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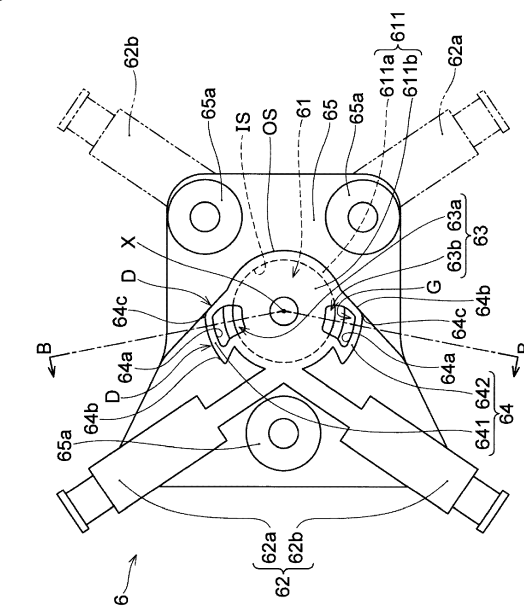
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(54) **WINDOW GLASS RAISING / LOWERING DEVICE**

(57) To provide a window glass raising/lowering device 1 having a housing 6 which can be shared by devices used respectively on the right and left sides.

A window glass raising/lowering device 1 includes: an inner space portion 61 having an accommodating portion in which a drum is accommodated, cable lead-in/out portions 62a and 62b, and opening portions 63a and 63b. A housing 6 has protruding portions 641 and 642 on a radially outer side of the opening portions 63a and 63b. The cable lead-in/out portions 62a and 62b are provided with the line-symmetric arrangement. The protruding portions 641 and 642 have an inner surface 64a and an outer surface 64b. The inner surface 64a has a drainage guide portion G that guides water having moved from the inner space portion 61 to the opening portions 63a and 63b to the outside of the housing when the protruding portions 641 and 642 are on a lower side. The outer surface 64b has a weir D that moves water adhering to each outer side of the protruding portions 641 and 642 downward when the protruding portions 641 and 642 are on an upper side.

Fig. 2



Description

Technical Field

[0001] The present invention relates to a window glass raising/lowering device.

Background Art

[0002] A window glass raising/lowering device (see Patent Literature 1) that raises and lowers a window glass using a cable is arranged to be laterally symmetrical with respect to a moving direction of a vehicle such that a rail, a drive unit, and the like are arranged at predetermined positions and directions with respect to the moving direction of the vehicle. Thus, many members relating to routing of the cable such as a drum housing are often used as dedicated parts for right and left depending on a position and a direction.

Citation List

Patent Literature

[0003] Patent Literature 1: JP 2006-076457 A

Summary of Invention

Technical Problem

[0004] The drum housing that accommodates a drum for winding and unwinding the cable is used as a part to be used for the window glass raising/lowering device with the cable. The drum housing is provided with a drum accommodating portion accommodating the drum, and the drum accommodating portion is provided with a discharge port to discharge water transmitted from the cable and water entering from above. The discharge port to discharge the water is provided below the drum accommodating portion in order to discharge the water accumulated in the drum accommodating portion, and thus, a position thereof is moved upward when the drum housing is laterally reversed. When there is an opening at an upper side of the drum housing, water enters the inside of the drum accommodating portion through the upper opening and the water is accumulated in the drum accommodating portion.

[0005] That is, it is difficult to share the housing, provided with the discharge port for the water on the lower side, directly on the right and left side.

[0006] An object of the present invention is to provide a window glass raising/lowering device having a housing that can be shared by devices used on the right and left sides.

Solution to Problem

[0007] A window glass raising/lowering device of the

present invention is a window glass raising/lowering device including: a moving member that moves a window glass; a cable connected to the moving member; a drum that moves the moving member by winding and unwinding the cable; a drive unit that rotates the drum; and a housing that includes: an inner space portion having an accommodating portion in which the drum is accommodated; a cable lead-in/out portion through which the cable is led in and out; and an opening portion that communicates the inner space portion with an outside. The opening portion is provided on a radially outer side with respect to a position of a drum center axis. The housing has a protruding portion, which extends to an opposite side of the drum in a center axis direction, on a radially outer side of the opening portion with respect to the position of the drum center axis. The cable lead-in/out portion has a first cable lead-in/out portion and a second cable lead-in/out portion. The first cable lead-in/out portion and the second cable lead-in/out portion are provided in the housing so as to be arranged such that each position of the first cable lead-in/out portion and the second cable lead-in/out portion when the housing is rotated by 180° about the drum center axis becomes line-symmetric with respect to each position of the other cable lead-in/out portion in a state before the rotation by 180°. The opening portion has a first opening portion, which is on an upper side with respect to the position of the drum center axis when the first cable lead-in/out portion is on an upper side and on a lower side with respect to the position of the drum center axis when the first cable lead-in/out portion is on a lower side, and a second opening portion which is on an upper side with respect to the position of the drum center axis when the second cable lead-in/out portion is on an upper side and on a lower side with respect to the position of the drum center axis when the second cable lead-in/out portion is on a lower side. The protruding portion has a first protruding portion, which is on an upper side of the first opening portion when the first opening portion is on the upper side and on a lower side of the first opening portion when the first opening portion is on the lower side, and a second protruding portion which is on an upper side of the second opening portion when the second opening portion is on the upper side and on a lower side of the second opening portion when the second opening portion is on the lower side. The protruding portion has an inner surface and an outer surface. The inner surface has a drainage guide portion that guides water, which has moved from the inner space portion of the housing to the opening portion when the protruding portion is on the lower side, to the outside of the housing. The outer surface has a weir that moves water adhering to an outer side of the protruding portion downward when the protruding portion is on the upper side.

Advantageous Effects of Invention

[0008] According to the present invention, the housing

of the window glass raising/lowering device used on the right and left sides can be shared by the right and left sides.

Brief Description of Drawings

[0009]

Fig. 1 is a schematic view illustrating a window glass raising/lowering device according to an embodiment of the present invention.

Fig. 2 is a schematic front view illustrating a housing of the window glass raising/lowering device of Fig. 1.

Fig. 3 is a exploded perspective view of the window glass raising/lowering device of Fig. 1 in which the housing and a base body are separated.

Fig. 4 is a exploded perspective view of the window glass raising/lowering device of Fig. 1 viewed from a side of an insertion port of the housing.

Fig. 5 is a schematic cross-sectional view cut along a line B-B in Fig. 2.

Fig. 6 is a cross-sectional view taken along a line A-A in Fig. 1.

Description of Embodiments

[0010] A window glass raising/lowering device according to an embodiment of the present invention will be described below with reference to the drawings. Incidentally, the embodiment to be illustrated hereinafter is merely an example, and the window glass raising/lowering device of the invention is not limited to the following embodiment.

[0011] As illustrated in Fig. 1, a window glass raising/lowering device 1 includes: a moving member 2 that moves a window glass W; a cable 3 connected to the moving member 2; a drum 4 that moves the moving member 2 by winding and unwinding the cable 3; a drive unit 5 that rotates the drum 4; and a housing 6 that accommodates the drum 4. In the present embodiment, the window glass raising/lowering device 1 further includes: a guide portion 7 that extends along a moving direction of the moving member 2 and guides the moving member 2; and a direction changing member 8 which is provided at an end of the guide portion 7 to change a direction of the cable 3.

[0012] The window glass raising/lowering device 1 is mounted to a predetermined mounting object, and raises and lowers the window glass W. The window glass raising/lowering device 1 of the present embodiment is mounted, for example, to a mounting object such as a door panel of a vehicle body. The window glass raising/lowering device 1 may be mounted to another mounting object other than the vehicle body. Incidentally, a side to which the window glass W is raised when the window glass raising/lowering device 1 is mounted to the mounting object is called an "upper side", and a side to which the window glass W is lowered is called a "lower side"

regarding the respective members of the window glass raising/lowering device 1 in the present specification.

