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(54) OPENING ACTION SUPPORTING DEVICE AND OPENING SECTION DEVICE

ÖFFNUNGSAKTIONSUNTERSTÜTZUNGSVORRICHTUNG UND
ÖFFNUNGSABSCHNITTVORRICHTUNG

DISPOSITIF DE SUPPORT D'ACTION D'OUVERTURE ET DISPOSITIF DE SECTION
D'OUVERTURE

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EP 3 540 162 B1

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an opening action supporting device that supports the opening action of a door body, and relates to an opening section device that includes the opening action supporting device.

2. Description of the Related Art

[0002] There are times when a large force is required for opening a large-size door body or a heavy door body from its closed state. In JP 2017-44044 A, a configuration is disclosed that includes an opening action supporting mechanism which, when an operation handle disposed in a vertical stile of a sliding door is turned, simultaneously kicks the sliding door against the frame member and relieves the force required for opening the sliding door.

[0003] In the configuration disclosed in JP 2017-44044 A, the action of the kicking member for projecting from the vertical stile of the sliding door to press the frame member is completely in conjunction with the action of the operation handle. In that regard, a mechanism is installed which, at the time of opening the sliding door, turns the operation handle in the opening direction and projects the kicking member, and then turns the operation handle in the opposite direction and retracts the kicking member; so that a situation is avoided in which the kicking member is retained at the kicking position. Hence, in this configuration, after turning the operation handle and kicking the sliding door with the kicking member, the user needs to take off the hand from the operation handle and wait for the turning of the operation handle in the opposite direction before opening the sliding door, thereby making the opening operation cumbersome. Besides, the operation handle needs to be designed on the premise of installation of an opening action supporting mechanism, thereby making the operation handle and the opening action supporting mechanism dedicated for each other and consequently leading to a decline in the general versatility.

[0004] The present invention is made in view of the issues faced in the conventional technology, and it is an object to provide an opening action supporting device that enables achieving enhancement in the operability and achieving enhancement in the general versatility of an operation mechanism and an opening action supporting mechanism, and to provide an opening section device that includes the opening action supporting device.

SUMMARY OF THE INVENTION

[0005] An opening action supporting device according to the present invention includes an opening action supporting mechanism including a kicking member that is

projectable and retractable from an outer face of a door body, the opening action supporting mechanism being configured to press a frame member supporting the door body that is openable and closable with respect to the frame member, by using the kicking member, to kick the door body against the frame member at time of opening the door body. An operation mechanism providable in the door body is linked to the opening action supporting mechanism via an interlocking member so that, when the operation mechanism is operated, the opening action supporting mechanism operates. The opening action supporting device according to the invention is characterized in that it includes a clutch mechanism configured to connect the interlocking member to the opening action supporting mechanism, and the clutch mechanism is configured to: connect the interlocking member, which moves in one direction when the operation mechanism is operated to a predetermined operating position in an opening direction, to the opening action supporting mechanism to transmit movement of the interlocking member to the opening action supporting mechanism to move the kicking member from a housing position at which the kicking member is retracted inside the door body to a kicking position at which the kicking member is projected outside the door body; and disconnect the interlocking member, which further moves in the one direction when the operation mechanism is further operated from the predetermined operating position in the opening direction, from the opening action supporting mechanism not to transmit movement of the interlocking member to the kicking member.

[0006] An opening section device includes: the opening action supporting device according to the invention including the above-described configuration; the door body that is supported by the frame member to be openable and closable with respect to the frame member and that is provided with the opening action supporting device; the operation mechanism that includes an operating unit exposed on an outer face of the door body; and the interlocking member that is movably supported inside the door body.

[0007] According to such a configuration, at the time of opening the door body, the user only has to operate the operation mechanism to the maximum operation position beyond a predetermined operation position, so that the clutch mechanism changes from the connected state to the disconnected state, and the locking member can be housed after the door body has been kicked. Hence, after the door body is kicked using the kicking member, the user can open the door body using the operation mechanism that has been operated to the maximum operation position, thereby enabling achieving a high degree of operability. Moreover, in the opening action supporting device, as a result of including the clutch mechanism, the separately-designed opening action supporting mechanism can be easily combined with the operation mechanism and the interlocking member. For that reason, the operation mechanism need not be configured

on the premise of installation of the opening action supporting mechanism. Hence, depending on the specifications of the opening section device, it becomes possible to install a plurality of opening action supporting mechanisms or it becomes possible to select the presence or absence of opening action supporting mechanisms using the same operation mechanism and the same interlocking member. That enables achieving a high degree of general versatility.

[0008] In the opening action supporting device according to the present invention, the clutch mechanism can include a unidirectional transmission structure that disconnects the interlocking member, which moves in another direction that is an opposite direction of the one direction when the operation mechanism is operated in a closing direction, from the opening action supporting mechanism. As a result, at the time of closing the door, the opening action supporting mechanism is prevented from operating in conjunction with the operation of the operation mechanism in the closing direction, and the housing position of the kicking member is reliably maintained so that interference of the kicking member in the closing action of the door body is avoided.

[0009] In the opening action supporting device according to the present invention, the opening action supporting mechanism can include a first elastic member configured to bias the kicking member in a direction in which the kicking member moves from the kicking position to the housing position. In a state where the interlocking member that moves in the one direction is connected to the opening action supporting mechanism by the clutch mechanism, the kicking member can move to the kicking position against biasing force of the first elastic member, and in a state where the interlocking member that moves in the other direction that is an opposite direction of the one direction is disconnected from the opening action supporting mechanism by the clutch mechanism, the kicking member can move to the housing position due to biasing force of the first elastic member. As a result, after having kicked the door body, the kicking member can be reliably moved to the housing position using the biasing force of the first elastic member.

[0010] In the opening action supporting device according to the present invention, the clutch mechanism can include a pin member that is provided in the kicking member, a driving member that is turnably supported by the interlocking member, that has a driving face enabling pressing of the pin member when the interlocking member is moving in the one direction, and that has a flank face that makes sliding contact with the pin member when the interlocking member is moving in the other direction that is an opposite direction of the one direction, a second elastic member configured to bias the driving member using the driving face to a turning position at which the pin member is pressable, and a guiding hole that includes a first guiding portion that moves the pin member along a direction of movement of the interlocking member, that includes a second guiding portion that is continuous from

the first guiding portion and that moves the pin member in an intersecting direction from a guiding direction guided by the first guiding portion, and into which the pin member is movably inserted, when the operation mechanism is operated to the predetermined position in the opening direction, as a result of pressing of the pin member by the driving face of the driving member, the opening action supporting mechanism can move the kicking member toward the kicking position while the pin member is being guided by the first guiding portion, and when the pin member moves from the first guiding portion into the second guiding portion and proceeds to a predetermined position in the second guiding portion, the pin member can move away from the driving face and thus the interlocking member and the opening action supporting mechanism are disconnected from each other to allow the kicking member to move from the kicking position to the housing position. As a result, the clutch mechanism can be configured with a simple configuration using the pin member and the guiding holes, and the structure of the opening action supporting device can be simplified. Moreover, by varying the angle, the length, and the arrangement of the first guiding portion and the tilted second guiding portion, replacing the member having the first guiding portion and the second guiding portion enables kicking at an arbitrary operation position. That enables achieving a high degree of general versatility at low cost.

[0011] In the opening action supporting device according to the present invention, the kicking member can include a first arm one end portion of which is rotatably positioned and supported with respect to the door body, a second arm one end portion of which is rotatably linked to another end portion of the first arm and another end portion of which is provided with the pin member, and a roller that is provided in a linking portion for linking the first arm and the second arm, and when the pin member is pressed by the driving face of the driving member, the first arm and the second arm are folded with the linking portion serving as fulcrum, so that the roller protrudes from the door body to press the frame member. As a result, while simplifying the configuration of the kicking member, the kicking member can be made to project and retract in a smooth manner due to the movement of the interlocking member based on the operation of the operation mechanism.

[0012] The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a profile diagram of an opening section de-

vice, which includes an opening action supporting device according to an embodiment of the present invention, when viewed from inside the room;

FIG. 2 is a perspective view, when viewed from inside the room, of the state in which a sliding door of the opening section device is open;

FIG. 3(A) is an enlarged main-part cross-sectional view illustrating the state of each mechanism when an operation handle is at a 0° position and the sliding door is locked, and FIG. 3(B) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to a 145° position in the opening direction from the state illustrated in FIG. 3(A);

FIG. 4(A) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to a 180° position in the opening direction from the state illustrated in FIG. 3(B), and FIG. 4(B) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to an 89° position in the closing direction from the state illustrated in FIG. 4(A);

FIG. 5(A) is an enlarged main-part cross-sectional view illustrating the state of each mechanism when the operation handle is at the 0° position and the sliding door is locked, and FIG. 5(B) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to the 89° position in the opening direction from the state illustrated in FIG. 5(A);

FIG. 6(A) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to the 145° position in the opening direction from the state illustrated in FIG. 5(B), and FIG. 6(B) is an enlarged main-part cross-sectional view illustrating the state in which a clutch mechanism is disconnected in the state illustrated in FIG. 6(A);

FIG. 7(A) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to the 180° position in the opening direction from the state illustrated in FIG. 6(B), and FIG. 7(B) is an enlarged main-part cross-sectional view illustrating the state in which the sliding door is closed from the state illustrated in FIG. 7(A);

FIG. 8(A) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to a 90° position in the closing direction from the state illustrated in FIG. 7(B), and FIG. 8(B) is an enlarged main-part cross-sectional view illustrating the state in which the operation handle is turned to an 86° position in the closing direction from the state illustrated in FIG. 8(A); and

FIG. 9 is an exploded perspective view of an opening action supporting mechanism and the clutch mechanism.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] An exemplary embodiment of an opening action supporting device according to the present invention is described below in detail by describing an opening section device, which includes the opening action supporting device, with reference to the accompanying drawings.

