plate becomes connection between dissimilar metals.

[0005] When such dissimilar metals make contact, electrolytic corrosion occurs and strength decreases in the contact portion. To prevent the decrease in strength, a member that prevents direct contact between the dissimilar metals, such as a resin-made washer, is usually used as a spacer.

[0006] However, to provide the member that prevents direct contact between the dissimilar metals in the connection portion, it is necessary to mount the member not to easily drop out of the carrier plate, and it is necessary to easily mount the carrier plate and the member.

[0007] An object of the present invention is to provide an object moving device and a window glass lifting device capable of easily mounting a member that prevents direct contact between dissimilar metals.

Solution to Problem

[0008] An object moving device of the present invention is an object moving device including:

a driving unit;
a carrier plate including a mounting portion to which a moving object is mounted and a metal body;
a guide member configured to guide the carrier plate;
a driving force transmitting member connected to the carrier plate and configured to transmit a driving force of the driving unit to the carrier plate; and
a fitting member to be fit in the carrier plate, wherein:

the driving force transmitting member includes a metal portion to be indirectly engaged with the metal body, and
the fitting member includes an electrolytic corrosion suppressing portion that is engaged with the metal portion to be interposed between the metal body and the metal portion to suppress electrolytic corrosion, and a fitting portion to be fit in the carrier plate.

[0009] In a window glass lifting device of the present invention, the moving object is a window glass, and the object moving device having the above-described configuration is used.

Advantageous Effects of Invention

[0010] According to the present invention, a member that prevents direct contact between dissimilar metals can be easily mounted.

Brief Description of Drawings

[0011]

Fig. 1 is a schematic front view illustrating an overall configuration of a window glass lifting device including an object moving device according to an embodiment of the present invention.
Fig. 2 is a rear view illustrating a carrier plate in the object moving device.
Fig. 3 is a schematic cross-sectional view taken along line A-A in Fig. 2.
Fig. 4 is a partially exploded rear-side perspective view illustrating a configuration of a main part of a mounting structure of a carrier plate and a driving force transmitting member of the object moving device.
Fig. 5 is a plan sectional view illustrating a configuration of the main part of the mounting structure of the carrier plate and the driving force transmitting member of the object moving device.
Fig. 6 is a perspective view of a fitting member illustrating an electrolytic corrosion suppressing portion.

Description of Embodiments

[0012] Hereinafter, an embodiment of the present invention will be described in detail with reference to the

drawings.

[0013] An object moving device according to the present embodiment is mounted to a mounting object, and moves a moving object mounted to a carrier plate by moving the carrier plate. In the present embodiment, the moving object of the object moving device is a separate object from the carrier plate and connected to the carrier plate. However, the moving object may be integrally connected to the carrier plate.

[0014] In the present embodiment, the mounting object is an inner panel and an outer panel of a door of a vehicle, and the object moving device is mounted between the inner panel and the outer panel of the door of the vehicle. Further, the moving object is a glass window, and the object moving device is applied to a window glass lifting device that moves up and down the glass window of a vehicle, that is, a window regulator.

[0015] Since the moving object is a window glass in the present embodiment, a moving direction of the carrier plate to which the window glass is mounted is an up-down direction defined with reference to a lifting direction of the window glass as the moving object.

[0016] Note that the object moving device of the present embodiment may be used in any device as long as the device moves the carrier plate and can be used in devices other than the window glass lifting device. In addition, the object moving device can be applied to a device that moves up and down a seating portion that moves up and down, for example. Further, the object moving device can also be applied to a walking assisting device that assists walking by moving up and down a handle with wheels at a lower end to be separated from the wheels by a predetermined length to enable a user holding the handle to take a walkable posture from a seated state at the time of walking.

<Window Glass>

[0017] A window glass Wg illustrated in Fig. 1 is a moving object of an object moving device 10 and is connected to carrier plates 30 and 50 of the object moving device 10. The window glass Wg is connected to and supported by the carrier plates 30 and 50 at lower ends. The window glass Wg moves up and down in conjunction with moving up and down of the carrier plates 30 and 50.

[0018] In the present embodiment, the window glass Wg moves up and down to open and close an opening portion (illustration is omitted) of a door window.

[0019] Note that, in the present embodiment, the window glass Wg moves up and down by winding and unwinding of a driving force transmitting member 80 by a drum 22 of a driving unit 20 together with the carrier plates 30 and 50. Therefore, a moving amount of the window glass Wg is equal to a moving amount of the carrier plates 30 and 50. As a result, the window glass Wg connected to the carrier plates 30 and 50 can move up and down to open and close the window without losing the posture.

[Object Moving Device 10]

[0020] In the present embodiment, the moving object is the window glass Wg connected to the carrier plate 30, as described above, and the carrier plates 30 and 50 support the window glass Wg.

[0021] In a case where an application example of the object moving device 10 is a window regulator, a moving direction UD of the carrier plates 30 and 50 is defined with reference to the lifting direction of the window glass Wg as the moving object. The moving direction UD is a direction in which a guide member 60 (guide rails 62 and 64) to be described below extends. Further, in the present embodiment, the object moving device 10 is applied to a double lift window regulator that supports and moves up and down the window glass Wg by the carrier plates 30 and 50. However, the object moving device 10 may be applied to a single lift window regulator that supports and moves up and down the window glass Wg by a single carrier plate.

[0022] The object moving device 10 includes, as illustrated in Fig. 1, the driving unit 20, the carrier plates 30 and 50, the guide member 60, the driving force transmitting member (specifically, cable) 80, and a fitting member 90 (see Fig. 3) .

[Driving Unit 20]

[0023] The driving unit 20 moves up and down the carrier plates 30 and 50 via the driving force transmitting member (cable) 80.

[0024] In the present embodiment, the driving unit 20 winds and unwinds the cable as the driving force transmitting member 80 to move the carrier plates 30 and 50.

[0025] Ends of the driving force transmitting member 80, that is, one end of an ascending cable 80B and one end of a descending cable 80C in the present embodiment are each connected to the driving unit 20.

[0026] Specifically, the driving unit 20 includes a housing 21, the drum 22, a motor 24 that is electrically driven, and a power transmission unit (not illustrated) such as a worm gear. The driving unit 20 transmits a rotational motion of the motor 24 to the drum 22 via the power transmission unit (not illustrated) to rotate the drum 22. The driving unit 20 rotationally drives the motor 24 in a forward direction and a reverse direction, and the drum 22 rotates in the forward direction and the reverse direction by this rotation driving.

[0027] In the present embodiment, the driving unit 20 is mounted to the mounting object so as to be located between the guide rails 62 and 64 arranged in parallel.

[0028] The housing 21 houses the drum 22, the motor 24, and the power transmission unit (not illustrated).

[0029] In the rotation driving of the motor 24, the drum 22 rotates in the forward direction and the reverse direction. The ascending cable 80B and the descending cable 80C are wound in reverse directions to each other and connected to the drum 22. The drum 22 winds up the

ascending cable 80B to pull a connecting cable 80A via the carrier plate 50 or winds up the descending cable 80C to pull the connecting cable 80A via the carrier plate 30 by the rotation in the forward direction or the reverse direction. The drum 22 unwinds the descending cable 80C via the connecting cable 80A when winding up the ascending cable 80B and unwinds the ascending cable 80B via the connecting cable 80A when winding up the descending cable 80C. Further, the driving unit 20 may be configured to be held by one of the guide rails 62 and 64.