[0013] The drive unit 5 generates a driving force to rotate the drum 4. The drive unit 5 has a driving force generation device such as an electric motor and a manually operated handle. In the present embodiment, the drive unit 5 includes an electric motor 51 and a shaft 52 (see Fig. 6) which is connected to the drum 4 and rotates the drum 4 by the driving force of the electric motor 51 as illustrated in Fig. 1. Incidentally, the drive unit 5 is not limited to the illustrated shape or structure as long as it is possible to generate the driving force to rotate the drum 4. Although the drive unit 5 is provided in the vicinity of the center in a longitudinal direction of the guide portion 7 illustrated as a guide rail in the present embodiment, but the position at which the drive unit 5 is provided is not limited. For example, the drive unit 5 may be provided at a lower end of the guide portion 7 or the like.

[0014] The drum 4 is rotated in forward and reverse directions about a center axis X of the drum 4 (hereinafter referred to as a drum center axis) by the drive unit 5, thereby moving the moving member 2 by winding and unwinding the cable 3 connected to the drum 4. In the present embodiment, the drum 4 is a substantially cylindrical member, and has an axial hole 41 to which the shaft 52 (see Fig. 6) is insertable and which is engaged with the shaft 52. When the shaft 52 is rotated by the driving force of the drive unit 5, the drum 4 is rotated as illustrated in Figs. 4 and 6.

[0015] The cable 3 is wound around the drum 4 and unwound from the drum 4 along with the rotation of the drum 4. The cable 3 is connected to the drum 4 and the moving member 2. As the cable 3 is operated by the rotation of the drum 4, the moving member 2 connected to the cable 3 is raised and lowered. In the present embodiment, the cable 3 has a first cable 31 and a second cable 32 as illustrated in Fig. 1. One end (not illustrated) of each of the first cable 31 and the second cable 32 is connected to the drum 4. Each of other ends 31E and 32E of the first cable 31 and the second cable 32 is connected to the moving member 2. In the present embodiment, the first cable 31 and the second cable 32 extend from the drum 4 toward the direction changing member 8, and are changed in direction by the direction changing member 8 to extend toward the moving member 2. In the present embodiment, the first cable 31 is a raising cable. When the first cable 31 is wound around the drum 4, the moving member 2 is pulled upward by the first cable 31 and moves in a raising direction. With the movement of the moving member 2 in the raising direction, the window glass W mounted to the moving member 2 is raised. The second cable 32 is a lowering cable. When the second cable 32 is wound around the drum 4, the moving member 2 is pulled downward by the second cable 32 and moves in a lowering direction. With the movement of the moving member 2 in the lowering direction, the window glass W mounted to the moving member 2 is lowered. Incidentally, a publicly-known control cable can be used

as the cable 3. For example, the first cable 31 and the second cable 32 can be used as inner cables of a control cable. As illustrated in Fig. 1, the first cable 31 and the second cable 32 may be partially inserted into an outer casing 33 in a routing path. In addition, the cable 3 is configured using the two cables in the present embodiment, but may be configured using one cable.

[0016] The moving member 2 is operated by the cable 3 to be raised and lowered, thereby raising and lowering the window glass W connected to the moving member 2. The window glass W is directly or indirectly mounted to the moving member 2 as illustrated in Fig. 1. In the present embodiment, the moving member 2 is mounted to the guide portion 7 so as to be movable along the longitudinal direction of the guide portion 7. As illustrated in Fig. 1, the moving member 2 includes: a first connection portion 21a to which the end 31E of the cable 3 is connected; a second connection portion 21b to which the end 32E of the cable 3 is connected; and a window glass mounting portion 22 to which a lower end of the window glass W is mounted. Incidentally, a shape and a structure of the moving member 2 are not limited to those illustrated in the drawings. In addition, the moving member 2 is guided by the guide portion 7 in the present embodiment, but the moving member 2 may move without being guided by the guide portion 7.

[0017] The housing 6 accommodates the drum 4 to be rotatable. The housing 6 is directly or indirectly mounted to a mounting object such as a door panel (not illustrated). In the present embodiment, the window glass raising/lowering device 1 has a base body 9 to which the housing 6 is mounted as illustrated in Figs. 1, 3, and 4. In the present embodiment, the housing 6 is mounted to the mounting object such as the door panel via the base body 9. Incidentally, the housing 6 may be directly mounted to the mounting object such as the door panel. In such a case, the mounting object itself such as the door panel serves as the base body.

[0018] As illustrated in Fig. 2, the housing 6 includes: an inner space portion 61 (see Fig. 5) having an accommodating portion 611 in which the drum 4 is accommodated; a cable lead-in/out portion 62 through which the cable 3 is led in and out; and an opening portion 63 that communicates the inner space portion 61 with the outside. In addition, the housing 6 includes a protruding portion 64 which extends to an opposite side of the drum 4 in a direction of the drum center axis X, on a radially outer side of the opening portion 63 with respect to a position of the drum center axis X as illustrated in Figs. 2 and 3. The housing 6 has an insertion port 6a (see Figs. 4 and 5) through which the drum 4 can be inserted into the inner space portion 61. In the present embodiment, the housing 6 includes a housing base 65, and the housing base 65 is provided with the accommodating portion 611, the cable lead-in/out portion 62 and the like as illustrated in Fig. 2. The housing base 65 has a connection portion 65a configured to mount the housing 6 to the base body 9. The connection portion 65a is fixed to a connected

portion 91 provided on the base body 9 by a publicly-known fixing member such as a bolt, a nut, and a screw.

[0019] The inner space portion 61 is a part which forms an inner space provided in the housing 6 that includes the accommodating portion 611 which forms a space in which the drum 4 is accommodated as illustrated in Fig. 5. The inner space portion 61 may include other spaces such as radial spaces S21 and S22 and axial spaces S31 and S32, which will be described later, in addition to an accommodating space S1 of the accommodating portion 611 as illustrated in Fig. 5.

[0020] The accommodating portion 611 accommodates the drum 4 to be rotatable. As illustrated in Figs. 5 and 6, the accommodating portion 611 has a circumferential wall 611a opposing an outer circumferential surface 42 (see Fig. 6) of the drum 4 and a bottom 611b opposing one end surface 4a of the drum 4. A recess defined by an inner surface IS of the circumferential wall 611a and the bottom 611b serves as the accommodating space S1 in the accommodating portion 611.

[0021] In the present embodiment, the inner space portion 61 includes not only the accommodating space S1 of the accommodating portion 611 but also the radial spaces S21 and S22, which extend to the radially outer side of the drum 4 to communicate with the accommodating space S1 of the accommodating portion 611, at an end on the base body 9 side in the direction of the drum center axis X as illustrated in Fig. 6. In addition, the inner space portion 61 includes the axial spaces S31 and S32, which extend in the direction of the drum center axis X between an inner surface 64a of the protruding portion 64 and an outer surface OS of the circumferential wall 611a, at parts where the opening portion 63 and the protruding portion 64 are provided as illustrated in Figs. 5 and 6. The radial spaces S21 and S22 and the axial spaces S31 and S32 will be described later.