[0015] FIG. 1 is a profile diagram of an opening section device 11, which includes an opening action supporting device 10 according to the embodiment of the present invention, when viewed from inside the room. FIG. 2 is a perspective view, when viewed from inside the room, of the state in which a sliding door 12 of the opening section device 11 is open. As illustrated in FIGS. 1 and 2, the opening section device 11 is a fitting that is a single-sliding-door in which the sliding door 12 and a fixed door 16 are supported by a frame member 14.

[0016] The frame member 14 is a rectangular frame having an upper frame 14a, a lower frame 14b, a left-side vertical frame 14c, and a right-side vertical frame 14d; and has a rectangular opening section 14e formed on the inside. The frames 14a to 14d are extruded sections made of, for example, work timber used in fittings, or a metal such as aluminum, or resin. The frame member 14 is fixed to an opening section provided in a building skeleton.

[0017] In the application concerned, the room inside-outside direction of the opening section device 11, that is, the direction from the inside of the room toward the outside of the room or the opposite direction is called as a depth direction (in the drawings, the direction indicated by an arrow Y); and the face extending along the depth direction is called as a depth face. The orthogonal direction to the depth direction is a width direction. In the case of the vertical frame 14c that is elongated in the vertical direction, the horizontal direction that is orthogonal to the longitudinal direction of the vertical frame 14c (in the drawings, the direction indicated by an arrow X) represents the width direction. In the case of the upper frame 14a that is elongated in the horizontal direction, the vertical direction that is orthogonal to the longitudinal direction of the upper frame 14a (in the drawings, the direction indicated by an arrow Z) represents the width direction. The face extending along the width direction is called as a width face. Meanwhile, the inside (inner periphery) of the frame-shaped member implies, for example, the inner side of the frame member 14; and the outside (outer periphery) of the frame-shaped member implies, for example, the outer side of the frame member 14 that is fixed to the building skeleton.

[0018] The fixed door 16 is a rectangular stile having an upper stile 16a, a lower stile 16b, a left-side vertical stile 16c, and a right-side vertical stile 16d; and holds a face bar 18 on the inside. Of the fixed door 16, the upper stile 16a is fixed to the depth face of the upper frame 14a, and the lower stile 16b is fixed to the depth face of the lower frame 14b. Moreover, the vertical stile 16c is fixed

to the depth face of the vertical frame 14c of the frame member. As a result, the fixed door 16 blocks approximately the left half of the opening section 14e of the frame member 14. The face bar 18 is made of, for example, a glass plate, a resin plate, or a wooden plate.

[0019] The sliding door (door body) 12 is a rectangular stile having an upper stile 12a, a lower stile 12b, a left-side vertical stile 12c, and a right-side vertical stile 12d; and holds a face bar 20 on the inside. The sliding door 12 is slidably supported along the longitudinal direction of the lower frame 14b and in between the upper frame 14a and the lower frame 14b. As a result, the sliding door 12 is openable and closable with respect to the area in approximately the right half of the opening section 14e of the frame member 14. The face bar 20 is made of, for example, a glass plate, or a resin plate, or a wooden plate.

[0020] In the vertical stile 12d representing a stile on a leading end side of the sliding door 12; a lock mechanism 22, an operation mechanism 24, and the opening action supporting device 10 are disposed. The opening action supporting device 10 includes an opening action supporting mechanism 26, which is embedded in a casing 25, and a clutch mechanism 28 (see FIG. 3). The casing 25 is fixed to the vertical stile 12d using a screw 27.

[0021] The lock mechanism 22 is a mechanism for locking and unlocking the sliding door 12 with respect to the frame member 14. The opening action supporting mechanism 26 is a mechanism that, at the time of opening the sliding door 12 from the closed position, kicks the sliding door 12 out from the frame member 14 so as to relieve the force required in opening the sliding door 12. The operation mechanism 24 is a mechanism that includes an operation handle 29 representing an operating unit exposed from the outside face of the sliding door 12; that enables locking an unlocking of the lock mechanism 22 as a result of the turning actions of the operation handle 29; and that is used to operate the opening action supporting mechanism 26. The clutch mechanism 28 is a mechanism for connecting the interlocked state between the operation mechanism 24 and the opening action supporting mechanism 26.

[0022] FIG. 3(A) is an enlarged main-part cross-sectional view illustrating the state of the mechanisms 22, 24, and 26 when the operation handle 29 is at a 0° position and the sliding door 12 is locked. In FIGS. 3(B) and 4(A) are illustrated states attained when the operation handle 29 is turned by respective turning angles (to a 145° position and a 180° position) in the opening direction from the state illustrated in FIG. 3(A). In FIG. 4(B) is illustrated the state attained when the operation handle 29 is turned to an 89° position in the closing direction from the state illustrated in FIG. 4(A). In the present embodiment, when the mechanisms 22, 24, and 26 are viewed from the inside of the room as illustrated in FIGS. 3 and 4; the position at which the operation handle 29 is oriented vertically upward represents the 0° position, and the position at which the operation handle is oriented vertically downward represents the 180° position. Moreover, the direc-

tion of turning the operation handle 29 in the counterclockwise direction represents the operation direction (opening direction) at the time of opening the closed sliding door 12, and the direction of turning the operation handle 29 in the clockwise direction represents the operation direction (closing direction) at the time of closing the open sliding door 12. However, the angular position of the operation handle 29 as well as the turning direction and the turning range of the operation handle 29 at the time of opening and closing the sliding door 12 as explained herein is only exemplary, and can be appropriately varied.

[0023] As illustrated in FIGS. 3 and 4, the operation mechanism 24 includes the operation handle 29 and an intermediate actuator 30. Regarding the actions of the operation mechanism 24, a turning movement is converted into a linear movement by the intermediate actuator 30, and the linear movement is then transmitted to the lock mechanism 22 and the opening action supporting mechanism 26 via a slidable interlocking member 32 (described later) that is embedded in the casing 25.

[0024] The operation handle 29 is a substantially L-shaped handle (see FIG. 2) that is disposed in a turnable manner with respect to a mount 35 which is fixed to a room-side width face 34 of the vertical stile 12d. The operation handle 29 has a handle shaft 29a protruding in the depth direction from the mounting face with respect to the mount 35. The handle shaft 29a is a prismatic member that is inserted through the mount 35 in a rotatable manner and is then non-rotatably fit with a cam member 36. In the present embodiment, the operation handle 29 can be turned in the opening direction from the 0° position illustrated in FIG. 3(A) to the 180° position illustrated in FIG. 4(A) in the counterclockwise direction with reference to the drawings, and can be turned in the closing direction from the 180° position illustrated in FIG. 4(A) to the 0° position illustrated in FIG. 3(A) in the clockwise direction with reference to the drawings.

[0025] The intermediate actuator 30 is fixed to the casing 25, and the room-side face of the intermediate actuator 30 facing the mount 35 has the cam member 36 rotatably supported thereon. The cam member 36 is a substantially elliptical disk capable of performing coaxial rotation with the handle shaft 29a, and has a link shaft 36a that projects at an eccentric position from the shaft center of the handle shaft 29a. The link shaft 36a rotatably supports the lower end portion of a link arm 31. When the operation handle 29 is turned, the cam member 36 rotates along with the handle shaft 29a. As a result, the link shaft 36a swings around the handle shaft 29a and moves the link arm 31 in the vertical direction.

[0026] The link arm 31 is a substantially boomerang-shaped plate disposed along the vertical direction. The link arm 31 has the lower end portion rotatably linked to the link shaft 36a, and has the upper end portion rotatably linked to a connecting shaft 38a that is a rotating shaft disposed in a linking member 38 constituting the interlocking member 32.

[0027] As illustrated in FIGS. 3 and 4, the interlocking member 32 includes the linking member 38, an interlocking lever 40, and a coupling member 41; and is disposed inside the vertical stile 12d to slide in the vertical direction.

[0028] The linking member 38 is a plate member extending in the vertical direction, and is disposed inside the vertical stile 12d in a slidable manner with respect to the vertical stile 12d. To the linking member 38, the actions of the operation mechanism 24 (the operation handle 29) are transmitted via the cam member 36 and the link arm 31. The linking member 38 includes an upper linking portion 38b at the upper end portion, a lower linking portion 38c at the lower end portion, and a base portion 38d that joins the upper linking portion 38b and the lower linking portion 38c. The upper linking portion 38b and the lower linking portion 38c are linked to the interlocking lever 40 using a clip 39. The base portion 38d includes the connecting shaft 38a and has a plurality of long holes 38e formed therein. The connecting shaft 38a protrudes from the surface on the side of the mount 35, and is shaft-supported at the upper end portion of the link arm 31. There are, for example, three long holes 38e formed in the vertical direction, and a guide pin 30b protruding from a guide face member 30a of the intermediate actuator 30 is slidably inserted in each long hole 38e. Since the long holes 38e are guided by the guide pins 30b, the vertical sliding of the linking member 38 (and the intermediate actuator 30) with respect to the vertical stile 12d is guided.

