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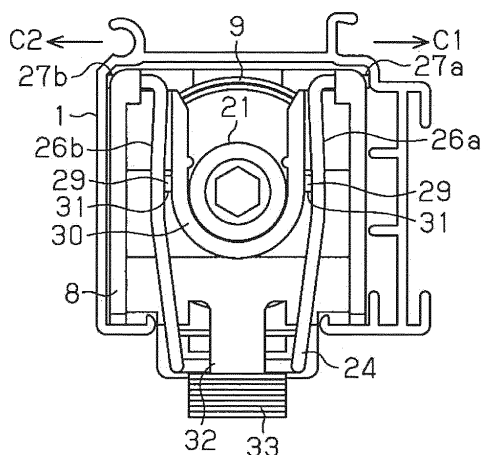
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(54) SOLAR RADIATION SHIELD DEVICE AND DEVICE FOR OPERATING SAME

(57) There is provided a sunlight shielding apparatus which allows a target member to be stably fixed in a frame. A sunlight shielding apparatus includes a frame 1 formed of a shaped material having an aperture, a target member to be fixed that is supported in the frame in such a manner that the target member can move only in a length direction of the frame, fixing means attached to the target member and configured to fix the target member to the frame. The fixing means includes an elastic

pressing member 24, a support portion formed on the target member and configured to support the pressing member in such a manner that the pressing member 24 can rotate between a fixed position and a fixation-released position of the target member, and pressing force generation means 31 formed on the target member and configured to press the pressing member against upper portions of inner side surfaces of the frame 1 at the fixed position.

FIG. 4



Description

TECHNICAL FIELD

[0001] The present invention relates to a sunlight shielding apparatus which includes a target member to be fixed, such as a roll-up curtain lift cord winding apparatus, and fixing means configured to fix the target member to a frame and to an operation apparatus configured to raise or lower the slats of a horizontal blind, the curtain fabric of a roll-up curtain or pleated curtain, or the like.

BACKGROUND ART

Sunlight Shielding Apparatus

[0002] A roll-up curtain is a curtain where a curtain fabric is suspended from and supported by a frame and which can control the amount of lighting by pulling up the lower edge of the curtain fabric using a lift cord to roll up or down the curtain fabric.

[0003] The frame includes a lift cord winding apparatus and has an operation apparatus mounted on one end thereof. An operation chain hangs from the operation apparatus. By operating the operation chain to rotate a drive shaft through the operation apparatus, it is possible to raise or lower the curtain fabric on the basis of the rotation of the drive shaft.

[0004] In the roll-up curtain described above, the lift cord winding apparatus is fixed to the frame either by a fixing screw, or, as disclosed in Patent Document 1, by rotating a fixture disposed on a bearing member of the lift cord winding apparatus.

[0005] There has been also proposed a fixing apparatus configured to fix a lift cord winding apparatus to a frame using the elasticity of a synthetic resin. Particularly, for roll-up curtains, whose curtain fabric needs to be mounted on a frame at the installation site, it is necessary to adjust the fixed position of a lift cord winding apparatus in the length direction of the frame in order to pass a lift cord through guide rings attached to the back of the curtain fabric. After the adjustment, the lift cord winding apparatus is fixed to the desired position of the frame using a fixing screw or fixture as described above.

Operation Apparatus Included in Sunlight Shielding Apparatus

[0006] In a roll-up curtain, a curtain fabric is suspended from and supported by a frame, and the lower ends of lift cords hanging from a lift cord winding apparatus in the frame are attached to the lower edge of the curtain fabric. By operating the lift cord winding apparatus to wind or unwind the lift cords, the curtain fabric can be raised or lowered.

[0007] An example of such a roll-up curtain operation apparatus is an operation apparatus which is mounted on one end of a frame and configured to rotate a drive

shaft for driving a lift cord winding apparatus, by operating an operation chain suspended from the operation apparatus.

[0008] In a roll-up curtain including this operation apparatus, by operating the operation chain to rotate the drive shaft in the lift cord winding direction, a curtain fabric is pulled up. By slightly rotating the operation chain in the lift cord winding direction and then releasing the operation chain, the operation of a stopper apparatus in the frame is released, so that the curtain fabric falls by self-weight.

[0009] Operation apparatuses as described above are mounted on the right end of a frame in some cases, and mounted on the left end of a frame in the other cases.

Prior Art Documents

Patent Documents

[0010]

Patent Document 1: Japanese Unexamined Patent Application Publication No. 2010-5314

Patent Document 2: Japanese Unexamined Patent Application Publication No. 2010-255386

Patent Document 3: Japanese Patent No. 2994552

Patent Document 4: Japanese Patent No. 3273007

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

Sunlight Shielding Apparatus

[0011] For a roll-up curtain, where a bearing member of a lift cord winding apparatus is fixed by a fixing screw, the fixing work requires a tool, such as a driver. Further, the fixing work is troublesome, since it involves inserting the fixing screw from below the frame.

[0012] For a fixing apparatus configured to fix a lift cord winding apparatus to a frame using the elasticity of a synthetic resin, the synthetic resin becomes deformed plastically and thus the holding force decreases with time. For this reason, the lift cord winding apparatus cannot be fixed stably.

[0013] In the case of a fixing apparatus disclosed in Patent Document 1, a bearing member is pressed against the inner ceiling of the frame by contacting a fixture with a portion adjacent to an aperture, of the frame. However, the dimensional accuracy of the aperture of the frame, formed of a shaped material, is originally unstable, and the aperture tends to become deformed by the pressing force of the fixture. Thus, the bearing member may be prevented from being securely fixed to the frame, or rotating the fixture may require a large operation force.

[0014] An object of a first aspect of the present invention is to provide a sunlight shielding apparatus which

allows a target member to be stably fixed in a frame.

Operation Apparatus Included in Sunlight Shielding Apparatus

[0015] In the roll-up curtain described above, the pulley having the operation chain hung thereon and the drive shaft are directly connected together. Accordingly, when the curtain fabric falls by self-weight, the pulley rotates, thereby rotating the operation chain.

[0016] Patent Document 2 discloses an operation apparatus which has a clutch function of preventing an operation chain from rotating when the curtain fabric falls by self-weight. However, this operation apparatus is asymmetrical in the front-back direction. Accordingly, if this operation apparatus is formed for right-side operation, it cannot be used for a left-side operation.

[0017] Patent Document 3 discloses an operation apparatus which is symmetrical in the front-back direction. For example, when the mounting position of this operation apparatus is changed from the right end of the frame to the left end, the pull-out direction of the lift cord is reversed in the front-back direction. Accordingly, this operation apparatus is less usable as an operation apparatus for a roll-up curtain.

[0018] Patent Document 4 discloses an operation apparatus which is symmetrical in the front-back direction and can be mounted on any of the left and right ends of a frame. However, when the curtain fabric falls by self-weight, the operation chain would rotate.

[0019] An object of a second aspect of the present invention is to provide an operation apparatus for a sunlight shielding apparatus such that the operation apparatus prevents an operation cord from operating when the curtain fabric falls by self-weight and the operation apparatus can be commonly used for right-side and left-side operations.

MEANS FOR SOLVING THE PROBLEMS

[0020] The above problems can be solved by at least one of the first and second aspects of the present invention described below. Embodiments of the first and second aspects described below can be combined, and combining them allows more favorable effects to be obtained. The object and effects of the first aspect of the present invention are achieved by carrying out the embodiment of the first aspect, and the object and effects of the second aspect of the present invention are achieved by carrying out the embodiment of the second aspect.

[0021] According to the first aspect of the present invention, there is provided a sunlight shielding apparatus. The sunlight shielding apparatus includes a frame formed of a shaped material having an aperture, a target member to be fixed that is supported in the frame in such a manner that the target member can move only in a length direction of the frame, and fixing means attached to the target member and configured to fix the target member to the

frame. The fixing means includes an elastic pressing member, a support portion formed on the target member and configured to support the pressing member in such a manner that the pressing member can rotate between a fixed position and a fixation-released position of the target member, and pressing force generation means formed on the target member and configured to press the pressing member against an upper portion of an inner side surface of the frame at the fixed position.

[0022] Preferably, the target member is provided with an operation piece configured to guide the pressing member to the fixed position, and the operation piece is exposed to the aperture of the frame.

[0023] Preferably, the target member is provided with a holding portion configured to hold the pressing member at the fixed position.

[0024] Preferably, the target member is provided with a release apparatus configured to release an operation of the holding portion, and the release apparatus is exposed to the aperture.

[0025] Preferably, the pressing member has parallel portions which are formed by bending a metal wire rod and extend in parallel; end portions of the parallel portions are bent toward the inner side surface of the frame; and the target member is provided with, as the pressing force generation means, a protrusion configured to increase an interval between the parallel portions at the fixed position to press the end portions of the parallel portions against the inner side surface of the frame.

[0026] Preferably, the pressing member is formed of an elastic metal wire rod.