[0022] One side of the inner space portion 61 in the direction of the drum center axis X (a side of the one end surface 4a of the drum 4) is covered by the bottom 611b except for a region of the opening portion 63 as illustrated in Figs. 5 and 6. The other side of the inner space portion 61 in the direction of the drum center axis X (a side of another end surface 4b of the drum 4) opens in the insertion port 6a as illustrated in Fig. 5 in a state where the base body 9 is not mounted. In the present embodiment, the base body 9 has a cover portion 92 that covers the insertion port 6a such that the drum 4 is not detachable from the housing 6 as illustrated in Figs. 3, 4 and 6. As the base body 9 is mounted to the housing 6, the insertion port 6a is covered by the cover portion 92 in a state where the drum 4 is accommodated in the accommodating portion 611. Incidentally, the base body 9 has the mounting portion 93 which mounts the window glass raising/lowering device 1 to a mounting object, such as a door panel, in the present embodiment. The mounting portion 93 is formed in an arm shape extending in a direction away from the housing 6 with respect to the plate-shaped cover portion 92. Incidentally, the shape of the base body 9 is

not particularly limited as long as it is possible to mount the housing 6.

[0023] The cable lead-in/out portion 62 leads the cable 3 to the outside of the housing 6 and leads the cable 3 to the inside of the housing 6. The cable lead-in/out portion 62 has a communication passage to communicate the accommodating portion 611 in which the drum 4 is accommodated with the outside of the housing 6, and the cable 3 is led out of the housing 6 and led into the housing 6 through the communication passage. As illustrated in Figs. 1 and 2, the cable lead-in/out portion 62 includes a first cable lead-in/out portion 62a and a second cable lead-in/out portion 62b. In the present embodiment, the outer casing 33 is connected to each of the first and second cable lead-in/out portions 62a and 62b, and the cable 3 is inserted into the outer casing 33 through the first and second cable lead-in/out portions 62a and 62b and extends toward the moving member 2.

[0024] The first cable lead-in/out portion 62a and the second cable lead-in/out portion 62b are provided in the housing 6 so as to be arranged such that each position thereof when the housing 6 is rotated by 180° about the drum center axis X (position illustrated by the two-dot chain line in Fig. 2) becomes line-symmetric (hereinafter simply referred to as line symmetry) with respect to a position of the other cable lead-in/out portion in a state before the rotation by 180° (hereinafter simply referred to as line symmetry). Therefore, for example, in a mounting object for which a pair of the housings 6 are provided at symmetrical positions, such as a left door and a right door of a vehicle, the same housing 6 can be shared by vertically reversing the housing 6 provided on the left side and the housing 6 provided on the right side. Incidentally, the entire housing 6 does not have to be completely line-symmetric as long as the housing 6 includes the first cable lead-in/out portion 62a and the second cable lead-in/out portion 62b arranged with the line symmetry such that the pair of housings arranged at symmetrical positions can be shared.

[0025] The opening portion 63 has a first opening portion 63a and a second opening portion 63b as illustrated in Fig. 2. The first opening portion 63a and the second opening portion 63b are provided on the radially outer side with respect to the position of the drum center axis X. The first opening portion 63a is provided on the upper side with respect to the position of the drum center axis X when the first cable lead-in/out portion 62a is on the upper side, and on the lower side with respect to the position of the drum center axis X when the first cable lead-in/out portion 62a is on the lower side. In addition, the second opening portion 63b is provided on the upper side with respect to the position of the drum center axis X when the second cable lead-in/out portion 62b is on the upper side, and on the lower side with respect to the position of the drum center axis X when the second cable lead-in/out portion 62b is on the lower side.

[0026] As a result, any one of the first opening portion 63a and the second opening portion 63b is positioned on

the lower side with respect to the position of the drum center axis X. Therefore, when water that has entered the inner space portion 61 flows downward below the drum center axis X, the water can be discharged to the outside of the inner space portion 61 through the opening portion 63.

[0027] The positions of the first opening portion 63a and the second opening portion 63b are not particularly limited as long as it is possible to communicate the inside of the inner space portion 61 with the outside of the inner space portion 61 and to discharge the water having entered the inner space portion 61 to the outside of the inner space portion 61 when positioned on the lower side with respect to the position of drum center axis X. In the present embodiment, the first opening portion 63a and the second opening portion 63b are provided to be opened at a position of a lower end of the circumferential wall 611a when positioned on the lower side with respect to the position of the drum center axis X as illustrated in Fig. 2. In this case, the first opening portion 63a and the second opening portion 63b open at a place where the water entered into the inner space portion 61 is collected downward along the circumferential wall 611a. Therefore, the water having entered the inner space portion 61 can be easily discharged.

[0028] Each shape and each size of the first opening portion 63a and the second opening portion 63b are not particularly limited as long as the first opening portion 63a and the second opening portion 63b have predetermined shape and sizes that can smoothly discharge the water having entered the inner space portion 61. Incidentally, the first opening portion 63a and the second opening portion 63b are provided such that an upper end and a lower end portion of the bottom 611b are penetrated in the direction of the drum center axis X, and an upper end and a lower end portion of the circumferential wall 611a are penetrated in a radial direction of the drum 4 in the present embodiment as illustrated in Figs. 2 and 5.

[0029] The protruding portion 64 has a first protruding portion 641 and a second protruding portion 642 as illustrated in Figs. 1 and 2. The first protruding portion 641 extends to the opposite side of the drum 4 in the direction of the center axis X (the left side of the one end surface 4a of the drum 4 in Fig. 6) on the radially outer side of the first opening portion 63a with respect to the position of the drum center axis X as illustrated in Fig. 6. That is, the first protruding portion 641 is provided to cover the first opening portion 63a from the radially outer side of the drum 4 toward a radially inner side. The first protruding portion 641 is provided between the first protruding portion 641 and the first opening portion 63a such that a predetermined interval is formed in the radial direction of the drum 4. Although it is sufficient to provide the first protruding portion 641 so as to cover at least a position where the first opening portion 63a is provided, in the direction of the drum center axis X, it is preferable that the first protruding portion 641 extend to the opposite side of the drum 4 beyond the first opening portion 63a

in the direction of the drum center axis X.

[0030] The first protruding portion 641 is provided on the upper side of the first opening portion 63a when the first opening portion 63a is on the upper side, and on the lower side of the first opening portion 63a when the first opening portion 63a is on the lower side. When the window glass raising/lowering device 1 is mounted to a mounting object, the first protruding portion 641 covers the first opening portion 63a from the upper side of the first opening portion 63a if the first opening portion 63a is positioned on the upper side with respect to the drum center axis X. If the first opening portion 63a is positioned on the lower side with respect to the drum center axis X, the first protruding portion 641 is arranged below the first opening portion 63a.

[0031] As illustrated in Fig. 6, the second protruding portion 642 extends to the opposite side of the drum 4 in the direction of the drum center axis X, on the radially outer side of the second opening portion 63b with respect to the position of the drum center axis X. That is, the second protruding portion 642 is provided to cover the second opening portion 63b from the radially outer side of the drum 4 toward the radially inner side. The second protruding portion 642 is provided between the second protruding portion 642 and the second opening portion 63b such that a predetermined interval is formed in the radial direction of the drum 4. Although it is sufficient for the second protruding portion 642 to extend so as to cover at least a position where the second opening portion 63b is provided, in the direction of the drum center axis X, it is preferable that the second protruding portion 642 extend to the opposite side of the drum 4 beyond the second opening portion 63b in the direction of the drum center axis X.

[0032] The second protruding portion 642 is provided on the upper side of the second opening portion 63b when the second opening portion 63b is on the upper side, and on the lower side of the second opening portion 63b when the second opening portion 63b is on the lower side. When the window glass raising/lowering device 1 is mounted to a mounting object, the second protruding portion 642 covers the second opening portion 63b from the upper side of the second opening portion 63b if the second opening portion 63b is positioned on the upper side with respect to the drum center axis X. If the second opening portion 63b is positioned on the lower side with respect to the drum center axis X, the second protruding portion 642 is arranged below the second opening portion 63b.