[Carrier Plates 30 and 50]

[0030] The carrier plates 30 and 50 are moved by the driving unit 20 via the driving force transmitting member 80, and move the moving object when the moving object is connected. In the present embodiment, the carrier plates 30 and 50 are connected to the window glass Wg and support the window glass Wg.

[0031] Fig. 2 is a rear view illustrating the carrier plate in the object moving device 10, and Fig. 3 is a schematic cross-sectional view taken along line A-A in Fig. 2. Further, Fig. 4 is a partially exploded perspective view illustrating a configuration of a main part of a mounting structure of the carrier plates 30 and 50 and the driving force transmitting member 80 of the object moving device 10. Fig. 5 is a plan sectional view illustrating a configuration of the main part of the mounting structure of the carrier plates 30 and 50 and the driving force transmitting member 80 of the object moving device 10.

[0032] In the carrier plate 30, the other end 82 (a metal portion 88 as a cable end to be described below) of the connecting cable 80A is locked in an end accommodating portion 33A on a lower side of a guide portion 32, and the connecting cable 80A extends upward from the carrier plate 30. In the carrier plate 30, the other end 84 (a metal portion 88 as a cable end to be described below) of the descending cable 80C is locked in an end accommodating portion 33B on an upper side of the guide portion 32, and the descending cable 80C extends downward from the carrier plate 30.

[0033] The carrier plate 30 includes a mounting portion 31 to which the moving object is mounted and the metal body (specifically, the guide portion 32). Note that, in the present embodiment, the carrier plate 30 is formed of a material such as a metal material having strength to movably support the window glass Wg.

[0034] In the present embodiment, the mounting portion 31 is a glass fixing portion for fixing the window glass Wg, and fixes a lower end portion of the window glass Wg. The mounting portion 31 is, for example, a screw hole, and fixes the window glass Wg by fastening a screw inserted into a through hole formed in a lower end of the window glass Wg.

[0035] The metal body is indirectly engaged with the metal portion of the driving force transmitting member, and a driving force of the driving unit 20 is transmitted through the driving force transmitting member 80. Note that the metal body of the carrier plate 30 is not directly engaged with the driving force transmitting member 80.

[0036] The metal body of the carrier plate 30 is the guide portion 32 with which the end portions of the driving force transmitting member 80 (the other end 82 of the connecting cable 80A and the other end 84 of the descending cable 80C) are engaged.

[0037] The guide portion 32 includes the end accommodating portion 33A accommodating the other end 82 (metal portion 88) of the connecting cable 80A and the end accommodating portion 33B accommodating the other end 84 (metal portion 88) of the descending cable 80C. In the present embodiment, the end accommodating portion 33A is arranged on the lower side in the guide portion 32 and the end accommodating portion 33B is arranged on the upper side in the guide portion 32. Note that the metal body may just have a structure including the end accommodating portions 33A and 33B and constituting at least part of the carrier plate 30.

[0038] A guide groove 34a into which the end portion of the connecting cable 80A is inserted is continuously provided in the end accommodating portion 33A to extend upward. A guide groove 34b into which the end portion of the descending cable 80C is inserted is continuously provided in the end accommodating portion 33B to extend downward to intersect with the guide groove 34a. These guide grooves 34a and 34b have smaller diameters than the end accommodating portions 33A and 33B. The connecting cable 80A and the descending cable 80C can be inserted through the guide grooves 34a and 34b but the respective other ends (cable ends) cannot be inserted therethrough. With the structure, when the other ends of the connecting cable 80A and the descending cable 80C are accommodated in the end accommodating portions 33A and 33B and the respective cables are routed in the guide grooves 34a and 34b, the respective other ends are engaged with edge portions (cable lead-out portions 34) of parts continuing into the end accommodating portions 33A and 33B and the guide grooves 34a and 34b.

[0039] Therefore, when the other end 82 of the connecting cable 80A routed above the carrier plate 30 is accommodated in the end accommodating portion 33A and the other end 84 of the descending cable 80C routed below the carrier plate 30 is accommodated in the end accommodating portion 33B, the connecting cable 80A and the descending cable 80C are engaged with the carrier plate 30 not to slip out of the carrier plate 30 in a routed state to intersect with each other.

[0040] Further, the guide portion 32 is fit to the guide rail 62 as the guide member 60 such that the carrier plate 30 becomes movable in the extending direction of the guide rail 62.

[0041] The guide portion 32 includes a claw portion 324 protruding to a back surface side of the guide rail 62. When the claw portion 324 is fit to an end portion 62a of the guide rail 62, the carrier plate 30 becomes movable

in the extending direction to the guide rail 62.

[0042] When the guide portion 32 is fit to the guide rail 62, a surface 321 on the opening portion side of the end accommodating portions 33A and 33B of the guide portion 32 is arranged at a position facing a rail body 62b that is a bottom surface of the groove-like guide rail 62. In the present embodiment, the fitting member 90 (specifically, a plate-like body portion 91 of the fitting member 90) is disposed between the surface 321 on the opening portion side of the guide portion 32 and the rail body 62b.

[0043] Note that the other end of the ascending cable 80B is locked in the carrier plate 50 via the end accommodating portion (illustration is omitted) provided similarly to the carrier plate 30, and the ascending cable 80B extends upward from the carrier plate 50. Further, one end of the connecting cable 80A is locked in the carrier plate 50 via the end accommodating portion (illustration is omitted) provided similarly to the carrier plate 30, and the connecting cable 80A extends downward from the carrier plate 50.

[0044] The present embodiment has adopted the configuration in which the carrier plates 30 and 50 move by the cables as an example of the driving force transmitting member 80. However, the present embodiment is not limited to the configuration and may have a configuration in which one moving member (carrier plate) moves.

[0045] In the object moving device 10, the carrier plates 30 and 50 are respectively fit to the guide rails 62 and 64 and are guided by the guide rails 62 and 64, and move up and down.

[0046] In the present embodiment, the carrier plates 30 and 50 hold the lower end portion of the window glass Wg at separated two positions, and are guided in the lifting direction of the window glass Wg along the guide rails 62 and 64.

[0047] The carrier plates 30 and 50 move in the moving direction UD between the one end side (the lower end side in Figs. 1 to 3) of the guide rails 62 and 64 and the other end side (the upper end side in Figs. 1 to 3) of the guide rails 62 and 64, and move the window glass Wg as the moving object in the lifting direction while holding the window glass Wg at the separated two positions.

[Guide Member 60 (Guide Rails 62 and 64)]

[0048] The guide member 60 guides the carrier plates 30 and 50. In the present embodiment, the guide member 60 includes the two guide rails 62 and 64.