[0027] According to the second aspect of the present invention, there is provided an operation apparatus for a sunlight shielding apparatus. The operation apparatus is mounted on an end of a frame and rotationally drives one drive shaft in the frame on the basis of an operation of an operation cord either to pull up a sunlight shielding material suspended from and supported by the frame or to cause the sunlight shielding material to fall by self weight. The operation apparatus includes a case configured to be mountable on both ends of the frame, a pulley rotatably supported by the case and configured to rotate on the basis of an operation of the operation cord, and a clutch apparatus configured to transmit rotation of the pulley to the drive shaft and not to transmit rotation of the drive shaft to the pulley when the sunlight shielding material falls by self weight.

[0028] Preferably, the case is provided with a tube configured to be fitted into an end of the frame; the frame is provided with containing space into which the tube can be inserted; and the tube and the containing space are each formed axisymmetrically with respect to the drive shaft in a front-back direction of the frame.

[0029] Preferably, the case is formed axisymmetrically with respect to the drive shaft in a front-back direction of the frame.

[0030] Preferably, the case contains the pulley, a gear wheel configured to transmit rotation of the pulley to the

clutch apparatus, and the clutch apparatus, and the pulley, the gear wheel, and the clutch apparatus are each disposed axisymmetrically with respect to the drive shaft in the front-back direction of the frame.

EFFECT OF THE INVENTION

[0031] According to the first aspect of the present invention, it is possible to provide a sunlight shielding apparatus which allows a target member to be stably fixed in a frame.

[0032] According to the second aspect of the present invention, it is possible to provide an operation apparatus for a sunlight shielding apparatus such that the operation apparatus prevents an operation cord from operating when the curtain fabric falls by self-weight and the operation apparatus can be commonly used for right-side and left-side operations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033]

FIG. 1 is a front view showing a roll-up curtain of one embodiment of a first aspect of the present invention. FIG. 2 is a side view showing the roll-up curtain of the one embodiment of the first aspect of the present invention.

FIG. 3 is a front view showing a lift cord winding apparatus of the one embodiment of the first aspect of the present invention.

FIG. 4 is a side view showing the lift cord winding apparatus of the one embodiment of the first aspect of the present invention.

FIG. 5 is an exploded perspective view showing the lift cord winding apparatus of the one embodiment of the first aspect of the present invention.

FIG. 6 is a front view showing an operation of a pressing member of the one embodiment of the first aspect of the present invention.

FIG. 7 is a side view showing an operation of the pressing member of the one embodiment of the first aspect of the present invention.

FIG. 8 is a front view showing a roll-up curtain for right-side operation of one embodiment of a second aspect of the present invention.

FIG. 9 is a sectional view showing an operation apparatus for right-side operation of the one embodiment of the second aspect of the present invention.

FIG. 10 is a sectional view showing an operation apparatus for left-side operation of the one embodiment of the second aspect of the present invention.

FIG. 11 is an exploded perspective view showing the operation apparatus for right-side operation of the one embodiment of the second aspect of the present invention.

FIG. 12 is a side view showing the operation apparatus mounted on a frame of the one embodiment of

the second aspect of the present invention.

FIG. 13 is a front view showing a roll-up curtain for left-side operation of the one embodiment of the second aspect of the present invention.

EMBODIMENTS FOR CARRYING OUT THE INVENTION

[0034] Hereafter, various embodiments of the present invention will be described. While respective embodiments of the first and second aspects of the present invention will be described for the sake of convenience, embodiments including two or more features of the first and second aspects are also possible. That is, the respective embodiments of the first and second aspects of the present invention described below can be combined. For numerals given to components, the same numerals may be given to different components in different embodiments.

One Embodiment of First Aspect of Present Invention

[0035] Hereafter, one embodiment of the first aspect of the present invention will be described with reference to the drawings. In a roll-up curtain shown in FIGS. 1 and 2, a curtain fabric 2 is suspended from and supported by a frame 1, and a bottom rail 4 is inserted in and supported by a bag-shaped portion 3 formed at the lower edge of the curtain fabric 2.

[0036] At least two lift cord winding apparatuses 5 are disposed in the frame 1, and lift cords 6 are suspended from and supported by the lift cord winding apparatuses 5. Attached to the lower edges of the lift cords 6 are hooks 7. The hooks 7 are also attached to the lower edge of the curtain fabric 2.

[0037] A winding shaft 9 of each lift cord winding apparatus 5 is rotatably supported by a support member 8, and the upper edge of the corresponding lift cord 6 is attached to the winding shaft 9. Due to rotation of the winding shaft 9, the lift cord 6 is wound around or unwound from the winding shaft 9.

[0038] A hexagonal bar-shaped drive shaft 10 is relatively unrotatably passed through the center of the winding shaft 9, and one end of the drive shaft 10 is fitted into the output shaft of an operation apparatus 11 mounted on one end of the frame 1.

[0039] Referring now to FIGS. 3 to 5, the specific configuration of the lift cord winding apparatus 5 will be described. As shown in FIG. 4, the frame 1 is made of an approximately square tubular shaped material having a downward aperture. The support member 8 is made of an elastic synthetic resin and in a shape which can be inserted into the frame 1 from a side thereof. Both ends of the support member 8 in the length direction thereof are held by the frame 1 in such a manner that the support member 8 is movable only in the length direction of the frame 1. The support member 8 has, on both ends in the length direction thereof, bearings 20a and 20b.

[0040] The winding shaft 9 is formed in such a manner that the diameter thereof is gradually reduced from one end thereof toward the other. The winding shaft 9 has, on both ends thereof, shafts 21. The shafts 21 are supported in a bearing hole 18 formed in the bearing 20a and in a bearing groove 19 formed in the bearing 20b, respectively.

[0041] Disposed on the inner side surface of the bearing groove 19 is a pair of opposite protrusions 19a configured to hold the shaft 21 in the bearing groove 19. The winding shaft 9 has, at the other end thereof, a hook 22 with which the upper end of the lift cord 6 is engaged. The lift cord 6, whose upper end is attached to the hook 22, runs on the outer peripheral surface of the winding shaft 9 and hangs down through a guide portion 23 disposed at one end of the support member 8.

[0042] When the winding shaft 9 is rotated in the lift cord winding direction, the lift cord 6 is wound around the winding shaft 9 in a spiral fashion from the major-diameter portion of the winding shaft 9 toward the minor-diameter portion thereof. Attached to the other end of the support member 8 is a pressing member 24 configured to immovably fix the support member 8 in the frame 1. The pressing member 24 is formed by bending a metal wire rod which becomes elastically deformed in a region where it can become deformed.

[0043] Specifically, the pressing member 24 is formed as follows: a rectangular locking portion 25 is formed by bending the middle portion of a single wire rod; and parallel portions 26a and 26b are formed by bending the wire rods extending from both sides of the locking portion 25 in positions adjacent to the locking portion 25 at a right angle in the same direction.

[0044] The interval between the parallel portions 26a and 26b is gradually increased from the bent positions to the middle positions of the parallel portions 26a and 26b. The end portions of the parallel portions 26a and 26b are bent at a right angle in directions in which the end portions go away from each other, forming rotational supports 27a and 27b.

[0045] The bearing 20b at the other end of the support member 8 has, at the upper edge thereof, support grooves 28a and 28b into which the rotational supports 27a and 27b can be elastically fitted. The bearing 20b has, on the external surface thereof, a rib 30 disposed along the aperture edge of the bearing groove 19. The rib 30 has, on the front and rear sides thereof, a pair of protrusions 31 which protrude in the front-back directions of the frame 1.

[0046] As shown in FIGS. 4 and 5, The protrusions 31 have, at the end portions thereof, slopes 29 oriented toward the outside of the support member 8. The bearing 20b has thereon an operation piece 32 which protrudes downward. When an uneven portion 33 disposed at the lower edge of the operation piece 32 is pressed in the direction of arrow A shown in FIG. 6, the lower edge of the operation piece 32 becomes deformed in the direction of arrow A. With the pressing member 24 attached to the

support grooves 28a and 28b, the operation piece 32 is located between the parallel portions 26a and 26b.

[0047] The support member 8 has thereon an elastic piece 34 which extends from the center in the length direction of the bottom surface of the support member 8 toward the operation piece 32. The elastic piece 34 has, at the front end thereof, a holding portion 35 which can hold the locking portion 25.

[0048] When the operation piece 32 becomes deformed in the direction of arrow A in a state shown in FIG. 6, the locking portion 25 of the pressing member 24 rotates in the direction of arrow A using the support grooves 28a and 28b as rotational support points. Thus, as shown in FIG. 3, the locking portion 25 is held by the holding portion 35.

[0049] When the elastic piece 34 is pressed upward, that is, in the direction of arrow B shown in FIG. 3, the front end thereof becomes deformed upward due to the elasticity of the synthetic resin. Thus, the locking portion 25 is detached from the holding portion 35.