[0033] Each of the first protruding portion 641 and the second protruding portion 642 has the inner surface 64a and an outer surface 64b as illustrated in Fig. 2. The inner surface 64a is a surface of the protruding portion 64 that faces a surface on the side of the opening portion 63, that is, a surface that faces the outer circumferential surface 42 of the drum 4. In addition, the outer surface 64b is a surface of the protruding portion 64 on the side opposite to the inner surface 64a, that is, the surface of the

protruding portion 64 that is farther from the drum center axis X.

[0034] The inner surface 64a has a drainage guide portion G that guides water, which has moved from the inner space portion 61 of the housing 6 to the opening portion 63 when the protruding portion 64 is on the lower side, to the outside of the housing 6 as illustrated in Fig. 2. In addition, the outer surface 64b has a weir D that moves water adhering to the outer side of the protruding portion 64 downward when the protruding portion 64 is on the upper side as illustrated in Fig. 2. When the water having moved from the inner space portion 61 to the opening portion 63 flows from the opening portion 63 to the protruding portion 64 further downward, the drainage guide portion G guides the water to the outside of the housing 6. The drainage guide portion G prevents water from being accumulated in the inner space portion 61 and the housing 6. The drainage guide portion G is provided with a guide portion that guides water from the opening portion 63 to a side away from the opening portion 63, and keeps the water away from the adjacent opening portion 63. The guide portion has, for example, a concave shape and is provided such that water moves downward. In addition, the weir D causes water flowing from the upper side of the protruding portion 64 to flow downward along the weir D so as to deviate from the opening portion 63, and prevents water from entering the opening portion 63 positioned below the protruding portion 64.

[0035] As described above, the window glass raising/lowering device 1 of the present embodiment is provided in the housing 6 with the arrangement in which the first cable lead-in/out portion 62a and the second cable lead-in/out portion 62b are line-symmetric. As a result, the same housing 6 can be shared by vertically reversing the housing 6 provided on the left side and the housing 6 provided on the right side in the mounting object for which the pair of the housings 6 are provided at symmetrical positions. In addition, the housing 6 includes the first opening portion 63a and the second opening portion 63b that communicate the inside of the inner space portion 61 with the outside of the inner space portion 61. The opening portion 63 positioned on the lower side between the first opening portion 63a and the second opening portion 63b discharges the water that has entered the inner space portion 61. The water discharged from the opening portion 63 on the lower side is guided to the outside of the housing 6 by the drainage guide portion G of the protruding portion 64 positioned on the lower side between the first protruding portion 641 and the second protruding portion 642. Meanwhile, when the housing 6 is shared by the right and left sides of the mounting object, the opening portion 63 is provided on the upper side of the inner space portion 61, but water is prevented from entering from the opening portion 63 on the upper side by the weir D of the upper protruding portion 64 on the upper side of the opening portion 63 positioned on the upper side. In this manner, the window glass raising/lowering device 1 of the present embodiment can share the

housing 6 on the right and left sides by vertically reversing the housing 6 and can suppress the entry and accumulation of water inside the inner space portion 61 of the housing 6.

[0036] Specifically, when a pair of the window glass raising/lowering devices 1 is arranged on the right and left sides of a vehicle, for example, the housing 6 is provided on the left side of the vehicle such that the first cable lead-in/out portion 62a, the first opening portion 63a, and the first protruding portion 641 are on the upper side. On the other hand, on the right side of the vehicle, the same housing 6 is provided to be vertically reversed from the housing 6 on the left side such that the second cable lead-in/out portion 62b, the second opening portion 63b, and the second protruding portion 642 are on the upper side. As a result, the housings 6 can be arranged to be laterally symmetric with respect to a moving direction of the vehicle on the right and left sides of the vehicle.

[0037] In addition, for example, in the housing 6 on the left side of the vehicle, the water ran along the cable 3 and the water entering from the upper side of the housing 6 are prevented from entering the inner space portion 61 through the first opening portion 63a by the weir D of the outer surface 64b of the first protruding portion 641. On the other hand, the first protruding portion 641 functioning as the weir D on the left side promotes the discharge of water flowing out of the first opening portion 63a by the drainage guide portion G of the inner surface 64a on the right side of the vehicle. Similarly, in the housing 6 on the left side of the vehicle, the drainage guide portion G of the inner surface 64a of the second protruding portion 642 promotes the discharge of water flowing out of the second opening portion 63b. On the other hand, the second protruding portion 642 functioning as the drainage guide portion G on the left side prevents water from entering the inner space portion 61 from the second opening portion 63b by the weir D of the outer surface 64b on the right side of the vehicle.

[0038] In addition, the first opening portion 63a and the second opening portion 63b are formed, and an air flow from the upper opening portion 63 toward the lower opening portion 63 is likely to occur inside the inner space portion 61 in the present embodiment. Therefore, the flow of water inside the inner space portion 61 is smoother than that in the case where there is only one opening portion, and the drainage from the inner space portion 61 is further promoted.

[0039] In the present embodiment, the protruding portion 64 is provided so as to protrude outward with respect to the drum center axis X as illustrated in Fig. 2. Since the protruding portion 64 protrudes outward, the weir D having an inclined surface, which has a downward slope with respect to a top 64c, is formed on both sides of the top 64c of the protruding portion 64 in the circumferential direction of the drum 4, on the outer surface 64b of the protruding portion 64 when the protruding portion 64 is arranged on the upper side as illustrated in Fig. 2. The water flowing from above in Fig. 2 is likely to flow from

the top 64c of the protruding portion 64 along the weirs D on both the sides, and the flow of water toward the upper opening portion 63 is less likely to occur. Therefore, the entry of water from the upper opening portion 63 to the inner space portion 61 is further suppressed. In addition, when the protruding portion 64 is arranged on the lower side, an inclined surface, which has a downward slope toward the top 64c, is provided on both sides of the top 64c of the protruding portion 64 on the inner surface 64a of the protruding portion 64 in the circumferential direction of the drum 4. Therefore, water is collected toward the drainage guide portion G of the inner surface 64a of the protruding portion 64, and drainage is further promoted. The weir D is provided with a guide portion that guides water from above to a side away from the opening portion 63, and keeps water away from the adjacent opening portion 63. The guide portion has, for example, a shape that is convex upward.

[0040] In the present embodiment, the protruding portion 64 extends to the radially outer side of the drum 4 from the circumferential wall 611a and covers the opening portion 63 in an arched shape such that the opening portion 63 is sandwiched in the circumferential direction of the drum 4 as illustrated in Fig. 2. As a result, the entry of water into the opening portion 63 is suppressed in the circumferential direction of the drum 4 as well as on the radially outer side of the upper opening portion 63. Incidentally, the protruding portion 64 does not necessarily extend from the circumferential wall 611a, and may extend from the housing base 65 in the direction of the drum center axis X independently of the circumferential wall 611a.

[0041] In addition, the base body 9 has a discharge portion 94 which forms, together with the housing 6, a hole capable of discharging water from the inner space portion 61 of the housing 6 in the present embodiment as illustrated in Fig. 6. The discharge portion 94 is a hole to discharge the water which has entered the inner space portion 61 from the base body 9 side. The discharge portion 94 penetrates through the base body 9 (cover portion 92) in a lower part of the inner space portion 61 to communicate the inside of the inner space portion 61 with the outside. Since the discharge portion 94 is provided, the water having moved toward the base body 9 side can be discharged from the discharge portion 94 inside the inner space portion 61 without being directed to the opening portion 63. Therefore, it is possible to further suppress that water from being stored in inner space portion 61.