[0029] The interlocking lever 40 is supported inside the vertical stile 12d in a vertically slidable manner with respect to the vertical stile 12d, and is formed as a section having a substantially H-shaped cross-section extending along the entire length of the vertical stile 12d (see FIG. 9). The interlocking member 32 is so configured that the linking member 38 and the coupling member 41 are linked to holes or notches formed at various positions of the interlocking lever 40.

[0030] The coupling member 41 is a rod member extending in the vertical direction and is fixed to the interlocking lever 40 (see FIG. 9). Although described later in detail, the coupling member 41 is a constituent element of the opening action supporting mechanism 26 and the clutch mechanism 28.

[0031] The interlocking member 32 slides upward along with the link arm 31 that moves up in response to the turning of the operation handle 29 in the opening direction; and slides downward along with the link arm 31 that moves down in response to the turning of the operation handle 29 in the closing direction (see FIGS. 3 and 4).

[0032] As illustrated in FIGS. 3 and 4, the lock mechanism 22 includes a drawing member 42 and a lock pin 44. In FIGS. 3 and 4 is illustrated the configuration in which the lock mechanism 22 is disposed only on the lower side of the operation mechanism 24. However, the lock mechanism 22 can be disposed at a plurality of positions along the longitudinal direction of the vertical stile

12d, including a position on the upper side of the opening action supporting mechanism 26 (see FIG. 5). The lock mechanisms 22 perform concurrent actions via the interlocking lever 40 that moves up and down in response to the turning of the operation handle 29.

[0033] The drawing member 42 is a plate member extending in the vertical direction, and is fixed to the interlocking lever 40. The drawing member 42 includes a drawing piece 42a that stands upright along the depth direction; a supporting piece 42b that is disposed on the lower side of the drawing piece 42a, the supporting piece 42b facing the drawing piece 42a with a gap between the supporting piece 42b and the drawing piece 42a; and a lock opening 42c that is formed in between the drawing piece 42a and the supporting piece 42b. The drawing piece 42a is a plate piece that is tilted from the lower end constituting the lock opening 42c toward the upper end and in the direction of gradually moving away from an outside depth face 46 of the vertical stile 12d, and that then extends in the vertically upward direction. The supporting piece 42b is a plate piece formed to have vertical symmetry with the drawing piece 42a. The lock opening 42c has a substantially tapering cross-section that gradually increases in the vertical opening width along the direction of moving away from the outside depth face 46 of the vertical stile 12d, that is, along the direction of moving away from the lock pin 44.

[0034] The lock pin 44 is a pin protruding toward the inside of the frame from an inside depth face 47 of the vertical frame 14d facing the vertical stile 12d (see FIGS. 1 and 5), and includes a head portion 44a having an expanded diameter at the leading end. In the drawings, a mounting plate 44b represents a mounting plate for fixing the lock pin 44 to the inside depth face 47. The head portion 44a of the lock pin 44 enters the lock opening 42c and fits in the drawing piece 42a, so that a lock is put in between the vertical stile 12d and the vertical frame 14d, that is, in between the sliding door 12 and the frame member 14.

[0035] As illustrated in FIGS. 3 and 4, the opening action supporting mechanism 26 includes a kicking member 48. Although described later in detail, the kicking member 48 projects from the outside depth face 46 of the vertical stile 12d accompanying the movement of the interlocking member 32. During the opening action of the sliding door 12, the kicking member 48 presses the inside depth face 47 of the vertical frame 14d, so as to support the opening of the sliding door 12. The clutch mechanism 28 is present in between the opening action supporting mechanism 26 and the interlocking member 32. According to the angular position and the turning direction of the operation handle 29, that is, according to the sliding position and the sliding direction of the interlocking member 32; the clutch mechanism 28 connects or disconnects the interlocked state between the interlocking member 32 and the kicking member 48.

[0036] Given below is the explanation of a specific configuration of the opening action supporting device 10.

[0037] FIG. 5(A) is an enlarged main-part cross-sectional view illustrating the state of the mechanisms 22, 26, and 28 when the operation handle 29 is at the 0° position and the sliding door 12 is locked. In FIG. 5(B) and FIG. 6(A) are illustrated states attained when the operation handle 29 is turned by respective turning angles (to the 89° position and the 145° position) in the opening direction from the state illustrated in FIG. 5(A). In FIG. 6(B) is illustrated a state in which the clutch mechanism 28 is disconnected in the state illustrated in FIG. 6(A). In FIG. 7(A) is illustrated the state in which the operation handle 29 is turned to the 180° position in the opening direction from the state illustrated in FIG. 6(B); and in FIG. 7(B) is illustrated the state in which the sliding door 12 is closed from the state illustrated in FIG. 7(A). In FIGS. 8(A) and 8(B) are illustrated the states in which the operation handle 29 is turned by respective turning angles (to the 90° position and an 86° position) in the closing direction from the state illustrated in FIG. 7(B). FIG. 9 is an exploded perspective view of the opening action supporting mechanism 26 and the clutch mechanism 28.

[0038] As illustrated in FIGS. 5 and 9, the opening action supporting mechanism 26 includes a base portion 50, the kicking member 48, and a housing mechanism portion 52; and is embedded in the casing 25. The clutch mechanism 28 includes the coupling member 41, a driving member 58, a driving pin (a pin member) 60 disposed in the kicking member 48, and guiding holes 62 formed in the housing mechanism portion 52. As illustrated in FIG. 9, in the present embodiment, the opening action supporting mechanism 26 and the clutch mechanism 28 are assembled in an integrated manner. However, alternatively, the clutch mechanism 28 can be configured separately from the opening action supporting mechanism 26, and can be disposed, for example, in between the linking member 38 and the opening action supporting mechanism 26.

[0039] Firstly, the explanation is given about a configuration of the opening action supporting mechanism 26. The base portion 50 is a sheet-metal member that is formed to have a substantially U-shaped cross-section by appropriately bending both ends in the depth direction of a vertically-extending plate. The base portion 50 is screwed to a lateral face of the casing 25 using a plurality of screws 78 (see FIG. 9). In the base portion 50, a pair of bent pieces 50a, a pair of bent pieces 50b, a pair of bent pieces 50c, and a pair of bent pieces 50d are disposed in parallel along the vertical direction. The topmost bent pieces 50a have shaft holes 64 formed facing each other, and the bottommost bent pieces 50d have the guiding holes 62 formed facing each other. On the depth face of the base portion 50, an auxiliary plate 65 is joined and fixed using screws 63.

[0040] The kicking member 48 includes first arms 66 on the upper side, second arms 67 on the lower side, a connecting shaft 68, and a roller 69.

[0041] The first arms 66 and the second arms 67 are

band plate members extending in the vertical direction, and are disposed in pair and facing each other in the depth direction. Each first arm 66 has a fixing hole 66a formed in the upper end portion and has a connecting hole 66b formed in the lower end portion. Each second arm 67 has a linking hole 67a formed in the upper end portion and has a movable hole 67b formed in the lower end portion. In the first arms 66 and the second arms 67, the ends of the connecting shaft 68 are fit by insertion in the connecting holes 66b and 67b, respectively. As a result, the first arms 66 and the second arms 67 are foldably linked in a V-shaped manner with the connecting shaft 68 serving as the fulcrum. On the connecting shaft 68, the roller 69 is rotatably extrapolated. In each first arm 66, an end portion of a fixed axle 70 rotatably fits in the corresponding fixing hole 66a. The fixed axle 70 is fit by insertion in a rotatable manner in the shaft holes 64. In each second arm 67, an end portion of the driving pin 60 rotatably fits in the corresponding movable hole 67b. The driving pin 60 gets rotatably and slidably engaged with the guiding holes 62 of the base portion 50, and has a collar 60a extrapolated on the shaft center.

[0042] In the kicking member 48, the upper end portions of the first arms 66 are positioned in the base portion 50 because of the fixed axle 70. Thus, when the driving pin 60 moves up and down along the guiding holes 62, the second arms 67 move up and down and, at that time, there is folding in between the first arms 66 and the second arms 67 via the connecting shaft 68. As a result, the connecting shaft 68 and the roller 69 that is extrapolated on the connecting shaft 68 move in the direction away from the base portion 50 and project from the outside depth face 46 of the vertical stile 12d (see FIGS. 5 to 8).

[0043] The housing mechanism portion 52 includes an extension arm 72 and an extension coil spring (a first elastic member) 74. The housing mechanism portion 52 is a mechanism that, when the opening action supporting mechanism 26 is disconnected from the interlocking member 32 due to the clutch mechanism 28, forcibly moves the kicking member 48 to the initial position at which the kicking member 48 is retracted inside the vertical stile 12d (see FIG. 5(A)).

[0044] The extension arm 72 is a substantially U-shaped sheet metal member in which the upper end portions of a pair of arm plates 72a in the depth direction are joined by a bridge plate 72b running along the depth direction. In the lower end portion of each arm plate 72a, a hook 72c is disposed that gets rotatably engaged with the driving pin 60 on the inner periphery side of the pair of guiding holes 62. On the bridge plate 72b, a supporting portion 72d is disposed in which the upper end portion of the extension coil spring 74 gets locked. Thus, the upper end portion of the extension coil spring 74 is locked in the supporting portion 72d. In the auxiliary plate 65, a relief long hole 65a is formed to extend vertically for the purpose of relieving the upper end portion of the extension coil spring 74 and the supporting portion 72d. The lower end portion of the extension coil spring 74 is locked

at a supporting member 76 that is joined to the base portion 50 and the auxiliary plate 65 using the screws 63.