[0050] By operating the operation piece 32, the pressing member 24, placed in a state shown in FIGS. 6 and 7, is rotated in the direction of arrow A and thus placed in a state shown in FIG. 3. Thus, the parallel portions 26a and 26b of the pressing member 24 run on the slopes 29 and then rest on the protrusions 31, thereby increasing the interval therebetween.

[0051] As shown in FIG. 4, the rotational supports 27a and 27b move in directions in which both go away from each other, that is, in directions of arrows C1 and C2. Thus, the end portions of the rotational supports 27a and 27b are pressed against inner side surfaces of the frame 1. As a result, the support member 8 is immovably fixed to the frame 1.

[0052] Next, the operation of the lift cord winding apparatus 5 thus configured will be described. To fix, to the desired position in the frame 1, the lift cord winding apparatus 5 housed in the frame 1 and having the drive shaft 10 passed through the winding shaft 9 thereof, the pressing member 24 is detached from the holding portion 35, as shown in FIG. 6.

[0053] In this state, as shown in FIG. 7, the end portions of the rotational supports 27a and 27b of the pressing member 24 are not pressed against the inner side surfaces of the frame 1. Accordingly, the support member 8 can be moved within the frame 1 in the length direction of the frame 1.

[0054] By moving the support member 8 to the desired position and then pressing the operation piece 32 in the direction of arrow A, the locking portion 25 of the pressing member 24 is engaged with the holding portion 35 of the elastic piece 34, as shown in FIG. 3. Thus, as shown in FIG. 4, the parallel portions 26a and 26b of the pressing member 24 runs on the slopes 29 and rest on the protrusions 31. The rotational supports 27a and 27b move in the directions of arrows C1 and C2, and the end portions thereof are pressed against upper portions of the inner side surfaces of the frame 1. Thus, the lift cord

winding apparatus 5 is immovably fixed in the frame 1.

[0055] On the other hand, by pushing the elastic piece 34 upward, that is, in the direction of arrow B with the lift cord winding apparatus 5 fixed in the frame 1, the locking portion 25 is detached from the holding portion 35. Thus, the pressing member 24 is rotated and thus placed in a state shown in FIG. 6, so that the press of the rotational supports 27a and 27b against the inner side surfaces of the frame 1 is released. Thus, the lift cord winding apparatus 5 can be moved in the frame 1.

[0056] The lift cord winding apparatus 5 thus configured can show the following effects.

(1) In a state in which the locking portion 25 of the pressing member 24 is not engaged with the holding portion 35 of the elastic piece 34, the position of the lift cord winding apparatus 5 in the frame 1 can be adjusted in the length direction of the frame 1.

(2) When the locking portion 25 of the pressing member 24 is engaged with the holding portion 35 of the elastic piece 34, the end portions of the rotational supports 27a and 27b are pressed against the inner side surfaces of the frame 1. Thus, the lift cord winding apparatus 5 can be fixed in the frame 1.

(3) The end portions of the rotational supports 27a and 27b can be pressed against the upper portions of the inner side surfaces of the frame 1. Since the frame 1 has the downward aperture, the dimensional accuracy of the interval between the upper portions of the inner side surfaces is easily maintained. Further, the pressing force is unlikely to cause plastic deformation. As a result, the lift cord winding apparatus 5 can be stably fixed in the frame 1.

(4) Since the end portions of the rotational supports 27a and 27b are pressed against the upper portions of the inner side surfaces of the frame 1 using the elasticity of the pressing member 24, the lift cord winding apparatus 5 can be fixed stably even when there is a slight difference in dimension between the inner side surfaces of the frame 1, as long as the protrusions 31 have sufficient heights.

(5) Since the pressing member 24 is formed of an elastic metal, the pressing force thereof does not easily decrease with time.

(6) By pressing the operation piece 32, which is exposed to the aperture of the frame 1, the locking portion 25 of the pressing member 24 can be engaged with the holding portion 35 of the elastic piece 34. As a result, the lift cord winding apparatus 5, which is housed in the frame 1, can be easily fixed without requiring a tool.

(7) By pushing up the elastic piece 34, which is exposed to the aperture of the frame 1, the locking portion 25 can be detached from the holding portion 35. As a result, the fixation of the lift cord winding apparatus 5, which is housed in the frame 1, can be easily released without requiring a tool.

[0057] The above embodiment may be carried out in the following mode.

·The above embodiment is applicable not only to lift cord winding apparatuses for roll-up curtains but also to cases where a lift cord winding apparatus for pleated curtains is fixed to a frame, cases where any component is fixed to a curtain rail, and other cases.

·While no guide roller is disposed between the guide portion 23 and the winding shaft 9 in the above embodiment, there may be disposed a guide roller which allows the lift cord 6 to smoothly move from the guide portion 23 to the winding shaft 9. A type of sunlight shielding apparatus which includes no winding shaft may employ a configuration in which a guide roller can be fixed to any position of the frame 1 in the length direction of the frame 1 using a support member and fixing means similar to those in the above embodiment. In such a case, the support member 8 is configured to be capable of supporting the guide roller.

One Embodiment of Second Aspect of Present Invention

[0058] Hereafter, one embodiment of the second aspect of the present invention will be described with reference to the drawings. In a roll-up curtain shown in FIG. 8, a curtain fabric 2 is suspended from and supported by a frame 1, and a bottom rail 4 is inserted in and supported by a bag-shaped portion 3 formed at the lower edge of the curtain fabric 2.

[0059] At least two lift cord winding apparatuses 5 are disposed in the frame 1, and lift cords 6 are suspended from and supported by the lift cord winding apparatuses 5. Attached to the lower edges of the lift cords 6 are hooks 7. The hooks 7 are also attached to the lower edge of the curtain fabric 2.

[0060] A winding shaft 9 of each lift cord winding apparatus 5 is rotatably supported by a support member 8, and the upper edge of the corresponding lift cord 6 is attached to the winding shaft 9. Due to rotation of the winding shaft 9, the lift cord 6 is wound around or unwound from the winding shaft 9.

[0061] A hexagonal bar-shaped drive shaft 10 is relatively unrotatably passed through the center of the winding shaft 9, and one end of the drive shaft 10 is fitted into the output shaft of an operation apparatus 11a mounted on one end of the frame 1.

[0062] A pulley 12 is rotatably supported in the operation apparatus 11a, and an endless ball chain 13 is engaged with the pulley 12. By operating the ball chain 13, the pulley 12 is rotated.

[0063] The operation apparatus 11a includes a torque limiter 14 and a clutch apparatus 15a. Rotation of the pulley 12 is transmitted to the drive shaft 10 through the torque limiter 14 and the clutch apparatus 15a.

[0064] The torque limiter 14 limits, to a given value or less, a rotational torque transmitted from the pulley 12 to

the clutch apparatus 15a. Thus, the ball chain 13, pulley 12, clutch apparatus 15a, or lift cord winding apparatus 5 is prevented from being broken due to an excessive rotational torque.

[0065] The clutch apparatus 15a transmits rotation of the pulley 12 caused by an operation of the ball chain 13 to the drive shaft 10. The clutch apparatus 15a also operates so that rotation of the drive shaft 10 is not transmitted to the pulley 12 when the curtain fabric 2 falls by self weight.

[0066] The frame 1 includes a stopper apparatus 16 through which the drive shaft 10 passes. If the drive shaft 10 is rotated in the pull-up direction of the curtain fabric 2 and subsequently the ball chain 13 is released, the stopper apparatus 16 prevents the drive shaft 10 from rotating in the fall direction of the curtain fabric, thereby preventing the curtain fabric 2 from falling by self weight.

[0067] If the drive shaft 10 is rotated slightly in the pull-up direction of the curtain fabric 2 with the self-weight fall of the curtain fabric 2 prevented and then the ball chain 13 is released, the operation of the stopper apparatus 16 is released, so that the curtain fabric 2 falls by self weight.

[0068] Next, the specific configuration of the operation apparatus 11a will be described with reference to FIGS. 9, 11, and 12. As shown in FIGS. 9 and 11, in the operation apparatus 11a, an intermediate plate 19 and a case cap 20 are mounted on the front end of a case 18. The case 18, the intermediate plate 19, and the case cap 20 are each axisymmetrically formed in the front-back direction of the roll-up curtain.

[0069] The pulley 12 is rotatably supported by a spindle 21 formed on the inner side surface of the case cap 20, and the torque limiter 14 is disposed inside the pulley 12. By operating the ball chain 13 to rotate the pulley 12, an output gear wheel 22 of the torque limiter 14 is by ordinary rotated.

[0070] The torque limiter 14 is configured not to transmit a rotational torque exceeding a predetermined value to the output gear wheel 22. If such a torque is applied to the pulley 12, the pulley 12 would turn free relative to the output gear wheel 22.