[0049] The guide rails 62 and 64 guide the movement of the carrier plates 30 and 50 and movably support the carrier plates 30 and 50, respectively. The guide rails 62 and 64 support the carrier plates 30 and 50 not to rotate in directions around axes of the guide rails 62 and 64. In the present embodiment, the guide rails 62 and 64 are rails that are long in the moving direction UD of the carrier plates 30 and 50 and have cross sections having substantially the same shapes extend in a longitudinal direction. For example, the guide rail 62 is formed in a recessed shape in plan view and has a bent portion in the end portion 62a. The end portion 62a is fit in the carrier plate 30 and movably support the carrier plate 30 up and down along the longitudinal direction of the guide rail 62. Note that the guide rail 64 has a similar configuration to the guide rail 62, and has the carrier plate 50 fit to the end portion of the guide rail 64 and supports the carrier plate 50 to be movable up and down along the longitudinal direction of the guide rail 64. The guide rails 62 and 64 are arranged substantially parallel to each other along the moving direction UD of the carrier plates 30 and 50.

[0050] Note that, in the present embodiment, the extending direction of the guide rails 62 and 64 is the up-down direction according to the movement of the carrier plates 30 and 50 in the up-down direction. In the present embodiment, the up-down direction that is the moving direction UD of the carrier plates 30 and 50 is inclined. However, the embodiment is not limited to the configuration. These moving directions UD can be appropriately set according to the moving direction of the moving object. Further, the guide rails 62 and 64 may be omitted as long as the carrier plates 30 and 50 have a configuration to be movably provided in the up-down direction in the object moving device 10. The present embodiment includes a first guide rail and a second guide rail. However, the present embodiment may include only the first guide rail. In the case where the guide rail 64 is only the first guide rail, the driving unit 20 may be provided at a lower end of the first guide rail or may be arranged to be located at an intermediate position of the guide rail in the longitudinal direction.

[Direction Changing Members 41 to 44]

[0051] Direction changing members 41 to 44 are members that change the moving direction of the driving force transmitting member 80. As the direction changing members 41 to 44, for example, a resin-made guide having elasticity to guide the driving force transmitting member 80 along a changing direction, a pulley, or the like is applied.

[0052] The direction changing members 41 and 42 are arranged separated in the moving direction UD of the carrier plate 30. The direction changing members 43 and 44 are arranged separated in the moving direction UD of the carrier plate 50. In the present embodiment, the direction changing members 41 and 42 are respectively provided at the upper and lower end portions of the guide rail 62. Further, the direction changing members 43 and 44 are respectively provided at the upper and lower end portions of the guide rail 64.

[Driving Force Transmitting Member 80]

[0053] The driving force transmitting member 80 is connected to the carrier plate 30 and transmits the driving force of the driving unit 20 to the carrier plate 30.

[0054] The driving force transmitting member 80 trans-

mits the driving force of the driving unit 20 to the carrier plate 30 to move the carrier plate 30.

[0055] In the present embodiment, the driving force transmitting member 80 includes the driving force transmitting member 80 including the connecting cable 80A, the ascending cable 80B, and the descending cable 80C, and the metal portion 88 constituting the cable end of the driving force transmitting member 80. The metal portion 88 may be a cable end constituted by casting of brass or the like.

[0056] The driving force transmitting member 80 is a member that transmits the driving force of the driving unit 20 to the carrier plate 30 in order to move the carrier plate 30 in the moving direction UD.

[0057] The driving force transmitting member 80 moves by the driving force of the driving unit 20. Specifically, the driving force transmitting member 80 is a cable that converts the driving force of the driving unit 20 into a pulling force to pull the carrier plates 30 and 50 or press the carrier plates 30 and 50 to move the carrier plate 30.

[0058] The driving force transmitting member 80 is an elongated member connecting the driving unit 20 and the carrier plates 30 and 50, and transmits the driving force generated by the driving unit 20 to the carrier plates 30 and 50.

[0059] As the driving force transmitting member 80, for example, a wire formed by twisting a plurality of at least one of metal strands and resin fiber strands can be used.

[0060] The driving force transmitting member 80 has flexibility that enables the direction to be changed by the direction changing members 41, 42, 43, and 44, for example.

[0061] In the present embodiment, the driving force transmitting member 80 is installed on the direction changing members 41, 42, 43, and 44.

[0062] The ascending cable 80B transmits the driving force by the driving unit 20 to move the carrier plates 30 and 50 to an ascending side to the carrier plates 30 and 50. Specifically, as the driving force transmitting member 80, the ascending cable 80B has one end connected to the drum 22 of the driving unit 20 and is put around the direction changing member 44 of the guide rail 64, and has a routing direction changed below the guide rail 64. The other end of the ascending cable 80B is connected to the carrier plate 50. The ascending cable 80B is wound and unwound in the routing direction by driving of the driving unit 20.

[0063] The ascending cable 80B is disposed in a state where tension is applied between the carrier plate 50 and the direction changing member 44 and between the direction changing member 44 and the drum 22.

[0064] The descending cable 80C transmits the driving force by the driving unit 20 to move the carrier plates 30 and 50 to a descending side to the carrier plates 30 and 50.

[0065] The descending cable 80C connects the drum 22 of the driving unit 20 and the carrier plate 30, and transmits the driving force of the driving unit 20 to the connecting cable 80A and the ascending cable 80B. The descending cable 80C is unwound when the ascending cable 80B is wound up by the drum 22 by the driving force of the driving unit 20, and is wound up when the ascending cable 80B is unwound. The descending cable 80C has one end connected to the drum 22 and is put around the direction changing member 41 arranged at the lower end of the guide rail 62, and has the routing direction changed above the guide rail 62. The other end 84 of the descending cable 80C is connected to the carrier plate 30 from a lower side. The descending cable 80C is disposed in a state where tension is applied between the drum 22 and the direction changing member 41 and between the carrier plate 30 and the direction changing member 41.

[0066] When the ascending cable 80B is wound up by the drum 22, the connecting cable 80A moves from the direction changing member 42 side to the direction changing member 43 side, and the descending cable 80C tows the carrier plate 30. When the ascending cable 80B is unwound from the drum 22, the descending cable 80C is wound up by the drum 22, so that the descending cable 80C moves from the direction changing member 41 side to the drum 22 side and tows the carrier plate 30.

[0067] The driving force of the driving unit 20 is transmitted to the carrier plates 30 and 50 via the driving force transmitting member 80 to move up and down the window glass Wg that is the moving object.

[0068] The connecting cable 80A is routed to intersect with the ascending cable 80B between the guide rails 62 and 64. The connecting cable 80A is also called middle cable, and is a cable routed in a middle of the two carrier plates 30 and 50 and connects the two carrier plates 30 and 50. The connecting cable 80A has one end connected to the carrier plate 50, is arranged to extend above the carrier plate 50, and is put around the direction changing member 42 located at the upper end of the guide rail 62, and has the routing direction changed. The connecting cable 80A having the routing direction changed by the direction changing member 42 is put around the direction changing member 43 located at the lower end of the guide rail 64, and has the routing direction changed above the guide rail 64. One end of the connecting cable 80A is connected to the carrier plate 50 from a lower side. The connecting cable 80A is arranged in a state where tension is applied between the carrier plate 30 and the direction changing member 42, between the direction changing members 42 and 43, and between the direction changing member 43 and the carrier plate 50.