[0045] When the driving pin 60 moves up and down along with the second arms 67 of the kicking member 48, the extension arm 72 of the housing mechanism portion 52 too moves up and down accompanying the up-and-down movement. At that time, because of having the lower end portion fixed to the base portion, the extension coil spring 74 moves up and down along with the extension arm 72 whose upper end portion moves up and down. That is, when the driving pin 60 moves up against the biasing force of the extension coil spring 74, a downward biasing force gets applied to the driving pin 60 from the extension coil spring 74.

[0046] The casing 25 has a substantially U-shaped cross-section extending along the substantially entire length of the vertical stile 12d. The casing 25 fits in a vertical opening formed in the substantial center in the depth direction of the vertical stile 12d, and a depth face 25a of the casing 25 is formed in a substantially flush manner with the outside depth face 46 of the vertical stile 12d (see FIG. 2). On the depth face 25a of the casing 25, an opening 25b through which the kicking member 48 is projectable and retractable is formed. In the state of having the interlocking member 32 slidably housed therein, the casing 25 is fixed to the bent pieces 50b and 50c of the base portion 50 using the screws 78.

[0047] Given below is the explanation of a configuration of the clutch mechanism 28. The coupling member 41 is a vertically-extending member that is fixed to an outside depth face 40a of the interlocking lever 40 using screws 79, and that is housed in the casing 25. The coupling member 41 includes a bulging portion 41a that protrudes toward the interlocking lever 40; a roller housing groove 41b that is a substantially C-shaped depression extending in the vertical direction on the side of the outer face of the bulging portion 41a; a long hole 41c that is formed in a penetrating manner in the depth direction in the upper portion of the roller housing groove 41b; and a driving member housing portion 41d that is a concave portion formed in the lower portion of the roller housing groove 41b. The bulging portion 41a gets inserted in an opening 40b that is formed in the interlocking lever 40 in a penetrating manner in the width direction. The coupling member 41 is disposed in a sandwiched manner between the arms 66 and 67 of the kicking member 48 in the depth direction, and the roller 69 is disposed in the roller housing groove 41b. At that time, since the fixed axle 70 is inserted in the long hole 41c, the sliding of the coupling member 41 is not blocked by the fixed axle 70.

[0048] The driving member 58 is supported in a turnable manner on the inner periphery side of the driving member housing portion 41d of the coupling member 41, and passes through the opening 40b of the interlocking lever 40. The driving member 58 includes a driving face 58a that enables lifting of the driving pin 60; a flank face 58b that extends downward in a substantial orthogonal manner from the driving face 58a; a shaft hole 58c in

which a turn shaft 82 is fit by insertion in a rotatable manner; and a stopper piece 58d that protrudes from below the shaft hole 58c toward the inner face of the coupling member 41. The driving member 58 has the shape of a bottomed vessel with an inner space in which a torsion coil spring (a second elastic member) 84 is disposed. The torsion coil spring 84 is extrapolated on the turn shaft 82. In the driving member 58, at the initial position at which no external force is exerted, the leading end of the stopper piece 58d is set at a turning position in an abutting manner against the inner face of the driving member housing portion 41d due to the biasing force of the torsion coil spring 84 (see FIG. 5(A)). At the initial position, the driving member 58 is retained in a tilted orientation in which the driving face 58a gradually tilts upward to the side of the vertical frame 14d, and the flank face 58b gradually tilts downward to the side of the vertical frame 14d. At that time, the driving face 58a is positioned at an overlapping position below the driving pin 60.

[0049] The guiding holes 62 are formed in the bent pieces 50d of the base portion 50, and are positioned facing each other in a pair. The guiding holes 62 are substantially boomerang-shaped long holes having a first guiding portion 62a running along the vertical direction, and having a second guiding portion 62b that is continuous from the upper end of the first guiding portion 62a and that is tilted upward in the direction of gradually moving away from the side of the driving member 58. In the guiding holes 62, the driving pin 60 gets inserted in a slidable manner. Hence, when the driving pin 60 moves up and down, the guiding holes 62 can vary the position of the driving pin 60 along the width direction (the X direction) of the vertical stile 12d.

[0050] Given below is the explanation of the actions of the opening section device 11 configured in the manner described above.

[0051] Firstly, the explanation is given about the action of opening of the sliding door 12 from the closed position illustrated in FIG. 1. When the sliding door is closed and the lock mechanism 22 is in the locked state, as illustrated in FIG. 3(A) and FIG. 5(A), the operation handle 29 is positioned at the 0° position and the interlocking member 32 is positioned at the lowermost sliding position. In this state, the head portion 44a of the lock pin 44 is engaged with the vertically-aligned portion of the drawing piece 42a, and the lock mechanism 22 is in the locked state. In the opening action supporting mechanism 26, since the driving pin 60 is positioned at the lower end of the first guiding portions 62a of the guiding holes 62; the first arms 66 and the second arms 67 are aligned substantially along the vertical direction, and the kicking member 48 is positioned at a housing position at which the roller 69 is retracted inside the vertical stile 12d. In the clutch mechanism 28, the driving face 58a of the driving member 58 is positioned sufficiently away from the driving pin 60. Hence, the sliding door 12 is closed with respect to the frame member 14, and the vertical stile 12d is closely attached to the vertical frame 14d via a predetermined

tight material. Hence, a significant force is required for the initial motion at the time of opening the sliding door 12.

[0052] At the time of opening the sliding door 12 from this state, firstly, the operation handle 29 is turned in the opening direction. When the operation handle 29 is turned in the opening direction from the 0° position, the interlocking member 32 moves up and, at the 89° position, lifting of the driving pin 60 is started due to the driving face 58a of the driving member 58 (see FIG. 5(B)). That is, from the 0° position to the 89° position, the clutch mechanism 28 is in the disconnected state and the driving member 58 is positioned away from the driving pin 60. Hence, the opening action supporting mechanism 26 (the kicking member 48) does not operate.

[0053] In the lock mechanism 22, the drawing member 42 moves up accompanying the interlocking member 32 even from the 0° position to the 89° position. Hence, the drawing piece 42a moves relatively upward with respect to the head portion 44a of the lock pin 44 (see FIGS. 5(A) and 5(B)). In the present embodiment, at the 89° position, a large part of the lock pin 44 is present in the lock opening 42c (see FIG. 5(B)) and, although not illustrated in the drawings, the lock pin 44 gets entirely disposed in the lock opening 42c at a 96° position. Thus, the lock mechanism 22 gets unlocked. In this way, in the opening section device 11, during the operation of unlocking the lock mechanism 22 from the locked state, the opening action supporting mechanism 26 does not operate in principle. For that reason, a defect in which the sliding door 12 is kicked before the unlocking of the lock mechanism 22 can be prevented from occurring.

[0054] When the operation handle 29 is further turned from the 89° position in the opening direction; since the clutch mechanism 28 is in the connected state, the driving face 58a of the driving member 58 lifts the driving pin 60 via the collar 60a accompanying the rising of the interlocking member 32. As a result, the driving pin 60 moves up inside the guiding holes 62 and lifts the second arms 67, so that there is gradual folding in between the first arms 66 and the second arms 67 via the connecting shaft 68. With that, the roller 69 of the kicking member 48 passes through the opening 25b of the casing 25 and protrudes to the outside from the outside depth face 46 (the depth face 25a) of the vertical stile 12d. As a result, the roller 69 presses the inside depth face 47 of the vertical frame 14d (see FIG. 6(A)), and the sliding door 12 slides to the open position due to the pressing force. In the present embodiment, when the operation handle 29 is positioned at the 145° position, the amount of protrusion of the roller 69 reaches the maximum level (kicking position). That is, at the 145° position, the amount of kicking the sliding door 12 by the kicking member 48 reaches the maximum level, and the action of kicking the sliding door 12 by the kicking member 48 reaches completion (see FIG. 6(A)).

[0055] During the kicking action from the 89° position to the 145° position, the driving pin 60 moves inside the guiding holes 62 from the first guiding portion 62a to the

second guiding portion 62b. Then, while rising up in the second guiding portion 62b, the driving pin 60 also gradually moves in the direction away from the driving face 58a of the driving member 58. In the present embodiment, at the 145° position at which the action of kicking the sliding door 12 by the kicking member 48 reaches completion, the driving pin 60 is positioned at the end portion of the driving face 58a, that is, at the boundary between the driving face 58a and the flank face 58b. In the state in which the driving pin moves up to the topmost portion of the guiding holes 62, the amount of tensile force of the extension coil spring 74 also reaches the maximum level, that is, the biasing force for pressing the driving pin 60 downward also reaches the maximum level.