[0042] In the present embodiment, the inner space portion 61 has the radial space (a first radial space) S21, which extends to the radially outer side of the drum 4 so as to communicate with the accommodating space S1 of the accommodating portion 611, at the end on the base body 9 side in the direction of the drum center axis X as illustrated in Figs. 5 and 6. The radial space S21 forms a recess downward on the lower side of the inner space portion 61, and functions as a water collecting portion to collect water directed toward the base body 9 side of the

inner space portion 61 in the direction of the drum center axis X. In the present embodiment, the discharge portion 94 is provided at a position corresponding to the radial space S21, and the water flowing into the radial space S21 is discharged from the inner space portion 61 through the discharge portion 94 by being communicated the radial space S21 with the discharge portion 94. Incidentally, the radial space (a second radial space) S22 extending to the radially outer side of the drum 4 is also provided on the upper side of the inner space portion 61 in the present embodiment. The upper radial space S22 is covered by the cover portion 92 of the base body 9, and water does not enter from the upper side of the inner space portion 61 through the base body 9. Incidentally, when the radial space S22 is arranged on the lower side, the radial space S22 communicates with the discharge portion 94 of the base body 9, and the water flowing into the radial space S22 is discharged from the inner space portion 61 through the discharge portion 94.

[0043] In addition, the inner space portion 61 has the axial space (a first axial space) S31 extending in the direction of the drum center axis X between the inner surface 64a of the protruding portion 64 and the outer surface OS of the circumferential wall 611a, in a part where the lower opening portion 63 and the protruding portion 64 are provided, in the present embodiment as illustrated in Figs. 5 and 6. The axial space S31 communicates with the radial space S21. Water discharged from the inner space portion 61 through the lower opening portion 63 moves to the weir D of the lower protruding portion 64. When the axial space S31 is provided, the water having moved to the weir D moves not only in the direction away from the base body 9 in the direction of the drum center axis X but also to the radial space S21. Therefore, the water having moved to the weir D can move to both the sides in the direction of the drum center axis X, and water can also be discharged directly from the weir D, and water can also be discharged through the axial space S31, the radial space S21, and the discharge portion 94. Thus, even if there is a large amount of water that has entered, the water can be reliably discharged. Incidentally, the axial space (a second axial space) S32, which extends in the direction of the drum center axis X, is provided between the inner surface 64a of the protruding portion 64 and the outer surface OS of the circumferential wall 611a even on the upper side of the inner space portion 61 in the present embodiment. The axial space S32 communicates with the radial space S22. When the axial space S32 is arranged on the lower side, the water can also be directly discharged from the weir D, and the water can be discharged through the axial space S32, the radial space S22, and the discharge portion 94, as in the case of the axial space S31.

Reference Signs List

1	Window glass raising/lowering device
2	Moving member
21a	First connection portion
21b	Second connection portion
5 22	Window glass mounting portion
3	Cable
31	First cable
31E	End of cable
32	Second cable
10 32E	End of cable
33	Outer casing
4	Drum
4a	One end surface of drum
4b	Other end surface of drum
15 41	Axial hole
42	Outer circumferential surface of drum
5	Drive unit
51	Electric motor
52	Shaft
20 6	Housing
6a	Insertion port
61	Inner space portion
611	Accommodating portion
611a	Circumferential wall
25 611b	Bottom
62	Cable lead-in/out portion
62a	First cable lead-in/out portion
62b	Second cable lead-in/out portion
63	Opening portion
30 63a	First opening portion
63b	Second opening portion
64	Protruding portion
64a	Inner surface of protruding portion
64b	Outer surface of protruding portion
35 64c	Top of protruding portion
641	First protruding portion
642	Second protruding portion
65	Housing base portion
65a	Connection portion
40 7	Guide portion
8	Direction changing member
9	Base body
91	Connected portion
92	Cover portion
45 93	Mounting portion
94	Discharge portion
D	Weir
G	Drainage guide portion
IS	Inner surface of circumferential wall
50 OS	Outer surface of circumferential wall
S1	Accommodating space
S21, S22	Radial space
S31, S32	Axial space
W	Window glass
55 X	Drum center axis

[0044]

Claims

1. A window glass raising/lowering device (1) comprising:

a moving member (2) that moves a window glass (W);
 a cable (3) connected to the moving member (2);
 a drum (4) that moves the moving member (2) by winding and unwinding the cable (3);
 a drive unit (5) that rotates the drum (4); and
 a housing (6) that includes: an inner space portion (61) having an accommodating portion (611) in which the drum (4) is accommodated;
 a cable lead-in/out portion (62) through which the cable (3) is led in and out; and an opening portion (63) that communicates the inner space portion (61) with an outside, and wherein the opening portion (63) is provided on a radially outer side with respect to a position of a drum center axis (X),
 the housing (6) has a protruding portion (64), which extends to an opposite side of the drum (4) in a center axis direction, on a radially outer side of the opening portion (63) with respect to the position of the drum center axis (X),
 the cable lead-in/out portion (62) has a first cable lead-in/out portion (62a) and a second cable lead-in/out portion (62b),
 the first cable lead-in/out portion (62a) and the second cable lead-in/out portion (62b) are provided in the housing (6) so as to be arranged such that each position of the first cable lead-in/out portion (62a) and the second cable lead-in/out portion (62b) when the housing (6) is rotated by 180° about the drum center axis (X) becomes line-symmetric with respect to each position of the other cable lead-in/out portion in a state before the rotation by 180°,
 the opening portion (63) has a first opening portion (63a), which is positioned on an upper side with respect to the position of the drum center axis (X) when the first cable lead-in/out portion (62a) is on an upper side and is positioned on a lower side with respect to the position of the drum center axis (X) when the first cable lead-in/out portion (62a) is on a lower side, and a second opening portion (63b) which is positioned on an upper side with respect to the position of the drum center axis (X) when the second cable lead-in/out portion (62b) is on an upper side and is positioned on a lower side with respect to the position of the drum center axis (X) when the second cable lead-in/out portion (62b) is on a lower side,
 the protruding portion (64) has a first protruding portion (641), which is positioned on an upper side of the first opening portion when the first

opening portion (63a) is on the upper side and is positioned on a lower side of the first opening portion (63a) when the first opening portion (63a) is on the lower side, and a second protruding portion (642) which is positioned on an upper side of the second opening portion (63b) when the second opening portion (63b) is on the upper side and is positioned on a lower side of the second opening portion (63b) when the second opening portion (63b) is on the lower side, the protruding portion (64) has an inner surface (64a) and an outer surface (64b), the inner surface (64a) has a drainage guide portion (G) that guides water, which has moved from the inner space portion (61) of the housing (6) to the opening portion (63) when the protruding portion (64) is on the lower side, to the outside of the housing (6), and the outer surface (64b) has a weir (D) that moves water adhering to an outer side of the protruding portion (64) downward when the protruding portion (64) is on the upper side.

2. The window glass raising/lowering device (1) according to claim 1, wherein the protruding portion (64) is provided so as to protrude outward with respect to the drum center axis (X).
3. The window glass raising/lowering device (1) according to claim 1 or claim 2, further comprising a base body (9) to which the housing (6) is mounted, and wherein the housing (6) has an insertion port (6a) through which the drum (4) is insertable into the inner space portion (61), and the base body (9) has: a cover portion (92) that covers the insertion port (6a) such that the drum (4) is not detachable from the housing (6); and a discharge portion (94) that forms a hole with the housing (6), the hole capable of discharging water from the inner space portion (61) of the housing (6).