[0069] In the present embodiment, the driving force transmitting member 80 is an inner cable slidably arranged in an outer casing.

[0070] The connecting cable 80A, the ascending cable 80B, and the descending cable 80C are each led out from both end portions of the outer casing, and are appropriately connected to the carrier plates 30 and 50 and the drum 22 at lead-out end portions.

[0071] The connecting cable 80A, the ascending cable

80B, and the descending cable 80C are each inserted into the outer casing (illustration is omitted), and the connecting cable 80A, the ascending cable 80B, and the descending cable 80C are each led out from the both end portions. The metal portions 88 are each provided in the end portions of the connecting cable 80A, the ascending cable 80B, and the descending cable 80C.

[0072] As described above, in the driving force transmitting member 80, the descending cable 80C moves via the connecting cable 80A following the movement of the ascending cable 80B in the routing direction as the ascending cable 80B is wound and unwound around the drum 22 by the driving unit 20. The carrier plates 30 and 50 move up and down by the movement of the connecting cable 80A, the ascending cable 80B, and the descending cable 80C.

[Metal Portion 88]

[0073] The metal portion 88 is indirectly engaged with the metal body (the cable lead-out portion 34 in the present embodiment) of the carrier plate 30. With the engagement, the driving force transmitting member 80 is connected to be able to transmit the driving force of the driving unit 20 to the carrier plate 30. In the present embodiment, the metal portion 88 is a cable end provided in the end portion of the driving force transmitting member 80, and is larger in outer diameter than a cable body.

[Fitting Member 90]

[0074] Fig. 6 is a perspective view of the fitting member 90 illustrating an electrolytic corrosion suppressing portion.

[0075] The fitting member 90 is fit in the carrier plate 30 in a state of preventing contact between the metal portion 88 of the driving force transmitting member 80 and the metal body (guide portion 32) of the carrier plate 30.

[0076] The fitting member 90 includes an electrolytic corrosion suppressing portion 92, a fitting portion 94 (see Figs. 4 and 5), and a moving portion 96.

[0077] The electrolytic corrosion suppressing portion 92 is engaged with the metal portion 88 to be interposed between the guide portion 32 (in particular, the cable lead-out portion 34) and the metal portion 88. The electrolytic corrosion suppressing portion 92 is engaged with the metal portion 88, and suppresses occurrence of electrolytic corrosion due to a mutual potential difference when a state in which the metal body and the metal portion 88 are in contact with each other continues. The metal portions 88 that are the cable ends of the connecting cable 80A, the ascending cable 80B, and the descending cable 80C press the electrolytic corrosion suppressing portions 92 in a state where tension is applied to the cables and are accommodated in the end accommodating portions 33A and 33B in a state of being not in contact with the metal body (particularly inner peripheral surfaces of the end accommodating portions 33A and 33B).

[0078] The fitting portion 94 is fit in the carrier plate 30.

[0079] The fitting portion 94 can be fit in any way as long as the fitting portion 94 is fit in the carrier plate 30 and prevents the contact between the metal portion 88 of the driving force transmitting member 80 and the metal body (specifically, the cable lead-out portion 34) of the carrier plate 30. In the present embodiment, the fitting portion 94 is configured to be fit in the claw portion 324 to be fit to the end portion 62a of the guide rail 62.

[0080] With the configuration, the fitting member 90 can be fit in the carrier plate 30 not to drop out of the carrier plate 30 even if the carrier plate 30 moves, without applying any special processing for being fit into the carrier plate 30. Further, the tension applied to the cable presses the electrolytic corrosion suppressing portions 92 toward the end accommodating portions 33A and 33B via the metal portions 88 as the cable ends. Therefore, the fitting member 90 can be fixed to the carrier plate 30.

[0081] The fitting member 90 may be formed of any material as long as the material prevents electrolytic corrosion occurring between the cable lead-out portion 34 and the metal portion 88. For example, the fitting member 90 may be a chromed metal or the like in a case where the guide portion 32 is made of aluminum die-cast and the metal portion 88 is made of zinc die-cast. Further, the fitting member 90 may be made of a resin such as an engineer plastic, examples including polycarbonate (PC), polyacetal (POM), polybutylene terephthalate (PBT), modified polyphenylene ether (modified PPE), glass fiber reinforced polyethylene terephthalate (GF-PET), and fluororesin (FR).

[0082] In the present embodiment, the fitting member 90 includes a plate-like body portion 91 arranged between an end accommodating surface of the end accommodating portions 33A and 33B of the carrier plate 30 and the rail body 62b of the guide rail 62. The electrolytic corrosion suppressing portions 92 provided in a protruding manner in the plate-like body portion 91 are inserted into the end accommodating portions 33A and 33B.

[0083] As illustrated in Fig. 6, the electrolytic corrosion suppressing portion 92 has a plate-like body with a recessed notch 922 formed in a leading end side, and the cable is inserted into the notch 922. In the end accommodating portion 33A or 33B, the electrolytic corrosion suppressing portion 92 is interposed between the cable end as the metal portion 88 and the cable lead-out portion 34 in the end accommodating portion 33A or 33B, and prevents direct contact between the cable lead-out portion 34 as the metal body and the cable end as the metal portion 88. The electrolytic corrosion suppressing portion 92 includes an abutting portion on which the metal portion 88 abuts, and a contact portion coming in contact with the inner peripheral surface of the end accommodating portion 33A or 33B, and is configured to form a space where the metal portion 88 is accommodated in the end accommodating portion 33A or 33B in a state where the contact portion is in contact with the inner peripheral sur-

face of the end accommodating portion 33A or 33B.

[0084] That is, in the present embodiment, the fitting member 90 can suppress the electrolytic corrosion in the respective cable ends (the other ends 82 and 84) in the connecting cable 80A and the descending cable 80C led out upward and downward from the carrier plate 30 by being simply mounted to the carrier plate 30.

[0085] The carrier plate 30 has a configuration to have the respective cable ends arranged in and engaged with the end accommodating portions 33A and 33B in a state of bringing the connecting cable 80A led out upward and the descending cable 80C led out downward intersecting with each other.

[0086] Further, the fitting member 90 is configured to have the electrolytic corrosion suppressing portions 92 interposed between the cable end (metal portion 88) of the connecting cable 80A and the cable lead-out portion 34 of the end accommodating portion 33A and between the cable end (metal portion 88) of the descending cable 80C and the cable lead-out portion 34 of the end accommodating portion 33B, respectively.

[0087] Therefore, by simply mounting the fitting member 90 to the carrier plate 30, the respective cable ends of the connecting cable 80A and the descending cable 80C can be engaged without coming in contact with the metal portions of the carrier plate 30, the metal portions having a potential difference.

[0088] The fitting member 90 in the present embodiment is arranged between the carrier plate 30 and the end portion 62a of the rail body 62b in the guide rail 62 arranged on the claw portion 324 of the carrier plate 30, and is mounted in a state of restricting movement in a removal direction to the end accommodating portions 33A and 33B. Further, the sliding portion 96 of the fitting member 90 can improve slidability with respect to a surface portion of the rail body 62b provided in a portion moving together with the carrier plate 30 in the rail body 62b.