[0056] Thus, after causing the kicking member 48 protrude to the maximum kicking amount at the 145° position, the driving pin 60 slips off to the flank face 58b from the driving face 58a due to the biasing force of the extension coil spring 74, and moves down inside the guiding holes 62 while sliding on the flank face 58b (see FIG. 6(B)). Eventually, the driving pin 60 moves to the lower end of the first guiding portion 62a, that is, to the position same as the 0° position. Hence, the interlocked state between the driving pin 60 and the driving face 58a of the driving member 58 is disconnected, and the clutch mechanism 28 becomes disconnected. While the driving pin 60 moves down inside the guiding holes 62, the kicking member 48 is gradually released from the folded state of the first arms 66 and the second arms 67 because of the downward movement of the second arms 67 (see FIG. 6(B)). As a result, the kicking member 48 is gradually housed in the vertical stile 12d, and the movement of the driving pin 60 to the lower end inside the guiding holes 62 results in the return of the kicking member 48 to the housing position same as the 0° position.

[0057] When the operation handle 29 is further turned from the 145° position in the opening direction, since the clutch mechanism 28 is in the disconnected state, the interlocking member 32 moves up, but the opening action supporting mechanism 26 does not operate. Then, as illustrated in FIG. 7(A), at the 180° position, the lock pin 44 of the lock mechanism 22 is positioned in the lock opening 42c, and the kicking member 48 of the opening action supporting mechanism 26 is housed in the vertical stile 12d. Hence, when the user performs the action of opening the sliding door 12 by pulling the operation handle 29 that is oriented vertically downward at the 180° position, it becomes easily possible to open the sliding door 12.

[0058] In this way, the opening section device 11 includes the opening action supporting mechanism 26 that operates in conjunction with the turning of the operation handle 29 in the opening direction. Hence, at the time of opening the sliding door 12 from the completely-closed position, even if the sliding door 12 is, for example, large or heavy, it can be easily opened with only a small amount of force.

[0059] Moreover, the opening section device 11 includes the clutch mechanism 28 that is capable of connecting the interlocking member 32 and the opening action supporting mechanism 26 in the midway of the action of turning the operation handle 29 in the opening direction. Hence, at the time of opening the sliding door 12, the user only needs to turn the operation handle 29 to a predetermined angular position (a predetermined operation position; in the present embodiment, the 145° position) and then directly turn the operation handle 29 to the turning end position (in the present embodiment, the 180° position). That is, in the opening section device 11, according to the turning angle at the time of turning the operation handle 29 in the opening direction, the clutch mechanism 28 changes from the disconnected state to the connected state and the opening action supporting mechanism 26 operates; and then the clutch mechanism 28 changes to the disconnected state and the opening action supporting mechanism 26 gets disconnected from the interlocking member 32. Thus, in the present embodiment, due to the housing mechanism portion 52 in which the extension coil spring 74 is used, the kicking member 48 that has been disconnected from the interlocking member 32 after the completion of the kicking action can be automatically housed at the housing position same as the 0° position. Meanwhile, the housing mechanism portion 52 can be omitted as well. That is, in the configuration according to the present embodiment, when the clutch mechanism 28 is disconnected at the 145° position, the driving pin 60 moves down due to its own weight. Thus, even if the housing mechanism portion 52 is omitted, the kicking member 48 can be automatically housed at the housing position after the completion of the kicking action.

[0060] In this way, in the opening section device 11, at the time of opening the sliding door 12, only by turning the operation handle 29 from the 0° position to the maximum turning position (the maximum operation position; in the present embodiment, the 180° position) beyond the predetermined angular position, the kicking member 48 is again housed after having kicked the sliding door 12. Hence, as a result of performing the action of opening the sliding door 12 using the operation handle 29 that has been turned to the 180° position, the user can easily open the sliding door 12, thereby enabling achieving a high degree of operability. Moreover, in the open state of the sliding door 12, the kicking member 48 does not obstruct the passage. Furthermore, since the opening section device 11 includes the clutch mechanism 28; the opening action supporting mechanism 26 that is separately designed can be easily combined with the operation mechanism 24 and the interlocking member 32. Hence, the operation mechanism 24 need not be configured on the premise of installing the opening action supporting mechanism 26. As a result, according to the specifications of the opening section device 11, the opening action supporting mechanism 26 can be installed in a plurality of ways, or it becomes possible to select the

presence or absence of the opening action supporting mechanism 26 using the same operation mechanism 24 or the same interlocking member 32. That enables achieving a high degree of general versatility.

[0061] Given below is the explanation of the action of closing the sliding door 12 from the open position illustrated in FIG. 7(A). When the sliding door 12 is opened and the lock mechanism 22 is unlocked, as illustrated in FIGS. 4(A) and 7(A), the operation handle 29 is positioned at the 180° position and the interlocking member 32 is positioned at the topmost sliding position. In that state, the lock opening 42c is at a position facing the lock pin 44 in the horizontal direction, and the lock mechanism 22 is in the unlocked state. Moreover, the driving pin 60 is positioned at the lower end of the first guiding portion 62a of the guiding holes 62. Hence, in the opening action supporting mechanism 26, the kicking member 48 is positioned in the housing position at which the roller 69 is retracted inside the vertical stile 12d. In the clutch mechanism 28, the flank face 58b of the driving member 58 is positioned on the upper side of the driving pin 60.

[0062] At the time of closing the sliding door 12 from the abovementioned state, for example, the operation handle 29 that is positioned at the 180° position is pressed and the sliding door 12 is slid toward the closed position. As a result, as illustrated in FIG. 7(B), the lock pin 44 enters the lock opening 42c. In that state, there remains a certain gap in between the outside depth face 46 of the vertical stile 12d and the inside depth face 47 of the vertical frame 14d.

[0063] Subsequently, the operation handle 29 is turned in the closing direction from the 180° position. As a result, the interlocking member 32 moves down and the driving member 58 too moves down accompanying the interlocking member 32, and the flank face 58b makes sliding contact with the driving pin 60. At that time, the flank face 58b gets subjected to the pressing force from the driving pin 60, and the driving member 58 moves in the direction away from the driving pin 60 against the biasing force of the torsion coil spring 84 (see FIG. 8(A)). That is, the driving member 58 not only includes a clutch structure for connecting the interlocking member 32 and the opening action supporting mechanism 26 at the time of turning the operation handle 29 in the opening direction, but also contains a unidirectional transmission structure for maintaining the disconnected state at the time of turning the operation handle 29 in the closing direction where the downward movement of the interlocking member 32 is not transmitted to the opening action supporting mechanism 26 due to the movement of the driving member 58 in the direction away from the driving pin 60 by the pressing force of the driving pin 60. As a result, the driving member 58 does not interfere with the turning of the operation handle 29 in the closing direction, and a smooth handle operation can be performed. Moreover, at the time of closing the sliding door 12, it becomes possible to avoid a situation in which the opening action supporting mechanism 26 operates in conjunction with the turning

of the operation handle 29 in the closing direction, and thus the housing position of the kicking member 48 is reliably maintained.

[0064] When the operation handle 29 is turned to the 86° position in the closing direction, the flank face 58b of the driving member 58 completely overleaps the driving pin 60. As a result, as illustrated in FIG. 8(B), due to the biasing force of the torsion coil spring 84, the driving member 58 returns to the initial position that overlaps in the lower portion of the driving pin 60 in the same manner as the 0° position.

[0065] During the turning action of the operation handle 29; in the lock mechanism 22, the drawing member 42 moves down during the movement of the operation handle 29 from the 180° position toward the closing direction. In the present embodiment, the drawing piece 42a of the drawing member 42 starts getting hooked against the head portion 44a of the lock pin 44 at a position such as the 96° position that is just before the 90° position illustrated in FIG. 8(A). That is, the locking action of the lock mechanism 22 starts. As a result, since the head portion 44a of the lock pin 44 moves along the tilt of the drawing piece 42a, the sliding door 12 is gradually drawn in the direction approaching the vertical frame 14d due to the lock pin 44. Subsequently, when the operation handle 29 is again turned to the 0° position, the head portion 44a of the lock pin 44 again engages with the drawing member 42 (see FIG. 42(A)), and the lock mechanism 22 gets locked. As a result, the sliding door 12 gets locked with respect to the frame member 14, and the vertical stile 12d becomes closely attached to the vertical frame 14d via a predetermined tight material. With that, the closing action of the sliding door 12 reaches completion.

[0066] In this way, in the opening section device 11, at the time of locking the lock mechanism 22 from the unlocked state, the opening action supporting mechanism 26 does not operate. For that reason, a defect in which the sliding door 12 is kicked during the locking of the lock mechanism 22 is prevented from occurring. Moreover, in the opening section device 11, when turned in the opening direction as well as in the closing direction, the operation handle 29 moves within the turning range from the 0° position to the 180° position. Hence, the operation handle 29 never overhangs from the contour range of the sliding door 12. For that reason, the operation handle 29 never interferes with the frame member 14.

[0067] Meanwhile, the present invention is not limited to the embodiment described above, and can be freely modified without deviating from the scope thereof.

[0068] In the embodiment describe above, the configuration is explained in which the interlocking member 32 is configured by linking the linking member 38, the interlocking lever 40, and the coupling member 41. Alternatively, for example, the interlocking member 32 can be configured using a single component or two components. However, as described above, when the interlocking member 32 is configured using the combination of the linking member 38 pertaining to the operation mecha-

nism 24; the interlocking lever 40 pertaining to the lock mechanism 22; and the coupling member 41 pertaining to the opening action supporting mechanism 26 and the clutch mechanism 28; for example, in the case of implementing the interlocking member 32 in an opening section device not requiring the opening action supporting mechanism 26, it becomes easily possible to omit the opening action supporting mechanism 26 and the clutch mechanism 28, thereby enabling achieving a high degree of general versatility.