[0071] The output gear wheel 22 is engaged with a transmission gear wheel 23 which is rotatably supported by the intermediate plate 19. Accordingly, as the output gear wheel 22 rotates, the transmission gear wheel 23 also rotates. The case 18 has, on the base end surface thereof, a tube 24 which protrudes toward the frame 1 and houses the clutch apparatus 15a. An input shaft 25 of the clutch apparatus 15a is relatively unrotatably fitted into the center of the transmission gear wheel 23. An end of the drive shaft 10 is relatively unrotatably fitted into an output shaft 26 of the clutch apparatus 15a.

[0072] The clutch apparatus 15a transmits rotation of the transmission gear wheel 23 to the drive shaft 10, as well as operates so that the rotational torque applied to the drive shaft 10 by the lift cord winding apparatus 5 is not transmitted to the transmission gear wheel 23.

[0073] As shown in FIGS. 11 and 12, the tube 24 of

the case 18 can be inserted into the frame 1. By inserting the tube 24 into the frame 1 and then inserting a tapping screw 30 into a rib 29 disposed on an upper portion of the frame 1 through insertion holes 27 and 28 formed in upper portions of the case 18 and the intermediate plate 19, the case 18 is fixed to the frame 1.

[0074] The operation apparatus 11a is assembled as follows. First, the case 18 which is housing the clutch apparatus 15a, the intermediate plate 19, and the transmission gear wheel 23 is fixed to the frame 1. Then, the pulley 12 having the ball chain 13 hung thereon and the torque limiter 14 are mounted on the case cap 20, which is then fixed to the case 18 using a screw 35.

[0075] The tube 24 has, on both sides of the outer peripheral surface thereof, a flat surface 31 and also has, on both sides of a lower portion thereof, ribs 32 and 33 which extend downward. When the tube 24 is inserted into the frame 1, one of the flat surfaces 31 contacts a rear inner side surface of the frame 1, and the other contacts a rib 34 which protrudes horizontally from a front inner side surface of the frame 1.

[0076] The ribs 32 and 33 sandwich ribs 35 which protrude upward from both sides of an aperture of the frame 1. According to the above configuration, the tube 24 can be inserted into the frame 1 in such a manner to be circumferentially positioned.

[0077] While the operation apparatus 11a thus configured is an operation apparatus for right-side operation, which is mounted on the right end of the frame 1, the operation apparatus 11a can be used as an operation apparatus for left-side operation by replacing the clutch apparatus 15a of the operation apparatus 11a with a clutch apparatus for left-side operation.

[0078] FIG. 10 shows an operation apparatus 11b for left-side operation. Except for a clutch apparatus 15b, the operation apparatus 11b has a common configuration with the operation apparatus 11a for right-side operation. The direction of a rotational torque transmitted from the clutch apparatus 15b to the drive shaft 10 is opposite to that of the clutch apparatus 15a.

[0079] Since the tube 24 of the case 18 is axisymmetrically formed, it can also be inserted into the left end of the frame 1. The case 18 and the case cap 20 are also each axisymmetrically formed. That is, the operation apparatus 11b is similar to the operation apparatus 11a in terms of design.

[0080] Next, the operation of the roll-up curtain thus configured will be described. For the roll-up curtain for right-side operation shown in FIG. 8, for example, by pulling down the ball chain 13, which is hung from the pulley 12 toward the room, rotation of the pulley is transmitted to the drive shaft 10 through the clutch apparatus 15a, so that the lift cord 6 is wound around the lift cord winding apparatus 5, followed by pull-up of the curtain fabric 2.

[0081] If the curtain fabric 2 is pulled up to the desired height and then the ball chain 13 is released, the stopper apparatus 16 operates so that the curtain fabric 2 is prevented from falling by self-weight. Thus, the curtain fabric

2 is held at the desired height.

[0082] In this state, if the ball chain 13 is slightly pulled in the pull-up direction of the curtain fabric 2 and then released, the operation of the stopper apparatus 16 is released, so that the curtain fabric 2 falls by self-weight. At this time, the drive shaft 10 is rotated in the lift cord unwinding direction; however, the clutch apparatus 15a operates so that the rotation of the drive shaft 10 is prevented from being transmitted to the transmission gear wheel 23. As a result, the ball chain 13 is not rotated.

[0083] By replacing the clutch apparatus 15a of the operation apparatus 11a with the clutch apparatus 15b, an operation apparatus 11b for left-side operation is formed. By mounting the operation apparatus 12b on the left end of the frame 1 as shown in FIG. 13 and then pulling down the ball chain 13, which is hung from the pulley 12 toward the room, rotation of the pulley is transmitted to the drive shaft 10 through the clutch apparatus 15b, so that the lift cord 6 is wound around the lift cord winding apparatus 5, followed by pull-up of the curtain fabric 2.

[0084] If the curtain fabric 2 is pulled up to the desired height and then the ball chain 13 is released, the stopper apparatus 16 operates so that the curtain fabric 2 is prevented from falling by self-weight. Thus, the curtain fabric 2 is held at the desired height.

[0085] In this state, if the ball chain 13 is slightly pulled in the pull-up direction of the curtain fabric 2 and then released, the operation of the stopper apparatus 16 is released, so that the curtain fabric 2 falls by self-weight. At this time, the drive shaft 10 is rotated in the lift cord unwinding direction; however, the clutch apparatus 15b operates so that the rotation of the drive shaft 10 is prevented from being transmitted to the transmission gear wheel 23. As a result, the ball chain 13 is not rotated.

[0086] The roll-up curtain operation apparatuses 11a and 11b thus configured can show the following effects.

(1) When the curtain fabric 2 falls by self-weight, rotation of the ball chain 13 can be prevented.

(2) By using the clutch apparatus 15a, the operation apparatus 11a for right-side operation can be formed. Similarly, by using the clutch apparatus 15b, the operation apparatus 11b for left-side operation can be formed.

(3) The operation apparatuses 11a and 11b can use common components except for the clutch apparatuses 15a and 15b.

(4) In raising or lowering the curtain fabric, it is possible to operate the ball chain 13 in the same direction in any of the operation apparatuses 11a and 11b.

(5) Since the tube 24 of the case 18 and the tube 24-containing space of the frame 1 are each formed axisymmetrically in the front-back direction, the operation apparatuses 11a and 11b can use the case as a common component.

(6) Since the case 18 and the case cap 20 of each of the operation apparatuses 11a and 11b are each

formed axisymmetrically in the front-back direction of the roll-up curtain, it is possible to form the operation apparatuses 11a and 11b mounted on the frames 1 into similar shapes in terms of design.

[0087] The above embodiments may be carried out in the following mode. The operation apparatuses of the above embodiments are applicable to roll-up curtains, as well as pleated curtains, horizontal blinds, and the like.

DESCRIPTION OF NUMERALS

Numerals in Embodiment of First Aspect of Present Invention

[0088] 1: frame, 5: target member to be fixed (lift cord winding apparatus), 8: target member to be fixed (support member), 24: fixing means (pressing member), 26a, 26b: parallel portion, 28a, 28b: fixing means (support portion, support groove), 31: fixing means (pressing force generation means, protrusion), 32: operation piece, 34: releasing apparatus (elastic piece), 35: holding portion

Numerals in Embodiment of Second Aspect of Present Invention

[0089] 1: frame, 2: sunlight shielding material (curtain fabric), 10: drive shaft, 11a, 11b: operation apparatus, 12: pulley, 13: operation cord (ball chain), 15a, 15b: clutch apparatus, 18, 20: case, 22, 23: gear wheel (output gear wheel, transmission gear wheel), 24: tube

Claims

1. A sunlight shielding apparatus comprising:

a frame formed of a shaped material having an aperture;
a target member to be fixed that is supported in the frame in such a manner that the target member can move only in a length direction of the frame;
fixing means attached to the target member and configured to fix the target member to the frame, wherein
the fixing means comprises:

an elastic pressing member;
a support portion formed on the target member and configured to support the pressing member in such a manner that the pressing member can rotate between a fixed position and a fixation-released position of the target member; and
pressing force generation means formed on the target member and configured to press the pressing member against an upper por-

tion of an inner side surface of the frame at the fixed position.

2. The sunlight shielding apparatus of claim 1, wherein the target member is provided with an operation piece configured to guide the pressing member to the fixed position, and the operation piece is exposed to the aperture of the frame. 5
3. The sunlight shielding apparatus of claim 1 or 2, wherein the target member is provided with a holding portion configured to hold the pressing member at the fixed position. 10
4. The sunlight shielding apparatus of claim 3, wherein the target member is provided with a release apparatus configured to release an operation of the holding portion, and the release apparatus is exposed to the aperture. 20
5. The sunlight shielding apparatus of any one of claims 1 to 4, wherein the pressing member has parallel portions which are formed by bending a metal wire rod and extend in parallel, end portions of the parallel portions are bent toward the inner side surface of the frame, and the target member is provided with, as the pressing force generation means, a protrusion configured to increase an interval between the parallel portions at the fixed position to press the end portions of the parallel portions against the inner side surface of the frame. 25 30 35
6. The sunlight shielding apparatus of any one of claims 1 to 5, wherein the pressing member is formed of an elastic metal wire rod. 40
7. An operation apparatus for a sunlight shielding apparatus, wherein the operation apparatus is mounted on an end of a frame and rotationally drives one drive shaft in the frame on the basis of an operation of an operation cord either to pull up a sunlight shielding material suspended from and supported by the frame or to cause the sunlight shielding material to fall by self weight, the operation apparatus comprising: 45 50
 - a case configured to be mountable on both ends of the frame;
 - a pulley rotatably supported by the case and configured to rotate on the basis of an operation of the operation cord; and 55
 - a clutch apparatus configured to transmit rotation of the pulley to the drive shaft and not to transmit rotation of the drive shaft to the pulley

when the sunlight shielding material falls by self weight.