Fig. 1

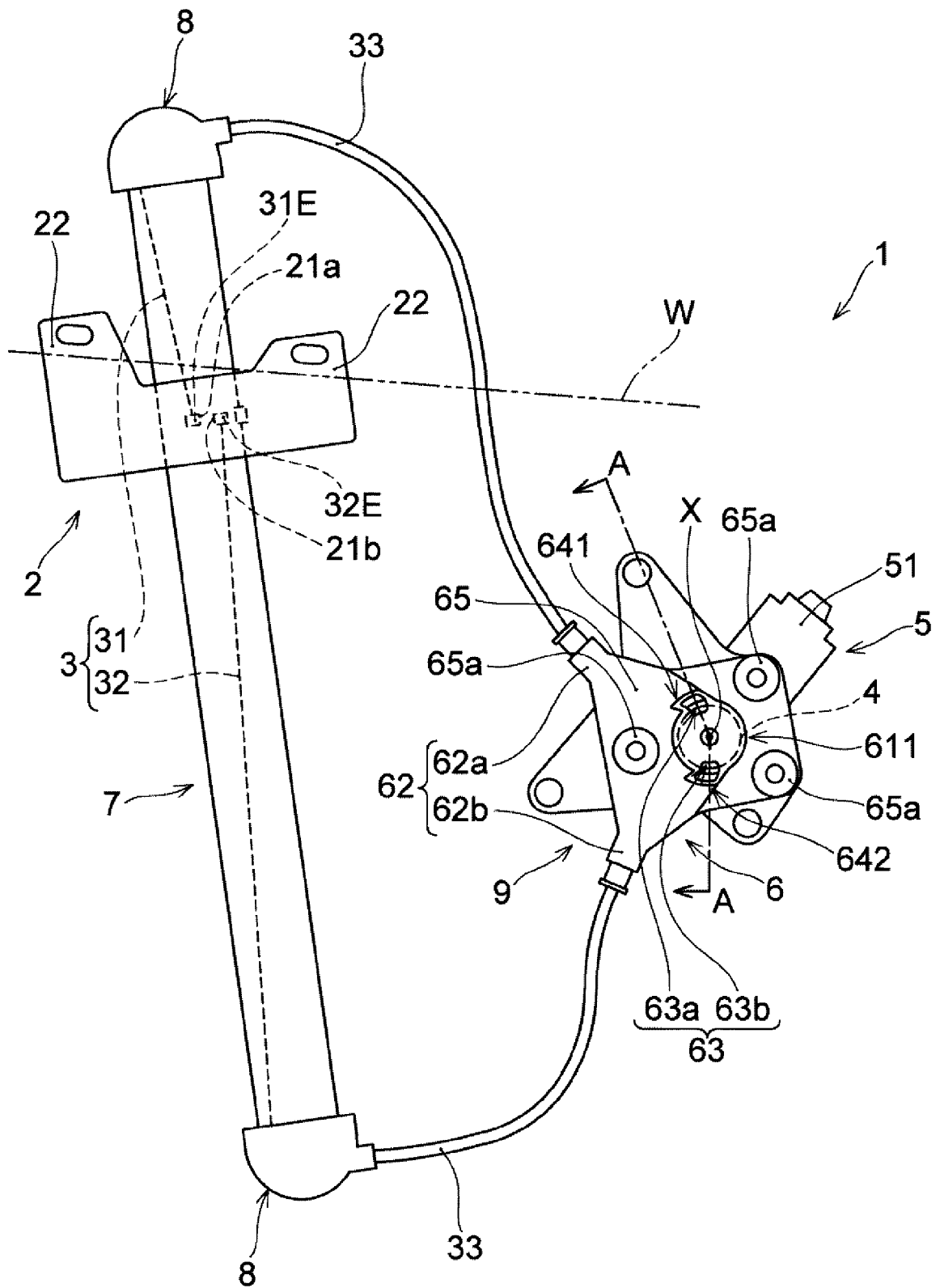


Fig. 2

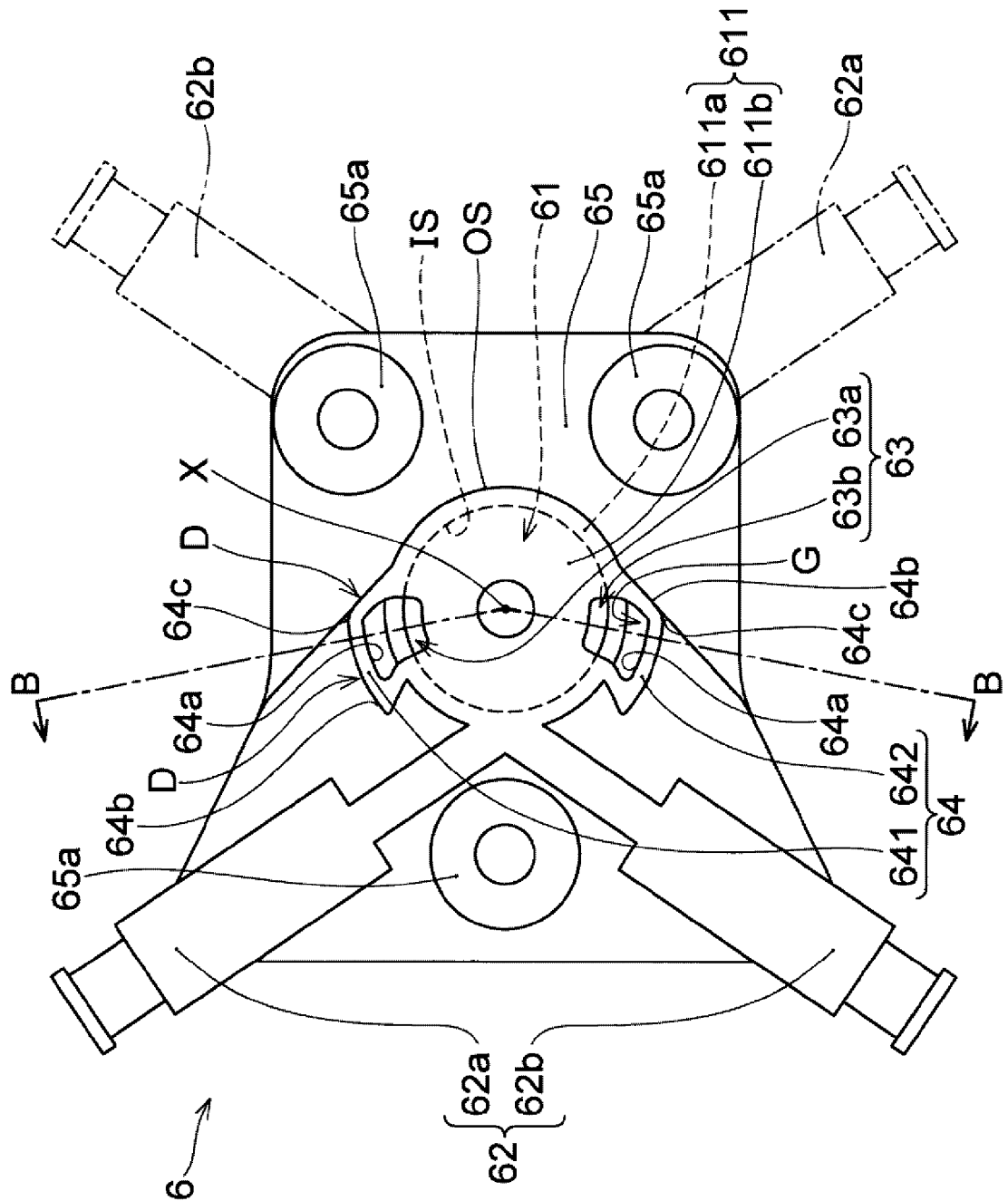


Fig. 3

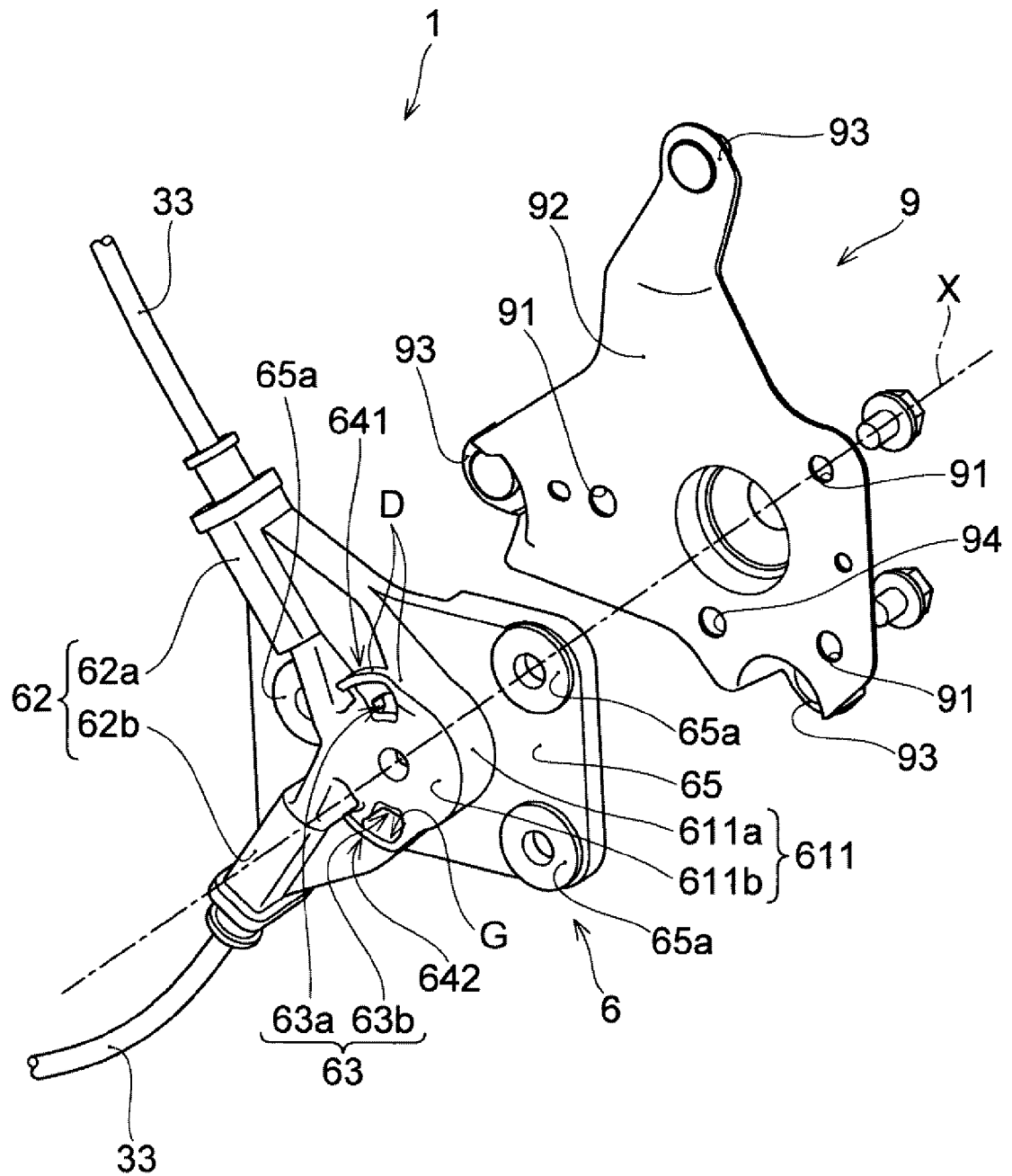


Fig. 4