[0069] In the embodiment described above, the configuration is explained in which the interlocking member 32 moves up when the operation handle 29 is turned in the opening direction and moves down when the operation handle 29 is turned in the closing direction. However, alternatively, the up-and-down relationship can be reversed.

[0070] In the embodiment described above, the configuration is explained in which the lock mechanism 22 and the opening action supporting mechanism 26 can be simultaneously operated. Alternatively, the opening action supporting mechanism 26 and the lock mechanism 22 can be configured to be separately operable; or the lock mechanism 22 can be omitted.

[0071] In the embodiment described above, the configuration is explained in which the upward movement and the downward movement of the interlocking member 32 occurs in conjunction with the turning of the operation handle 29. Alternatively, the operation mechanism 24 can be electric equipment having a motor, or can be a hand operating device in which the interlocking member 32 is moved up and down using some other component such as a lifting lever instead of using the operation handle 29.

[0072] In the embodiment described above, the opening section device 11 is a fitting having an inner sash structure in which the sliding door 12 slides at the room side of the fixed door 16. Alternatively, the opening section device 11 can have an outer sash structure in which the sliding door 12 slides at the outdoor side of the fixed door 16. Even when the external sash structure is adapted, the operation handle 29 is retained at the 180° position after the end of the actions of the opening action supporting mechanism 26. Hence, when the sliding door 12 is completely open, the operation handle 29 is prevented from interfering with the meeting stile (the vertical stile 16d) of the fixed door 16, thereby enabling achieving maximization of the opening dimensions of the sliding door 12.

[0073] In the embodiment described above, the fitting is configured with the sliding door 12 of the single sliding type as the door body whose opening action is supported by the opening action supporting device 10. Alternatively, the opening section device 11 can be used also in doors and windows having various sliding structures, such as in a double sliding door in which, for example, two sliding doors 12 are disposed in a double-slidable manner, or in a window disposed at a position from which people enter

and exit. Moreover, the door body whose opening action is supported by the opening action supporting mechanism 26 can be, for example, a door or a horizontal pivoted window that is different than a sliding door. In that case, it is sufficient to vary the installation direction of the opening action supporting mechanism 26, and the operation mechanism 24 can be disposed in a horizontal stile instead of a vertical stile. Meanwhile, when a door body does not have a stile structure, the opening action supporting device 10 can be disposed with respect to the face bar or the aggregate constituting the door body.

[0074] According to the present invention, it becomes possible to enhance the operability at the time of opening and closing a door body, and also to enhance the general versatility of the operation mechanism and the opening action supporting mechanism.

[0075] Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fall within the scope of the invention as defined by the claims.

Claims

1. An opening action supporting device (10) comprising an opening action supporting mechanism (26) including a kicking member (48) that is projectable and retractable from an outer face of a door body (12), the opening action supporting mechanism (26) being configured to press a frame member (14) supporting the door body (12) that is openable and closable with respect to the frame member (14), by using the kicking member (48), to kick the door body (12) against the frame member (14) at time of opening the door body (12), wherein
an operation mechanism (24) providable in the door body (12) is linked to the opening action supporting mechanism (26) via an interlocking member (32) so that, when the operation mechanism (24) is operated, the opening action supporting mechanism (26) operates, **characterized in that** the opening action supporting device (10) comprises a clutch mechanism (28) configured to connect the interlocking member (32) to the opening action supporting mechanism (26), and
the clutch mechanism (28) is configured to:

connect the interlocking member (32), which moves in one direction when the operation mechanism (24) is operated to a predetermined operating position in an opening direction, to the opening action supporting mechanism (26) to transmit movement of the interlocking member (32) to the opening action supporting mechanism (26) to move the kicking member (48) from

a housing position at which the kicking member (48) is retracted inside the door body (12) to a kicking position at which the kicking member (48) is projected outside the door body (12); and disconnect the interlocking member (32), which further moves in the one direction when the operation mechanism (24) is further operated from the predetermined operating position in the opening direction, from the opening action supporting mechanism (26) not to transmit movement of the interlocking member (32) to the kicking member (48).

2. The opening action supporting device (10) according to claim 1, wherein the clutch mechanism (28) includes a unidirectional transmission structure that disconnects the interlocking member (32), which moves in another direction that is an opposite direction of the one direction when the operation mechanism (24) is operated in a closing direction, from the opening action supporting mechanism (26).
3. The opening action supporting device (10) according to claim 1 or 2, wherein
the opening action supporting mechanism (26) includes a first elastic member (74) configured to bias the kicking member (48) in a direction in which the kicking member (48) moves from the kicking position to the housing position,
in a state where the interlocking member (32) that moves in the one direction is connected to the opening action supporting mechanism (26) by the clutch mechanism (28), the kicking member (48) moves to the kicking position against biasing force of the first elastic member (74), and
in a state where the interlocking member (32) that moves in the other direction that is an opposite direction of the one direction is disconnected from the opening action supporting mechanism (26) by the clutch mechanism (28), the kicking member (48) moves to the housing position due to biasing force of the first elastic member (74).
4. The opening action supporting device (10) according to any one of claims 1 to 3, wherein
the clutch mechanism (28) includes

a pin member (60) that is provided in the kicking member (48),
a driving member (58) that is turnably supported by the interlocking member (32), that has a driving face (58a) enabling pressing of the pin member (60) when the interlocking member (32) is moving in the one direction, and that has a flank face (58b) that makes sliding contact with the pin member (60) when the interlocking member (32) is moving in the other direction that is an opposite direction of the one direction,

a second elastic member (84) configured to bias the driving member (58) using the driving face (58a) to a turning position at which the pin member (60) is pressable, and a guiding hole (62)

that includes a first guiding portion (62a) that moves the pin member (60) along a direction of movement of the interlocking member (32),
that includes a second guiding portion (62b) that is continuous from the first guiding portion (62a) and that moves the pin member (60) in an intersecting direction from a guiding direction guided by the first guiding portion (62a), and
into which the pin member (60) is movably inserted,

when the operation mechanism (24) is operated to the predetermined position in the opening direction, as a result of pressing of the pin member (60) by the driving face (58a) of the driving member (58), the opening action supporting mechanism (26) moves the kicking member (48) toward the kicking position while the pin member (60) is being guided by the first guiding portion (62a), and
when the pin member (60) moves from the first guiding portion (62a) into the second guiding portion (62b) and proceeds to a predetermined position in the second guiding portion (62b), the pin member (60) moves away from the driving face (58a) and thus the interlocking member (32) and the opening action supporting mechanism (26) are disconnected from each other to allow the kicking member (48) to move from the kicking position to the housing position.

5. The opening action supporting device (10) according to claim 4, wherein the kicking member (48) includes

a first arm (66) one end portion of which is rotatably positioned and supported with respect to the door body (12),
a second arm (67) one end portion of which is rotatably linked to another end portion of the first arm (66) and another end portion of which is provided with the pin member (60), and
a roller (69) that is provided in a linking portion for linking the first arm (66) and the second arm (67), and

when the pin member (60) is pressed by the driving face (58a) of the driving member (58), the first arm (66) and the second arm (67) are folded with the linking portion serving as fulcrum, so that the roller (69) protrudes from the door body (12) to press the

frame member (14).

6. An opening section device (11) comprising:

the opening action supporting device (10) according to any one of claims 1 to 5;
the door body (12) that is supported by the frame member (14) to be openable and closable with respect to the frame member (14) and that is provided with the opening action supporting device (10);
the operation mechanism (24) that includes an operating unit (29) exposed on an outer face of the door body (12); and
the interlocking member (32) that is movably supported inside the door body (12).

Patentansprüche

1. Öffnungsvorgangs-Unterstützungsvorrichtung (10), die Folgendes umfasst:

einen Öffnungsvorgangs-Unterstützungsmechanismus (26), der ein Stoßelement (48) enthält, das von einer Außenseite eines Türkörpers (12) verschiebbar und zurückziehbar ist, wobei der Öffnungsvorgangs-Unterstützungsmechanismus (26) konfiguriert ist, ein Rahmenelement (14), das den Türkörper (12), der in Bezug auf das Rahmenelement (14) geöffnet und geschlossen werden kann, trägt, unter Verwendung des Stoßelements (48) zu drücken, um den Türkörper (12) zum Zeitpunkt des Öffnens des Türkörpers (12) gegen das Rahmenelement (14) zu stoßen, wobei ein Betätigungsmechanismus (24), der im Türkörper (12) vorgesehen werden kann, mittels eines Verriegelungselements (32) mit dem Öffnungsvorgangs-Unterstützungsmechanismus (26) verbunden ist, derart, dass dann, wenn der Betätigungsmechanismus (24) betätigt wird, der Öffnungsvorgangs-Unterstützungsmechanismus (26) arbeitet,

dadurch gekennzeichnet, dass

die Öffnungsvorgangs-Unterstützungsvorrichtung (10) einen Kupplungsmechanismus (28) umfasst, der konfiguriert ist, das Verriegelungselement (32) mit dem Öffnungsvorgangs-Unterstützungsmechanismus (26) zu verbinden, und der Kupplungsmechanismus (28) konfiguriert ist zum