8. The operation apparatus of claim 7, wherein the case is provided with a tube configured to be fitted into an end of the frame, the frame is provided with containing space into which the tube can be inserted, and the tube and the containing space are each formed axisymmetrically with respect to the drive shaft in a front-back direction of the frame.
9. The operation apparatus of claim 7 or 8, wherein the case is formed axisymmetrically with respect to the drive shaft in a front-back direction of the frame. 15
10. The operation apparatus of claim 9, wherein the case contains the pulley, a gear wheel configured to transmit rotation of the pulley to the clutch apparatus, and the clutch apparatus, and the pulley, the gear wheel, and the clutch apparatus are each disposed axisymmetrically with respect to the drive shaft in the front-back direction of the frame. 20 25 30 35 40 45 50 55

FIG. 1

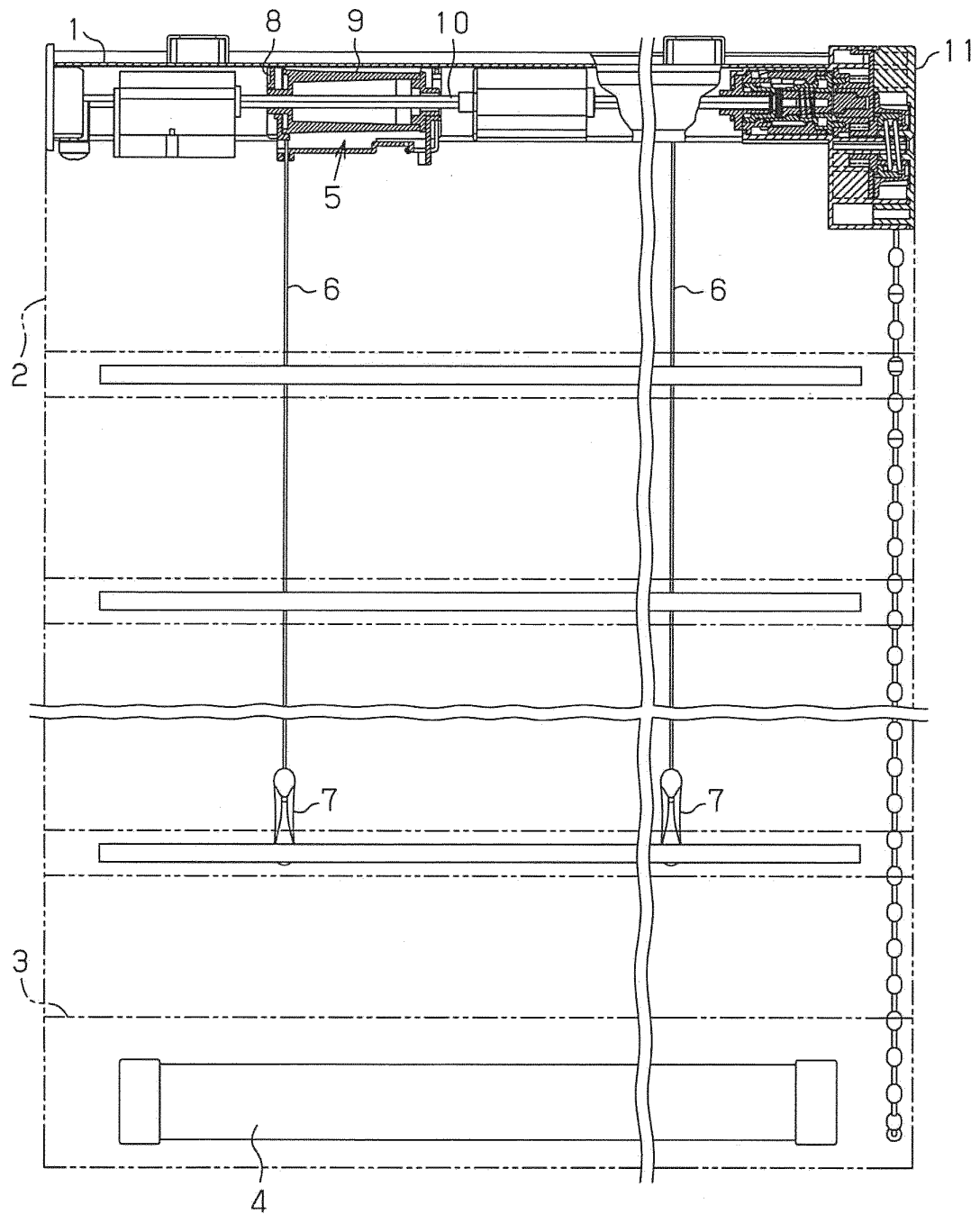


FIG. 2

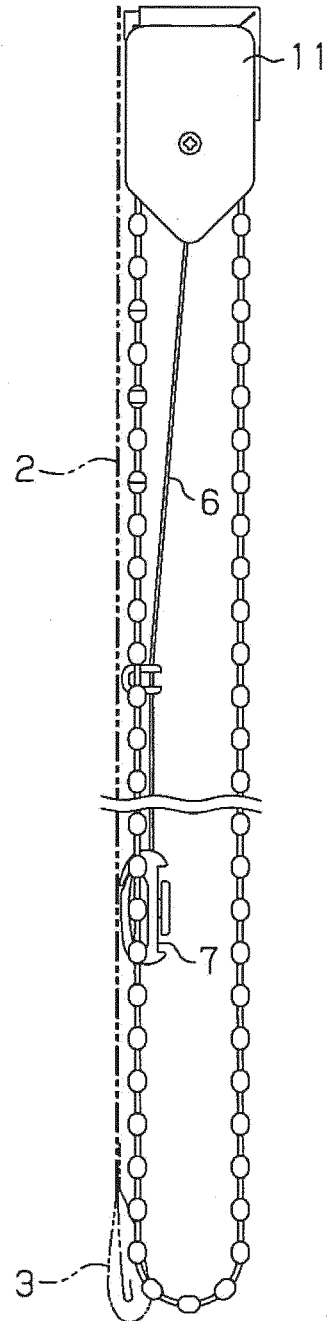


FIG. 3

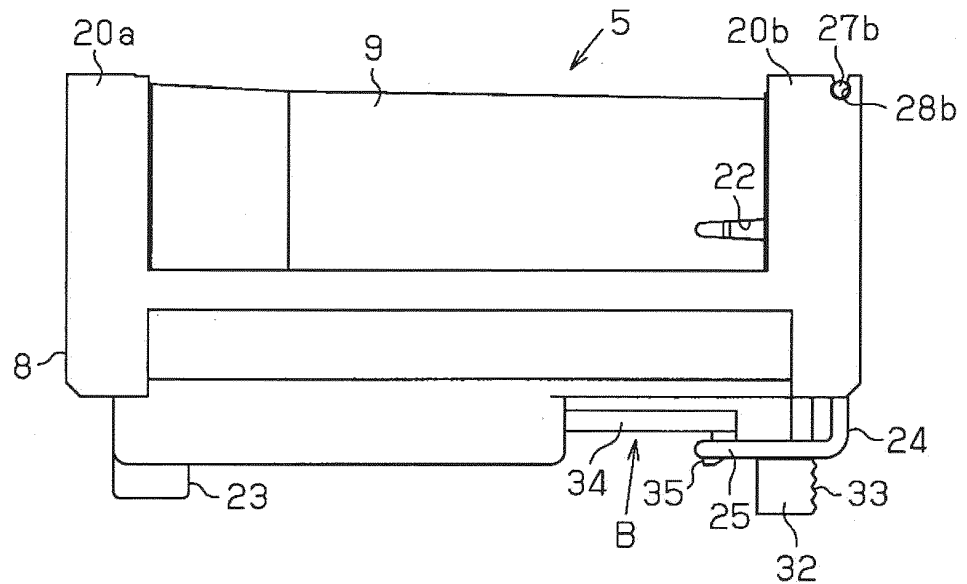


FIG. 4

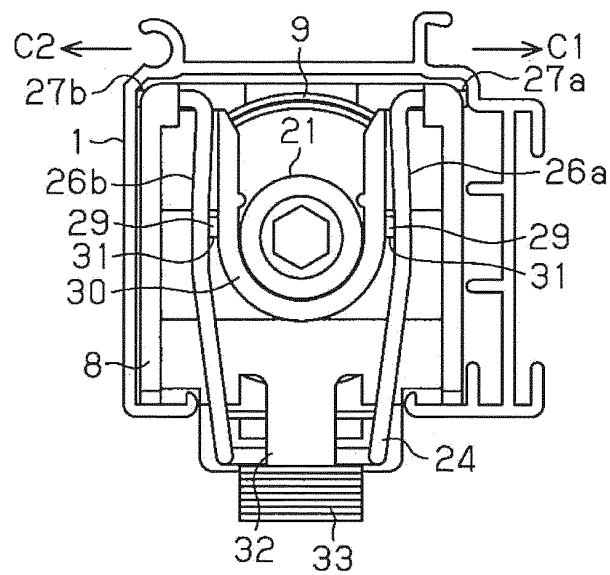


FIG. 5

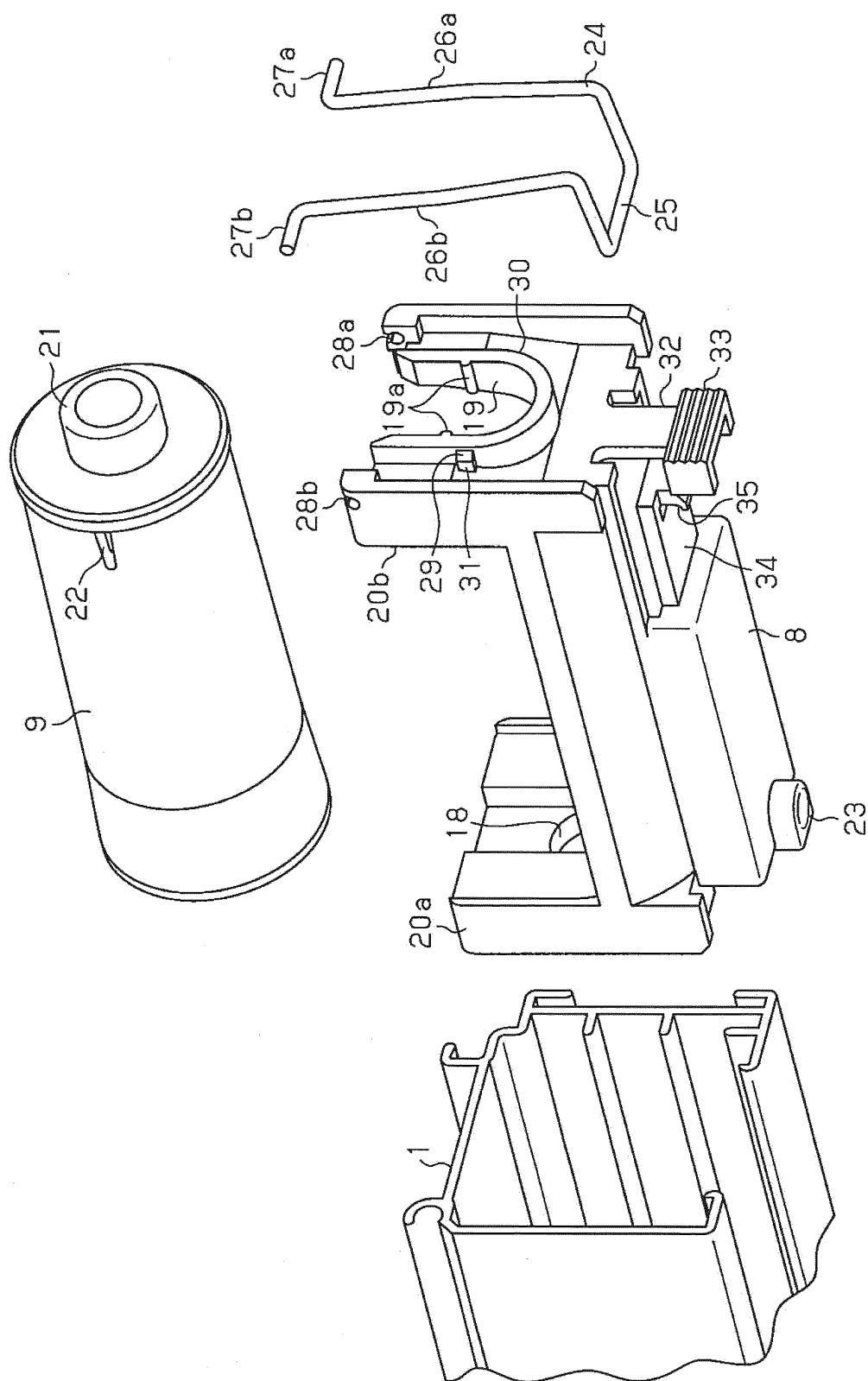


FIG. 6

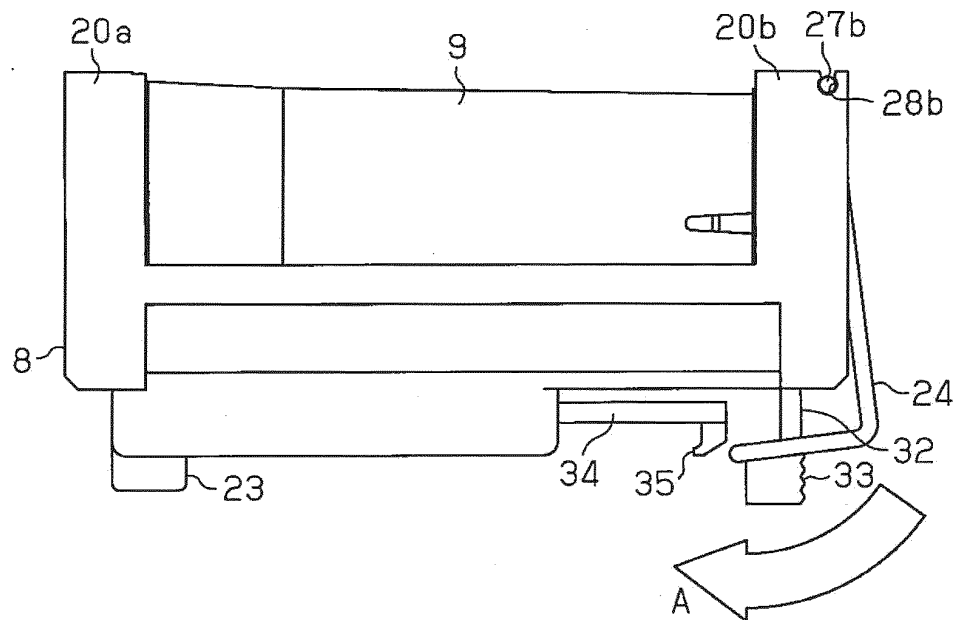


FIG. 7

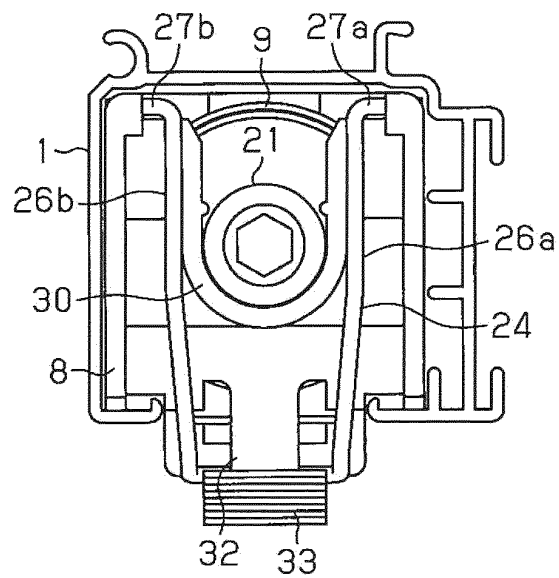


FIG. 8

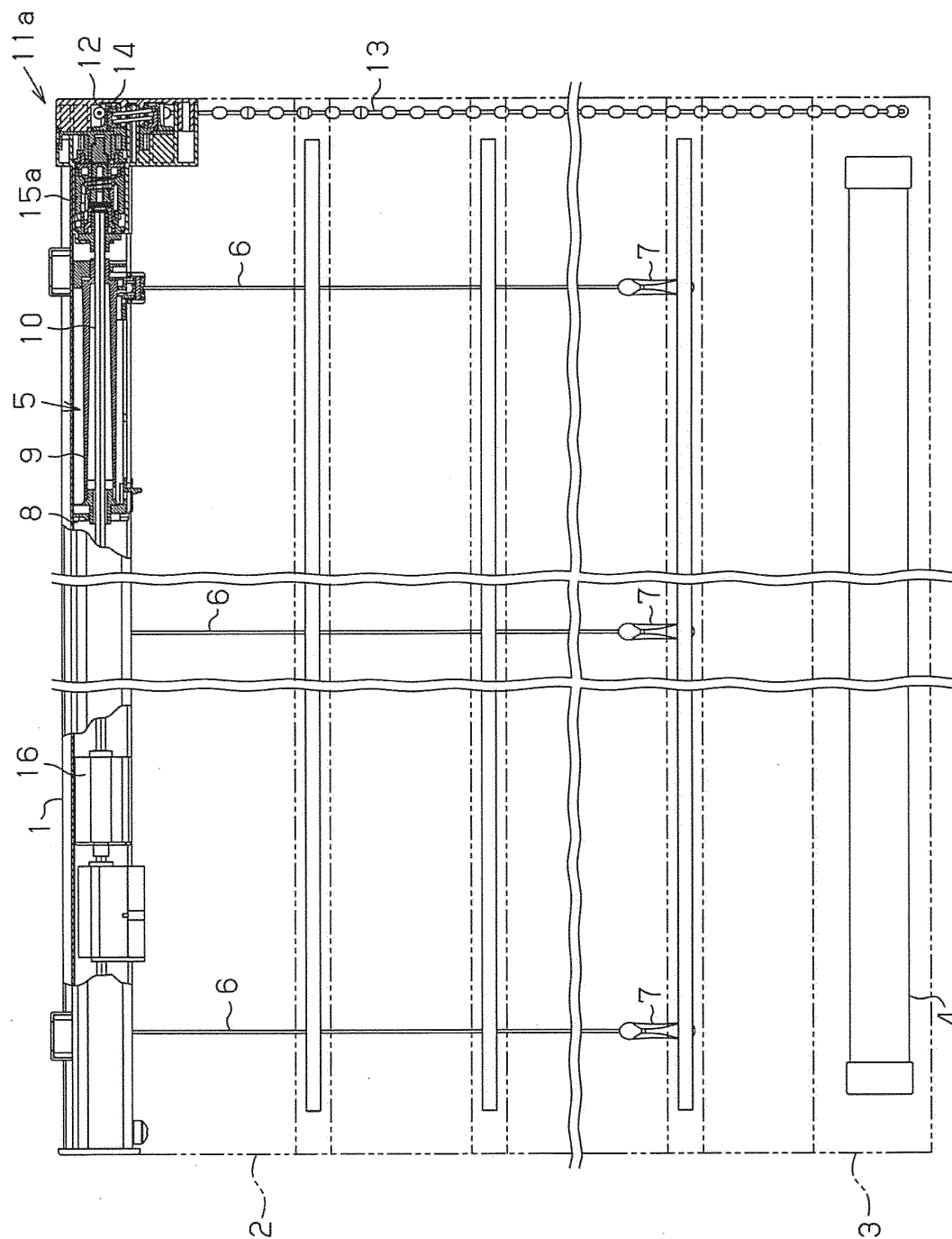


FIG. 9

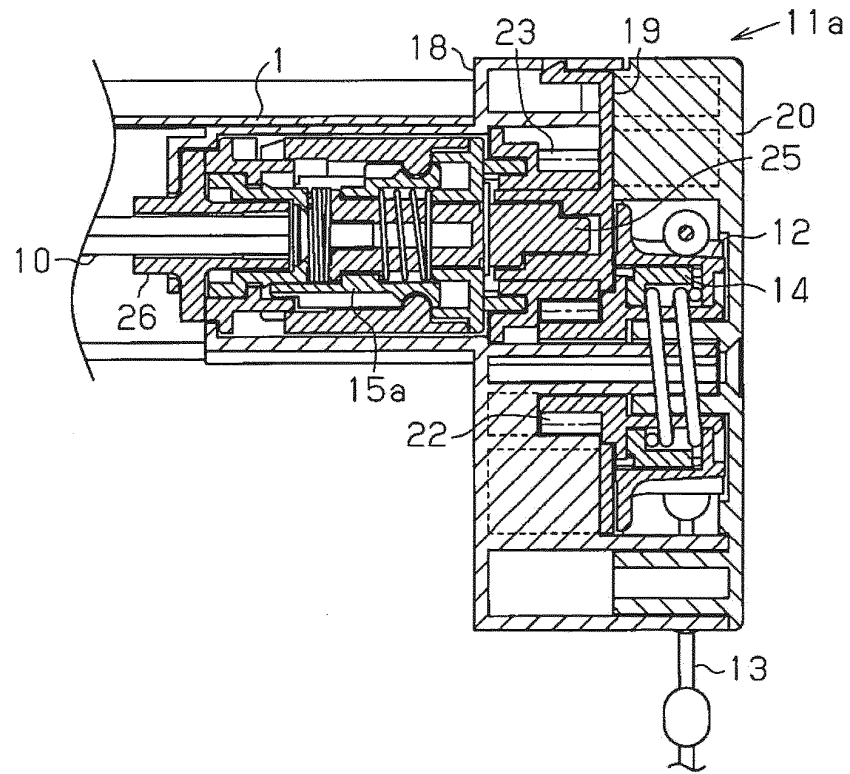


FIG. 10

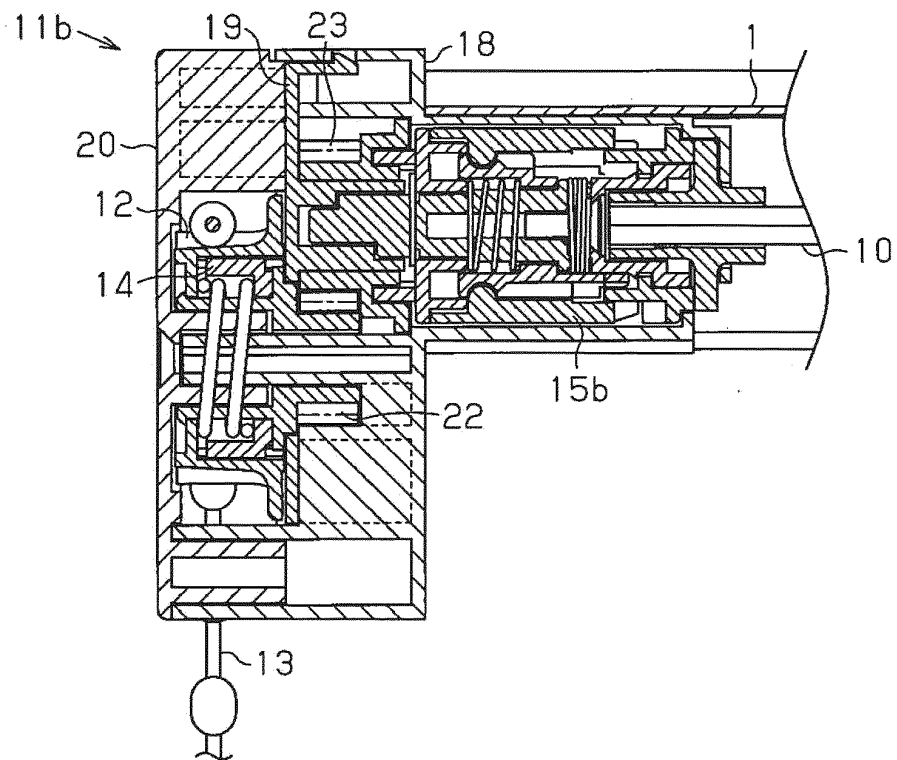


FIG. 11