[0089] Further, in the plate-like body portion 91 of the fitting member 90, a surface on an opposite side of the surface on which the electrolytic corrosion suppressing portion 92 is provided in a protruding manner is the sliding portion 96 that slides with respect to the rail body 62b. This sliding portion 96 moves together with the carrier plate 30 when the carrier plate 30 moves along the extending direction of the guide rail 62.

[0090] As illustrated in Fig. 5, the sliding portion 96 is provided over the entire surface of the portion in contact with the carrier plate 30, whereby the fitting member 90 does not drop out of the carrier plate 30 even if the mounted carrier plate 30 moves. Further, when the fitting member 90 is made of resin, the sliding portion 96 is also made of resin and can improve the slidability with respect to the guide rail 62 made of metal, for example.

[Functions and Effects of Object Moving Device 10]

[0091] The object moving device 10 according to the present embodiment moves up and down the window glass Wg via the carrier plates 30 and 50. For example, in a case of moving up the window glass Wg, the ascending cable 80B is wound up by driving the driving unit 20, that is, by rotating the drum 22 by driving of the motor 24. By winding up the ascending cable 80B, the ascending cable 80B moves toward the drum 22, and the carrier plate 50 connected to the other end of the ascending cable 80B moves in an ascending direction by being pulled upward. With the movement, the connecting cable 80A having one end connected to the carrier plate 50 is also pulled, and the carrier plate 30 connected to the other end 82 of the connecting cable 80A is also pulled upward and moves in the ascending direction.

[0092] At this time, the metal portion 88 constituting the cable end of the other end 82 of the connecting cable 80A is pulled toward the guide groove 34a in the end accommodating portion 33A of the carrier plate 30, and receives tension toward the cable lead-out portion 34. In the end accommodating portion 33A, the electrolytic corrosion suppressing portion 92 of the fitting member 90 is interposed between the metal portion 88 and the cable lead-out portion 34. Therefore, even if the metal portion 88 is pulled upward and moves toward the cable lead-out portion 34, the metal portion 88 does not come in contact with the cable lead-out portion 34. Further, when the carrier plate 30 is pulled upward by the connecting cable 80A, the end accommodating portion 33B of the carrier plate 30 moves upward. As a result, the end accommodating portion 33B moves in the ascending direction with respect to the metal portion 88 constituting the cable end of the other end 84 of the descending cable 80C in the end accommodating portion 33B, and the metal portion 88 constituting the cable end of the other end 84 receives a force from the electrolytic corrosion suppressing portion 92 in a direction approaching the cable lead-out portion 34 of the end accommodating portion 33B.

[0093] The electrolytic corrosion suppressing portion 92 of the fitting member 90 is interposed between the metal portion 88 constituting the cable end of the other end 84 and the cable lead-out portion 34 of the end accommodating portion 33B.

[0094] The metal portion 88 constituting the cable end of the other end 84 and the cable lead-out portion 34 of the end accommodating portion 33B are indirectly engaged across the electrolytic corrosion suppressing portion 92. When the carrier plate 30 moves in the ascending direction, the descending cable 80C is also pulled upward. At this time, since the drum 22 winds up the ascending cable 80B and unwinds the descending cable 80C, the carrier plate 30 smoothly moves up together with the carrier plate 50.

[0095] Further, in a case of moving down the window glass Wg, the descending cable 80C is wound up by driving the driving unit 20, that is, by rotating the drum 22 by the driving of the motor 24. By winding up the descending cable 80C, the one end side of the descending cable 80C

moves toward the drum 22. With the movement, the descending cable 80C having the other end connected to the carrier plate 30 is also pulled, and the carrier plate 30 connected to the other end 82 of the connecting cable 80A is also pulled downward and moves in a descending direction. At this time, the metal portion 88 constituting the cable end of the other end 84 of the descending cable 80C is pulled toward the guide groove 34b in the end accommodating portion 33B of the carrier plate 30 and moves toward the cable lead-out portion 34. In the end accommodating portion 33B, the electrolytic corrosion suppressing portion 92 of the fitting member 90 is interposed between the metal portion 88 constituting the cable end of the other end 84 and the cable lead-out portion 34. Therefore, even if the metal portion 88 is pulled downward and moves toward the cable lead-out portion 34, the metal portion 88 does not come in contact with the cable lead-out portion 34. In this way, the metal portion 88 constituting the cable end of the other end 84 and the cable lead-out portion 34 move in the descending direction in the state of being engaged indirectly not to come into contact with each other, and the carrier plate 30 is pulled downward.

[0096] With the movement, the end accommodating portion 33A of the carrier plate 30 also moves down. As a result, the end accommodating portion 33A moves in the descending direction with respect to the metal portion 88 constituting the cable end of the other end 82 of the connecting cable 80A in the end accommodating portion 33A, and the cable lead-out portion 34 of the end accommodating portion 33A moves in a direction approaching the metal portion 88 constituting the cable end of the other end 82.

[0097] The electrolytic corrosion suppressing portion 92 of the fitting member 90 is interposed between the metal portion 88 constituting the cable end of the other end 82 and the cable lead-out portion 34 of the end accommodating portion 33A. With the configuration, in the state where the metal portion 88 constituting the cable end of the other end 82 and the cable lead-out portion 34 of the end accommodating portion 33A are indirectly engaged across the electrolytic corrosion suppressing portion 92, the carrier plate 30 moves in the descending direction and the connecting cable 80A is pulled downward. At this time, since the drum 22 unwinds the ascending cable 80B and winds up the descending cable 80C, the carrier plate 30 smoothly moves down together with the carrier plate 50.

[0098] These electrolytic corrosion suppressing portions 92 can realize the object moving device 10 in which the electrolytic corrosion is prevented between the cable ends of the two cables extending in the moving direction of the carrier plate 30 by simply fitting the fitting member 90 into the carrier plate 30 (as well as the carrier plate 50).

[0099] As described above, according to the present embodiment, the fitting member 90 that prevents direct contact between dissimilar metals can be easily mounted.

[0100] The embodiment of the present invention has been described above. Note that the above description is an illustration of a favorable embodiment of the present invention, and the scope of the present invention is not limited thereto. That is, the description of the configurations of the above device and the shapes of each portions are merely examples, and it is obvious that various modifications and additions to these examples are possible within the scope of the present invention.

Industrial Applicability

[0101] The object moving device according to the present invention has an effect of easily mounting a member that prevents direct contact between dissimilar metals and is useful as a window glass lifting device such as a window regulator.