Verbinden des Verriegelungselements (32), das sich in eine Richtung bewegt, wenn der Betätigungsmechanismus (24) zu einer vorgegebenen Betätigungsstellung in einer Öffnungsrichtung betätigt wird, mit dem Öffnungsvorgangs-Unterstützungsmechanismus (26), um eine Be-

- wegung des Verriegelungselements (32) zum Öffnungsvorgangs-Unterstützungsmechanismus (26) zu übertragen, um das Stoßelement (48) von einer Gehäusestellung, bei der das Stoßelement (48) in den Türkörper (12) zurückgezogen ist, zu einer Stoßstellung, bei der das Stoßelement (48) aus dem Türkörper (12) vorgeschoben ist, zu bewegen; und
- Trennen des Verriegelungselements (32), das sich weiter in der einen Richtung bewegt, wenn der Betätigungsmechanismus (24) von der vorgegebenen Betätigungsstellung weiter in der Öffnungsrichtung betätigt wird, vom Öffnungsvorgangs-Unterstützungsmechanismus (26), um keine Bewegung des Verriegelungselements (32) zum Stoßelement (48) zu übertragen.
2. Öffnungsvorgangs-Unterstützungsvorrichtung (10) nach Anspruch 1, wobei der Kupplungsmechanismus (28) eine unidirektionale Übertragungsstruktur enthält, die das Verriegelungselement (32), das sich in einer weiteren Richtung, die der einen Richtung entgegengesetzt ist, bewegt, wenn der Betätigungsmechanismus (24) in einer Schließrichtung betätigt wird, vom Öffnungsvorgangs-Unterstützungsmechanismus (26) trennt.
3. Öffnungsvorgangs-Unterstützungsvorrichtung (10) nach Anspruch 1 oder 2, wobei der Öffnungsvorgangs-Unterstützungsmechanismus (26) ein erstes elastisches Element (74) enthält, das konfiguriert ist, das Stoßelement (48) in eine Richtung, in der sich das Stoßelement (48) von der Stoßstellung zur Gehäusestellung bewegt, vorzubelasten, in einem Zustand, in dem das Verriegelungselement (32), das sich in die eine Richtung bewegt, durch den Kupplungsmechanismus (28) mit dem Öffnungsvorgangs-Unterstützungsmechanismus (26) verbunden ist, das Stoßelement (48) sich gegen eine Vorbelastungskraft des ersten elastischen Elements (74) zur Stoßstellung bewegt und in einem Zustand, in dem das Verriegelungselement (32), das sich in die weitere Richtung, die eine der einen Richtung entgegengesetzte Richtung ist, bewegt, durch den Kupplungsmechanismus (28) vom Öffnungsvorgangs-Unterstützungsmechanismus (26) getrennt wird, das Stoßelement (48) sich aufgrund einer Vorbelastungskraft des ersten elastischen Elements (74) zur Gehäusestellung bewegt.
4. Öffnungsvorgangs-Unterstützungsvorrichtung (10) nach einem der Ansprüche 1 bis 3, wobei der Kupplungsmechanismus (28) Folgendes enthält:
- ein Stiftelement (60), das im Stoßelement (48) vorgesehen ist,

ein Antriebselement (58), das durch das Verriegelungselement (32) drehbar getragen wird und eine Antriebsfläche (58a) besitzt, die ein Drücken des Stiftelements (60) ermöglicht, wenn das Verriegelungselement (32) sich in die eine Richtung bewegt, und das eine Flankenfläche (58b) besitzt, die einen gleitenden Kontakt mit dem Stiftelement (60) herstellt, wenn sich das Verriegelungselement (32) in der weiteren Richtung, die eine der einen Richtung entgegengesetzte Richtung ist, bewegt, ein zweites elastisches Element (84), das konfiguriert ist, das Antriebselement (58) unter Verwendung der Antriebsfläche (58a) zu einer Drehstellung, bei der das Stiftelement (60) drückbar ist, vorzubelasten, und ein Führungsloch (62),

das einen ersten Führungsabschnitt (62a) enthält, der das Stiftelement (60) in einer Bewegungsrichtung des Verriegelungselements (32) bewegt, das einen zweiten Führungsabschnitt (62b) enthält, der vom ersten Führungsabschnitt (62a) kontinuierlich ist und der das Stiftelement (60) in einer Schnittrichtung einer Führungsrichtung, die durch das erste Führungsabschnitt (62a) geführt wird, bewegt, und in das das Stiftelement (60) beweglich eingesetzt ist, wobei

dann, wenn der Betätigungsmechanismus (24) zur vorgegebenen Stellung in der Öffnungsrichtung betätigt wird, der Öffnungsvorgangs-Unterstützungsmechanismus (26) als Ergebnis des Drückens des Stiftelements (60) durch die Antriebsfläche (58a) des Antriebselements (58) das Stoßelement (48) zur Stoßstellung bewegt, während das Stiftelement (60) durch den ersten Führungsabschnitt (62a) geführt wird, und dann, wenn das Stiftelement (60) sich vom ersten Führungsabschnitt (62a) in den zweiten Führungsabschnitt (62b) bewegt und sich zu einer vorgegebenen Position im zweiten Führungsabschnitt (62b) fortbewegt, das Stiftelement (60) sich von der Antriebsfläche (58a) wegbewegt und somit das Verriegelungselement (32) und das Öffnungsvorgangs-Unterstützungsmechanismus (26) voneinander getrennt sind, um dem Stoßelement (48) zu ermöglichen, sich von der Stoßstellung zur Gehäusestellung zu bewegen.

5. Öffnungsvorgangs-Unterstützungsvorrichtung (10) nach Anspruch 4, wobei das Stoßelement (48) Folgendes enthält:

einen ersten Arm (66), dessen einer Endabschnitt in Bezug auf den Türkörper (12) drehbar positioniert ist und getragen wird,
einen zweiten Arm (67), dessen einer Endabschnitt mit einem weiteren Endabschnitt des ersten Arms (66) drehbar verbunden ist und dessen weiterer Endabschnitt mit dem Stiftelement (60) versehen ist, und
ein Wälzelement (69), das in einem Verbindungsabschnitt zum Verbinden des ersten Arms (66) und des zweiten Arms (67) vorgesehen ist, und

dann, wenn das Stiftelement (60) durch die Antriebsfläche (58a) des Antriebselements (58) gedrückt wird, der erste Arm (66) und der zweite Arm (67) verschränkt sind, wobei der Verbindungsabschnitt als Drehpunkt dient, derart, dass das Wälzelement (69) vom Türkörper (12) vorsteht, um das Rahmenelement (14) zu drücken.

6. Öffnungsabschnittsvorrichtung (11), die Folgendes umfasst:

die Öffnungsvorgangs-Unterstützungsvorrichtung (10) nach einem der Ansprüche 1 bis 5;
den Türkörper (12), der durch das Rahmenelement (14) derart getragen wird, dass er in Bezug auf das Rahmenelement (14) geöffnet und geschlossen werden kann, und der mit der Öffnungsvorgangs-Unterstützungsvorrichtung (10) versehen ist;
den Betätigungsmechanismus (24), der eine Betätigungseinheit (29), die an einer Außenseite des Türkörpers (12) freiliegt, enthält; und
das Verriegelungselement (32), das im Türkörper (12) beweglich getragen wird.

Revendications

1. Dispositif de support d'action d'ouverture (10), comprenant
un mécanisme de support d'action d'ouverture (26) incluant un élément de frappe (48) qui peut faire saillie et être rétracté à partir d'une face extérieure d'un corps de porte (12), le mécanisme de support d'action d'ouverture (26) étant configuré pour appuyer sur un élément de cadre (14) supportant le corps de porte (12) qui peut être ouvert et fermé par rapport à l'élément de cadre (14), en utilisant l'élément de frappe (48), pour frapper le corps de porte (12) contre l'élément de cadre (14) à l'instant de l'ouverture du corps de porte (12), dans lequel
un mécanisme d'actionnement (24) pouvant être prévu dans le corps de porte (12) est lié au mécanisme de support d'action d'ouverture (26) par l'intermédiaire d'un élément d'enclenchement (32) pour

que, lorsque le mécanisme d'actionnement (24) est actionné, le mécanisme de support d'action d'ouverture (26) entre en fonctionnement,

caractérisé en ce que

le dispositif de support d'action d'ouverture (10) comprend un mécanisme d'embrayage (28) configuré pour raccorder l'élément d'enclenchement (32) au mécanisme de support d'action d'ouverture (26), et le mécanisme d'embrayage (28) est configuré pour :

raccorder l'élément d'enclenchement (32), qui se déplace dans une direction lorsque le mécanisme d'actionnement (24) est actionné jusqu'à une position d'actionnement prédéterminée dans une direction d'ouverture, au mécanisme de support d'action d'ouverture (26) pour transmettre le mouvement de l'élément d'enclenchement (32) au mécanisme de support d'action d'ouverture (26) pour déplacer l'élément de frappe (48) à partir d'une position de logement, à laquelle l'élément de frappe (48) est rétracté à l'intérieur du corps de porte (12), jusqu'à une position de frappe, à laquelle l'élément de frappe (48) est en saillie à l'extérieur du corps de porte (12) ; et

séparer l'élément d'enclenchement (32), qui se déplace davantage dans l'une direction lorsque le mécanisme d'actionnement (24) est actionné davantage à partir de la position d'actionnement prédéterminée dans la direction d'ouverture, du mécanisme de support d'action d'ouverture (26) pour ne pas transmettre le mouvement de l'élément d'enclenchement (32) à l'élément de frappe (48).