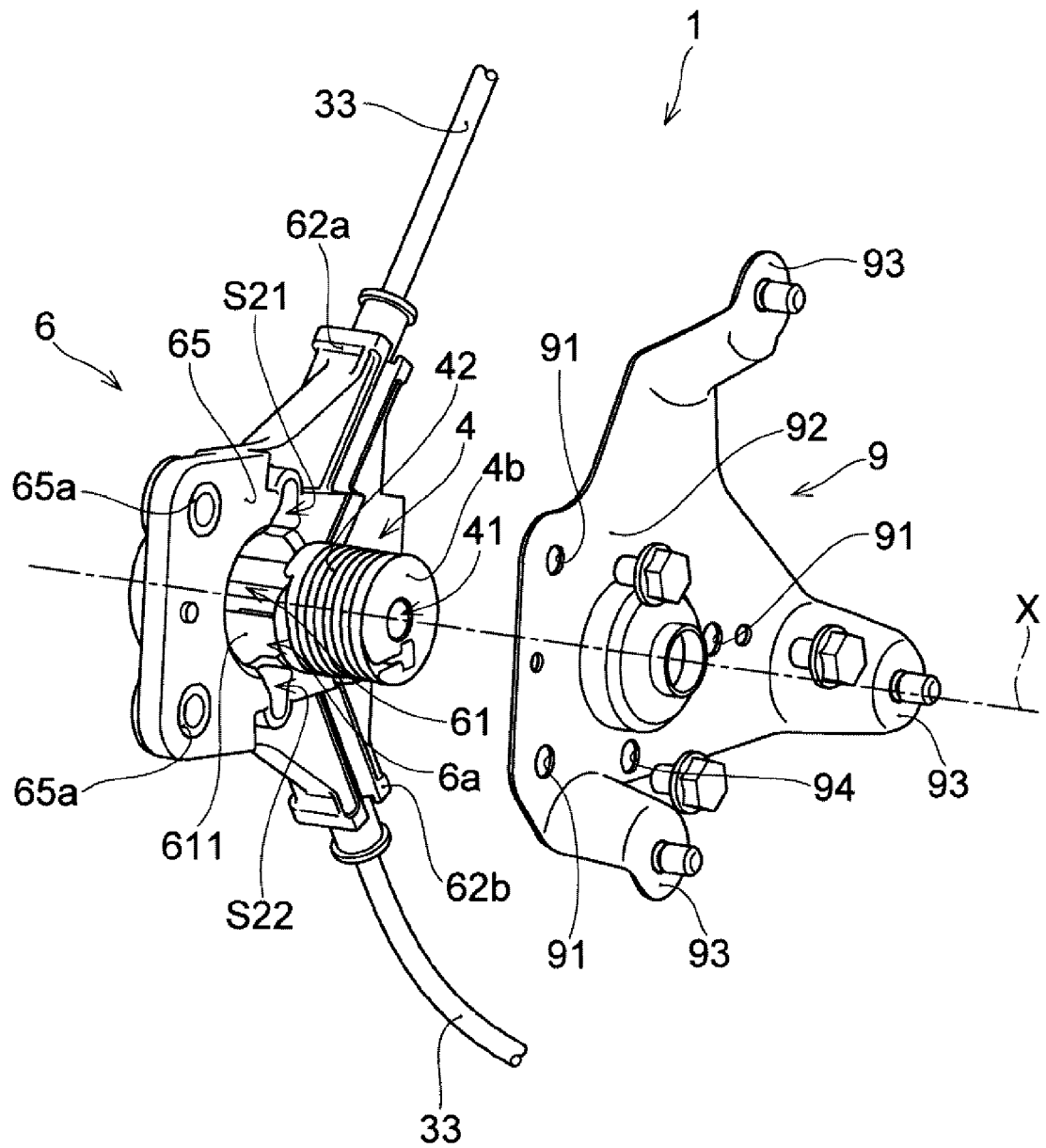


Fig. 5

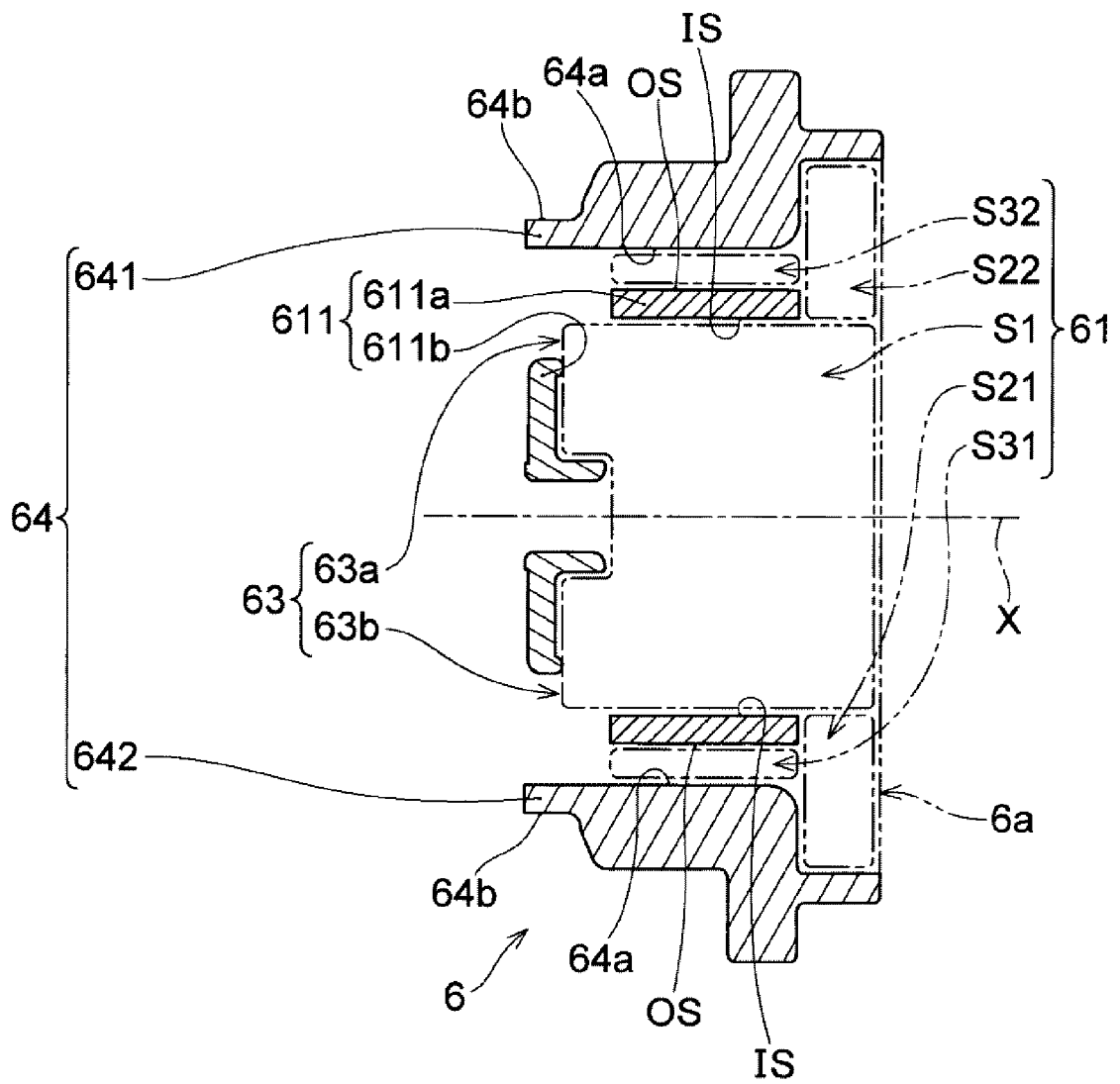
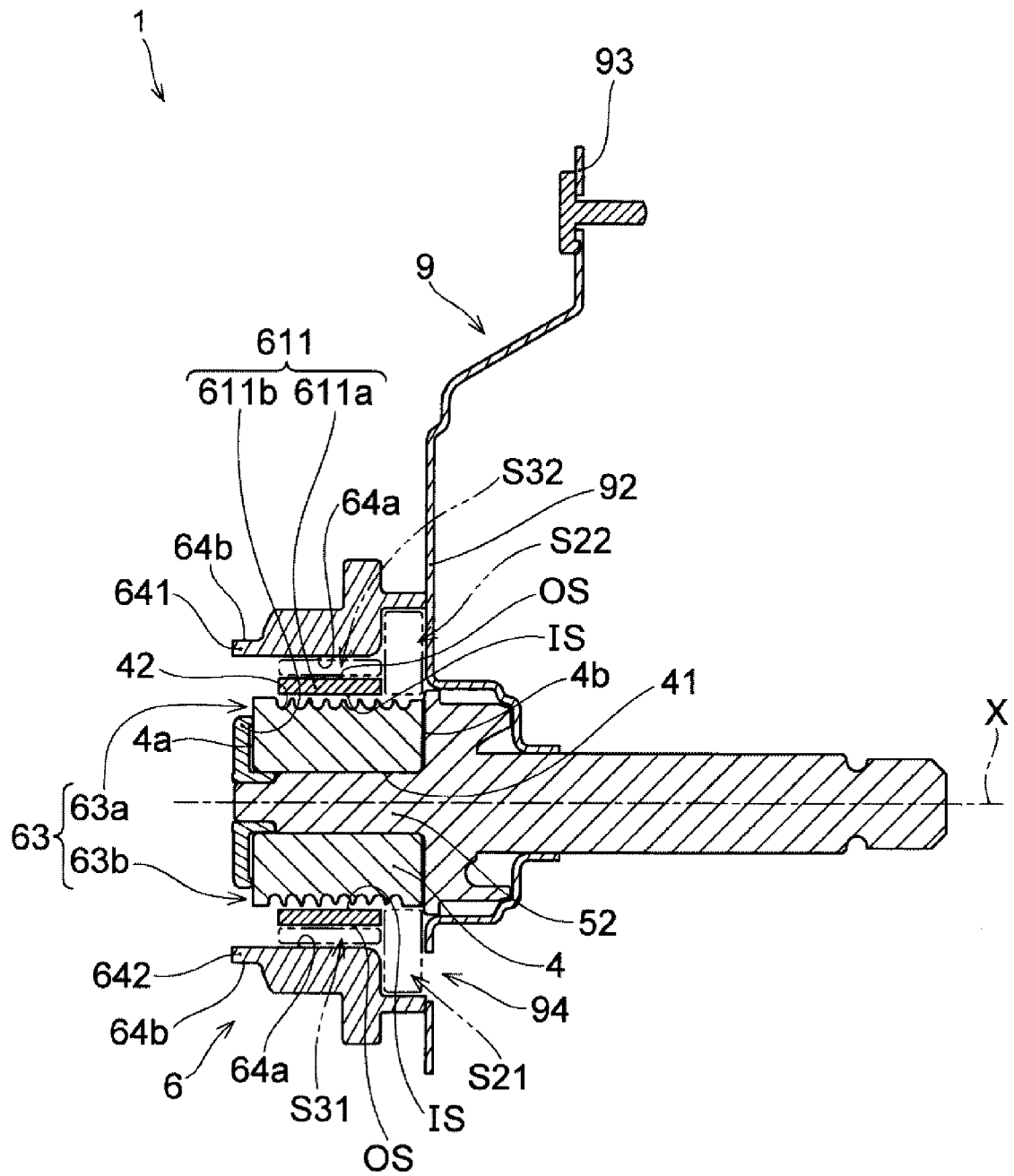


Fig. 6





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Place of search The Hague		Date of completion of the search 13 January 2020	Examiner Viethen, Lorenz
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