Reference Signs List

[0102]

10	Object moving device
20	Driving unit
21	Housing
22	Drum
24	Motor
30, 50	Carrier plate
31	Mounting portion
32	Guide portion
33A, 33B	End accommodating portion
34	Cable lead-out portion (metal body)
34a, 34b	Guide groove
41, 42, 43, 44	Direction changing member
60	Guide member
62, 64	Guide rail (guide member)
62a	End portion
62b	Rail body
80	Driving force transmitting member
80A	Connecting cable
80B	Ascending cable
80C	Descending cable
82, 84	The other end
88	Metal portion
90	Fitting member
91	Plate-like body portion
92	Electrolytic corrosion suppressing portion
94	Fitting portion
96	Sliding portion
321	Surface
324	Claw portion

Claims

1. An object moving device (10) comprising:

a driving unit (20);
a carrier plate (30) including a mounting portion (31) to which a moving object (Wg) is mounted and a metal body (34) ;
a guide member (60) configured to guide the carrier plate (30);
a driving force transmitting member (80) connected to the carrier plate (30) and configured to transmit a driving force of the driving unit (20) to the carrier plate (30); and
a fitting member (90) to be fit in the carrier plate (30), wherein:

the driving force transmitting member (80) includes a metal portion (88) to be indirectly engaged with the metal body (34), and
the fitting member (90) includes an electrolytic corrosion suppressing portion (92) that is engaged with the metal portion (88) to be interposed between the metal body (34) and the metal portion (88) to suppress electrolytic corrosion, and a fitting portion (94) to be fit in the carrier plate (30).

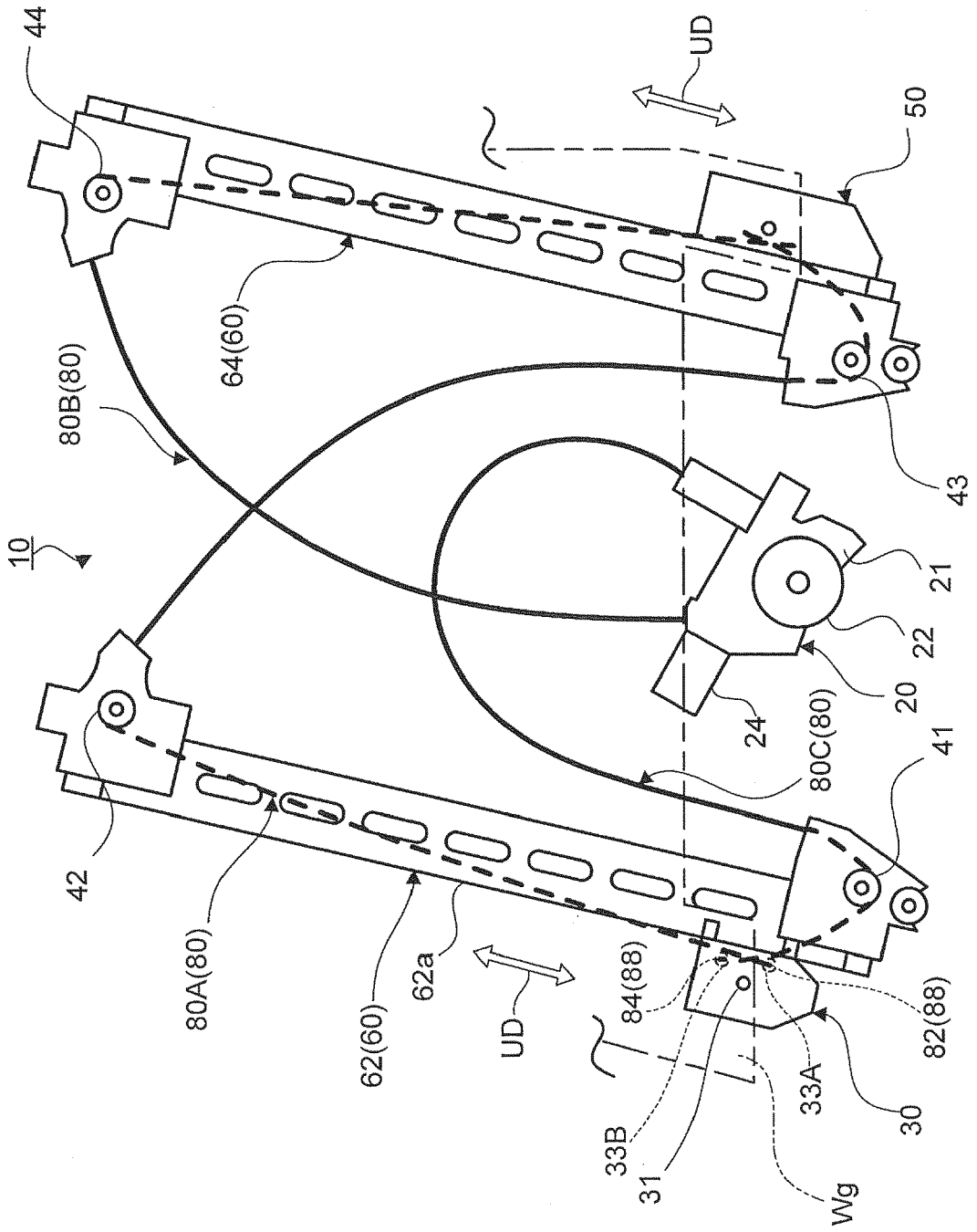
2. The object moving device (10) according to claim 1, wherein
the fitting member (90) includes a sliding portion (96) that slides with the guide member (60).

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

the driving force transmitting member (80) includes a first cable and a second cable, and
the metal portion (88) is a first end provided in an end portion of the first cable and a second end provided in the second cable.

4. A window glass lifting device, wherein
the moving object (Wg) is a window glass, and the object moving device (10) according to any one of claims 1 to 3 is used.

Fig.1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82(88)
33A
30
33B
31
Wg