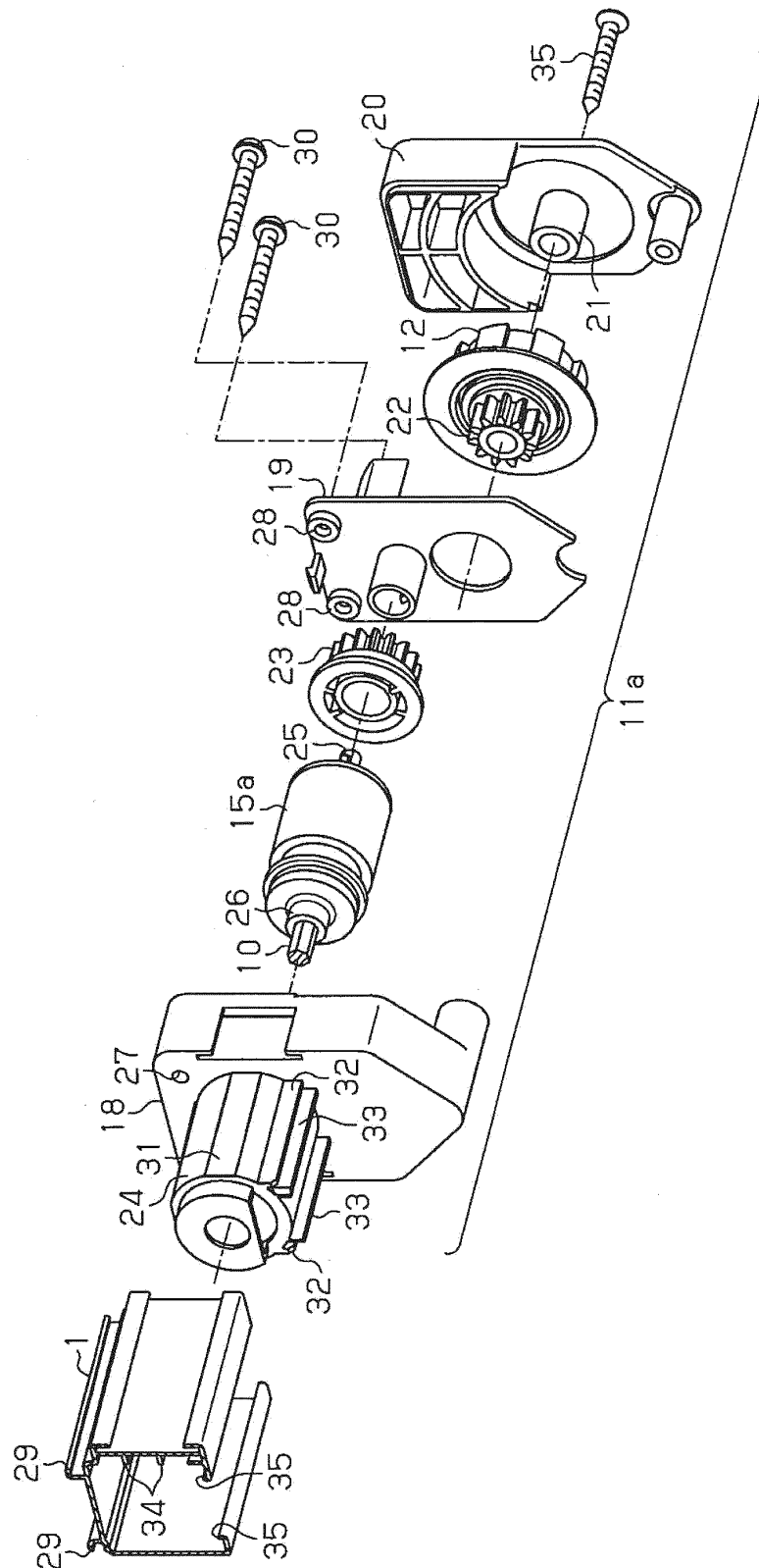


FIG. 12

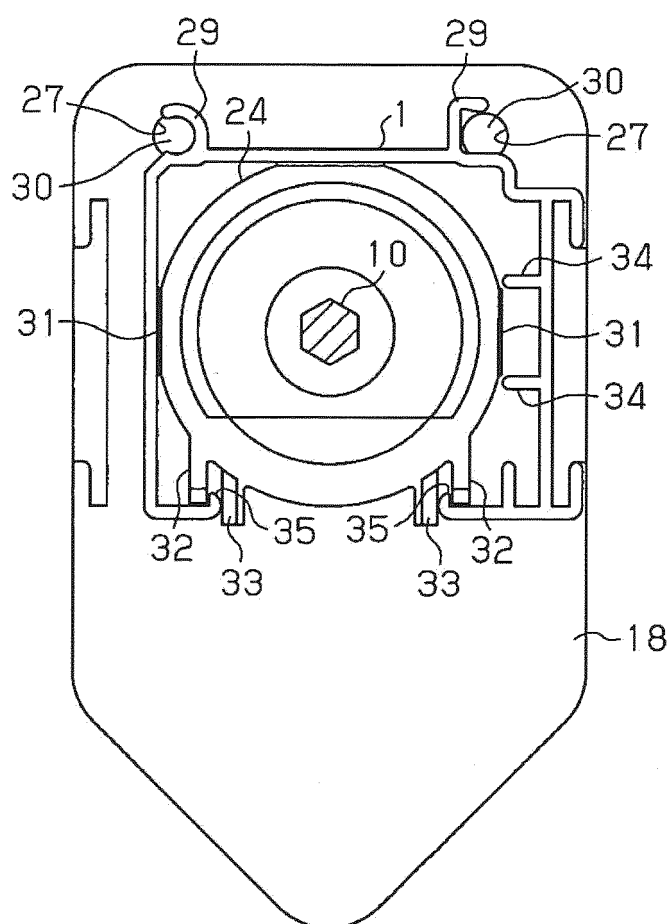
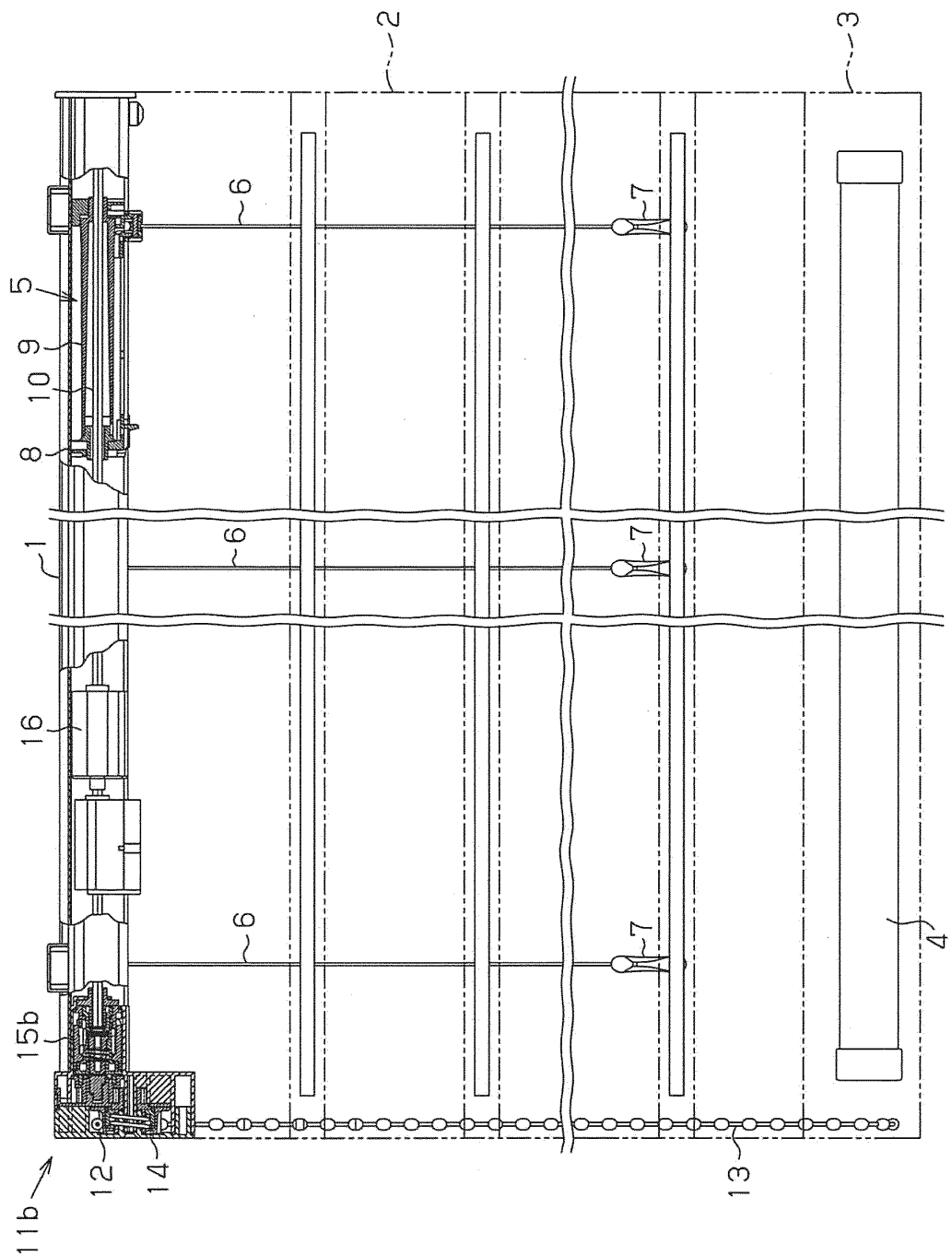


FIG. 13



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/059106

A. CLASSIFICATION OF SUBJECT MATTER A47H5/08 (2006.01) i, A47H5/02 (2006.01) i, E06B9/322 (2006.01) i, E06B9/323 (2006.01) i According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A47H5/08, A47H5/02, E06B9/322, E06B9/323 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012 Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012 Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2010-5314 A (Tachikawa Corp.), 14 January 2010 (14.01.2010), entire text; all drawings (Family: none)	1-6
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 25118/1985 (Laid-open No. 140099/1986) (Tachikawa Corp.), 30 August 1986 (30.08.1986), entire text; all drawings (Family: none)	1-6
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 13 June, 2012 (13.06.12)		Date of mailing of the international search report 26 June, 2012 (26.06.12)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/059106

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- (Invention 1) the inventions of claims 1-6
(Invention 2) the inventions of claims 7-10

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-6

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2010005314 A [0010]
- JP 2010255386 A [0010]
- JP 2994552 B [0010]
- JP 3273007 B [0010]