Fig.2

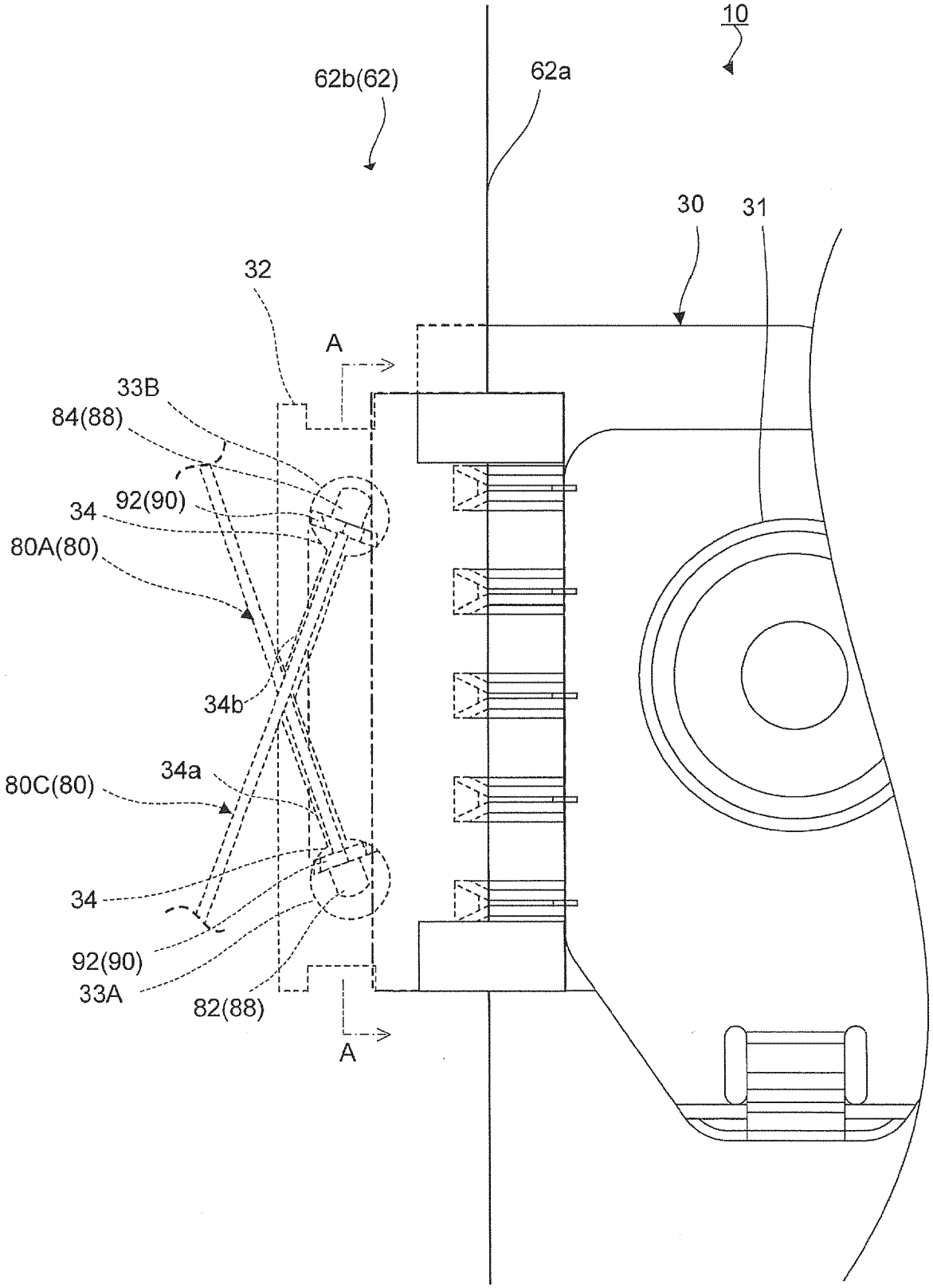
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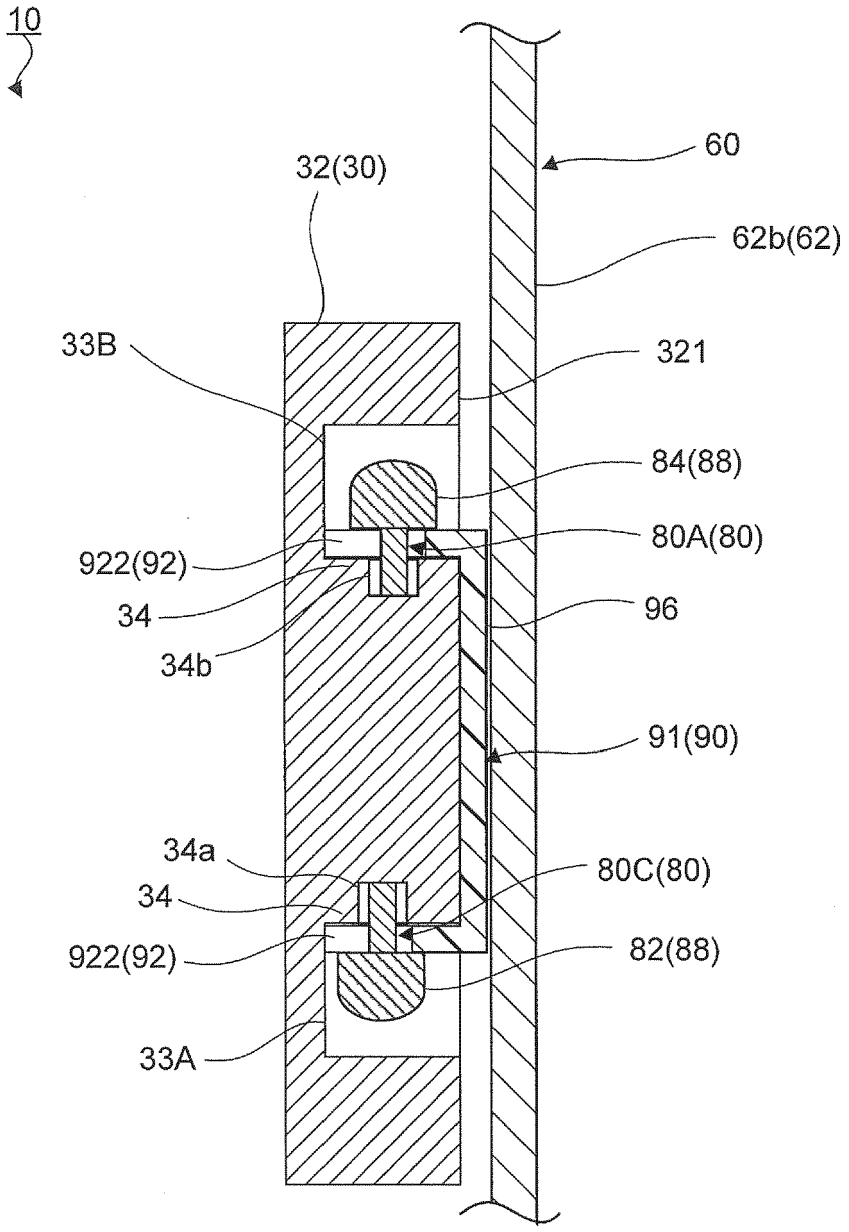
Fig.3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33A

Fig.4

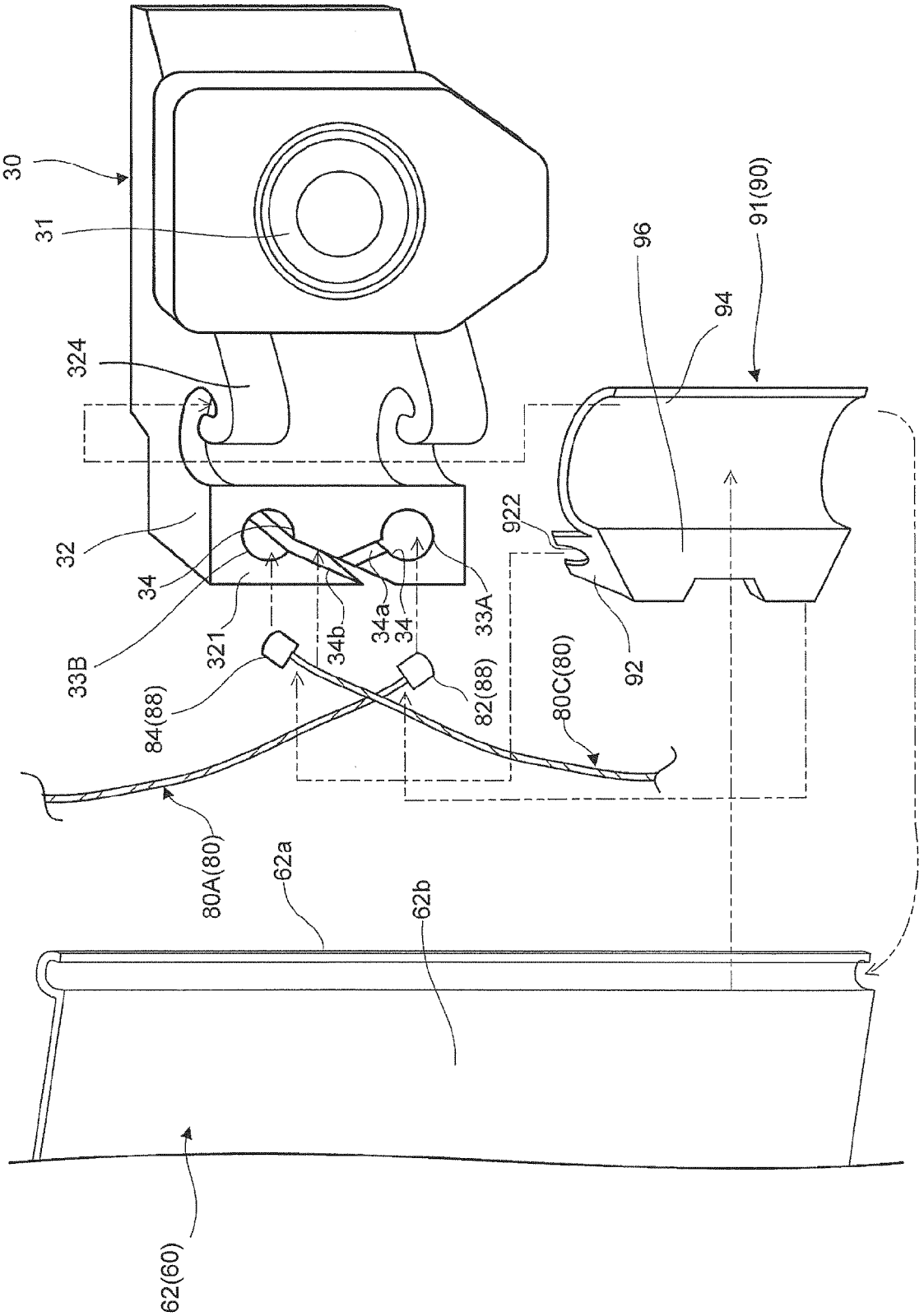
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Fig.5

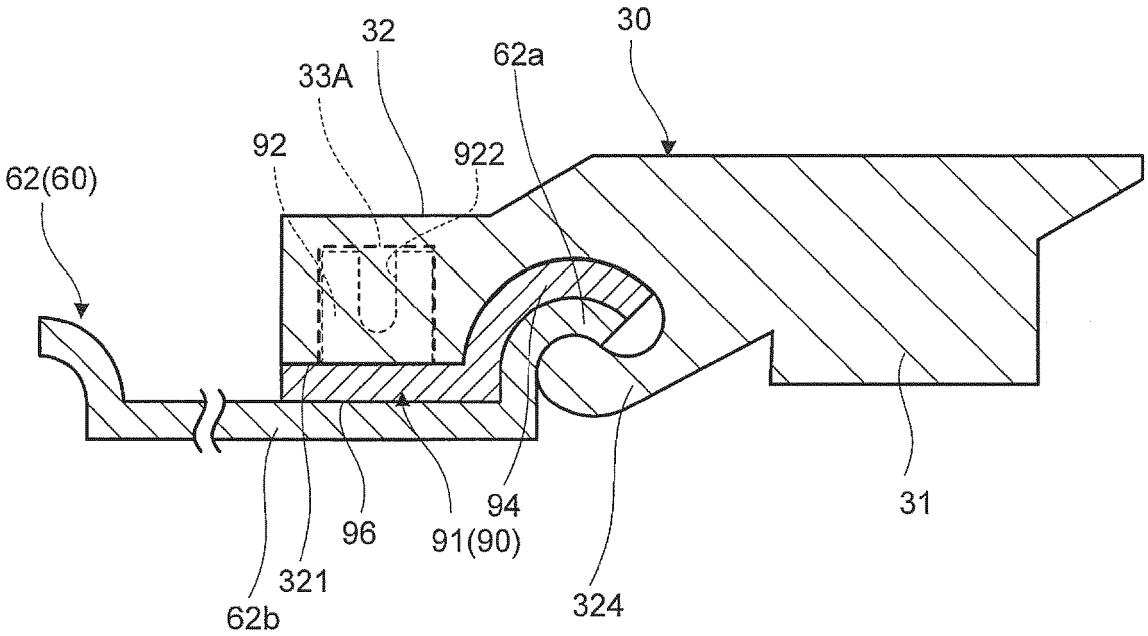
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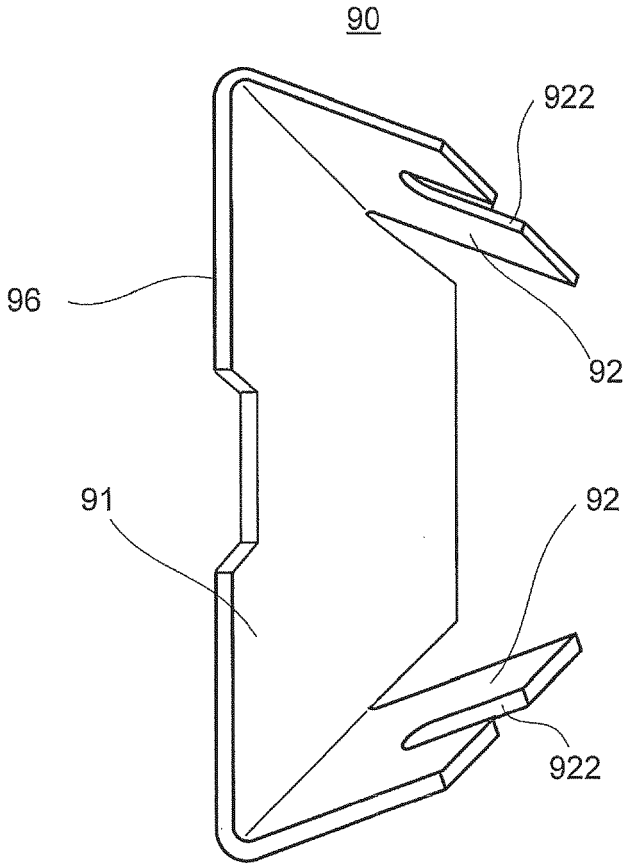
Fig.6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EUROPEAN SEARCH REPORT

Application Number
EP 19 17 1131

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 864 987 A (MARIEL JAMES G [US] ET AL) 2 February 1999 (1999-02-02) * column 1, paragraph 4 * * column 4, lines 47-67 * * column 5, lines 1-32; figures *	1-4	INV. E05F11/48
X	DE 30 49 921 A1 (BROSE FAHRZEUGTEILE [DE]) 1 June 1983 (1983-06-01) * page 5, paragraph 4 - page 6, paragraph 2; figures *	1-4	
X	US 2017/268271 A1 (URANO YOSHITAKA [JP] ET AL) 21 September 2017 (2017-09-21) * line 57; figures *	1	
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			E05F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 September 2019	Witasse-Moreau, C

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20-09-2019

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