2. Dispositif de support d'action d'ouverture (10) selon la revendication 1, dans lequel le mécanisme d'embrayage (28) inclut une structure de transmission unidirectionnelle qui sépare l'élément d'enclenchement (32), qui se déplace dans une autre direction qui est une direction opposée par rapport à l'une direction lorsque le mécanisme d'actionnement (24) est actionné dans une direction de fermeture, du mécanisme de support d'action d'ouverture (26).

3. Dispositif de support d'action d'ouverture (10) selon la revendication 1 ou 2, dans lequel
le mécanisme de support d'action d'ouverture (26) inclut un premier élément élastique (74) configuré pour solliciter l'élément de frappe (48) dans une direction dans laquelle l'élément de frappe (48) se déplace à partir de la position de frappe jusqu'à la position de logement,
dans un état où l'élément d'enclenchement (32), qui se déplace dans l'une direction, est raccorder au mécanisme de support d'action d'ouverture (26) par le mécanisme d'embrayage (28), l'élément de frappe (48) se déplace jusqu'à la position de frappe contre

une force de sollicitation du premier élément élastique (74), et
 dans un état où l'élément d'enclenchement (32), qui se déplace dans l'autre direction qui est une direction opposée par rapport à l'une direction, est séparé du mécanisme de support d'action d'ouverture (26) par le mécanisme d'embrayage (28), l'élément de frappe (48) se déplace jusqu'à la position de logement en raison de la force de sollicitation du premier élément élastique (74).

4. Dispositif de support d'action d'ouverture (10) selon l'une quelconque des revendications 1 à 3, dans lequel

le mécanisme d'embrayage (28) inclut

un élément à goupille (60) qui est prévu dans l'élément de frappe (48),

un élément d'entraînement (58) qui est supporté de façon rotative par l'élément d'enclenchement (32), qui a une face d'entraînement (58a) permettant d'appuyer sur l'élément à goupille (60) lorsque l'élément d'enclenchement (32) se déplace dans l'une direction, et qui a une face de flanc (58b) qui entre en contact coulissant avec l'élément à goupille (60) lorsque l'élément d'enclenchement (32) se déplace dans l'autre direction qui est une direction opposée par rapport à l'une direction,

un second élément élastique (84) configuré pour solliciter l'élément d'entraînement (58) en utilisant la face d'entraînement (58a) jusqu'à une position de rotation à laquelle il est possible d'appuyer sur l'élément à goupille (60), et un trou de guidage (62)

qui inclut une première portion de guidage (62a) qui se déplace l'élément à goupille (60) le long d'une direction du mouvement de l'élément d'enclenchement (32), qui inclut une seconde portion de guidage (62b) qui est continue à la première portion de guidage (62a) et qui déplace l'élément à goupille (60) dans une direction d'intersection par rapport à une direction de guidage guidée par la première portion de guidage (62a), et dans lequel l'élément à goupille (60) est inséré de façon mobile,

lorsque le mécanisme d'actionnement (24) est actionné jusqu'à la position prédéterminée dans la direction d'ouverture, en conséquence du fait que la face d'entraînement (58a) de l'élément d'entraînement (58) appuie sur l'élément à goupille (60), le mécanisme de support d'action d'ouverture (26) déplace l'élément de frappe (48) vers la position de frappe alors que l'élément à goupille (60) est guidé

par la première portion de guidage (62a), et lorsque l'élément à goupille (60) se déplace depuis la première portion de guidage (62a) jusque dans la seconde portion de guidage (62b) et continue jusqu'à une position prédéterminée dans la seconde portion de guidage (62b), l'élément à goupille (60) s'éloigne de la face d'entraînement (58a) et ainsi l'élément d'enclenchement (32) et le mécanisme de support d'action d'ouverture (26) sont séparés l'un de l'autre pour permettre à l'élément de frappe (48) de se déplacer à partir de la position de frappe jusqu'à la position de logement.

5. Dispositif de support d'action d'ouverture (10) selon la revendication 4, dans lequel l'élément de frappe (48) inclut

un premier bras (66) dont une portion d'extrémité est positionnée et supportée de façon rotative par rapport au corps de porte (12), un second bras (67) dont une portion d'extrémité est liée de façon rotative à une autre portion d'extrémité du premier bras (66) et dont une autre portion d'extrémité est pourvue de l'élément à goupille (60), et un galet (69) qui est prévu dans une portion de liaison pour lier le premier bras (66) et le second bras (67), et

lorsque la face d'entraînement (58a) de l'élément d'entraînement (58) appuie sur l'élément à goupille (60), le premier bras (66) et le second bras (67) sont pliés, la portion de liaison servant de point de pivotement, pour que le galet (69) fasse saillie à partir du corps de porte (12) pour appuyer sur l'élément de cadre (14).

6. Dispositif de section d'ouverture (11), comprenant :

le dispositif de support d'action d'ouverture (10) selon l'une quelconque des revendications 1 à 5 ;
 le corps de porte (12) qui est supporté par l'élément de cadre (14) pour pouvoir être ouvert et fermé par rapport à l'élément de cadre (14) et qui est pourvu du dispositif de support d'action d'ouverture (10) ;
 le mécanisme d'actionnement (24) qui inclut une unité d'actionnement (29) exposé sur une face extérieure du corps de porte (12) ; et l'élément d'enclenchement (32) qui est supporté de façon mobile à l'intérieur du corps de porte (12).

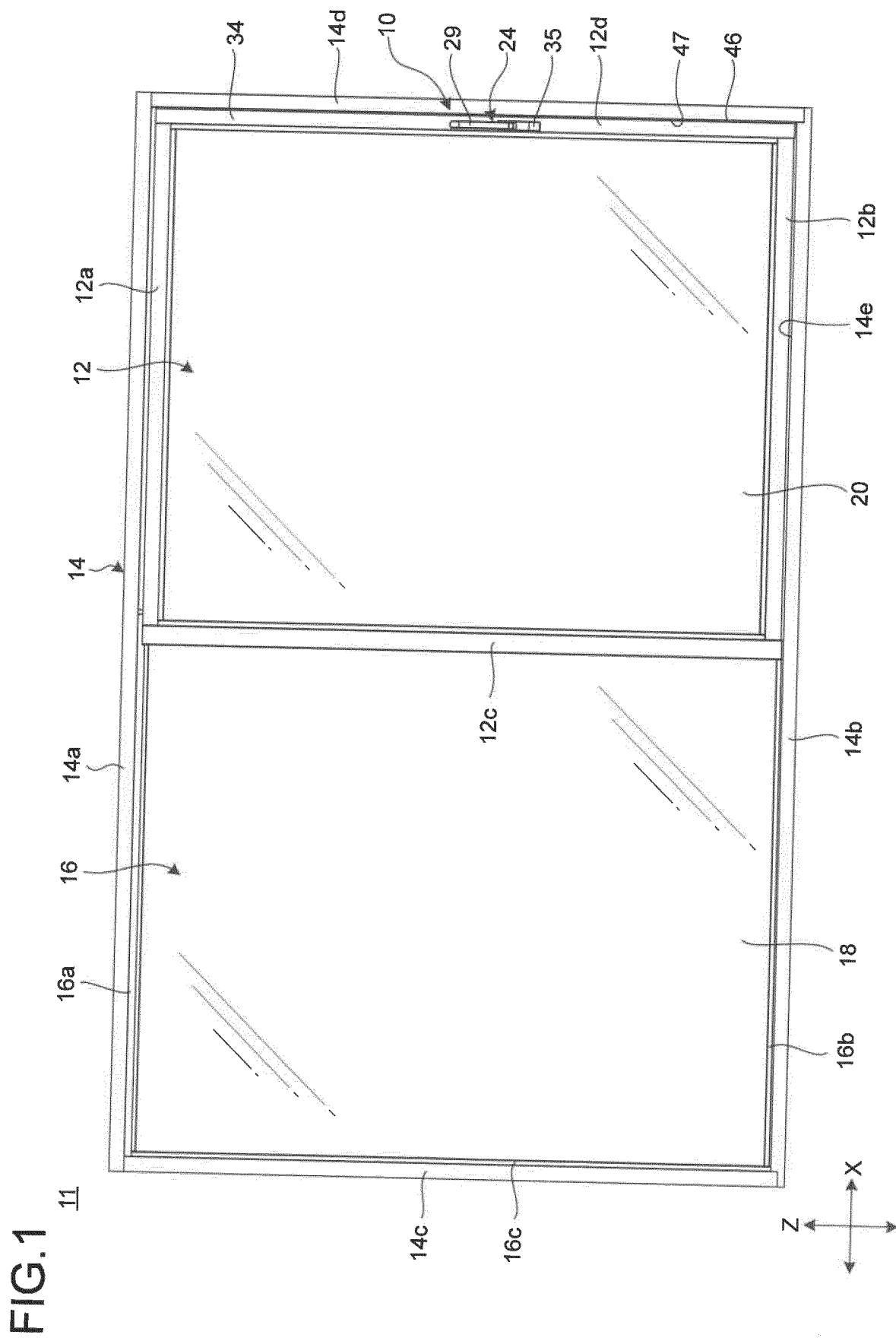


FIG.2

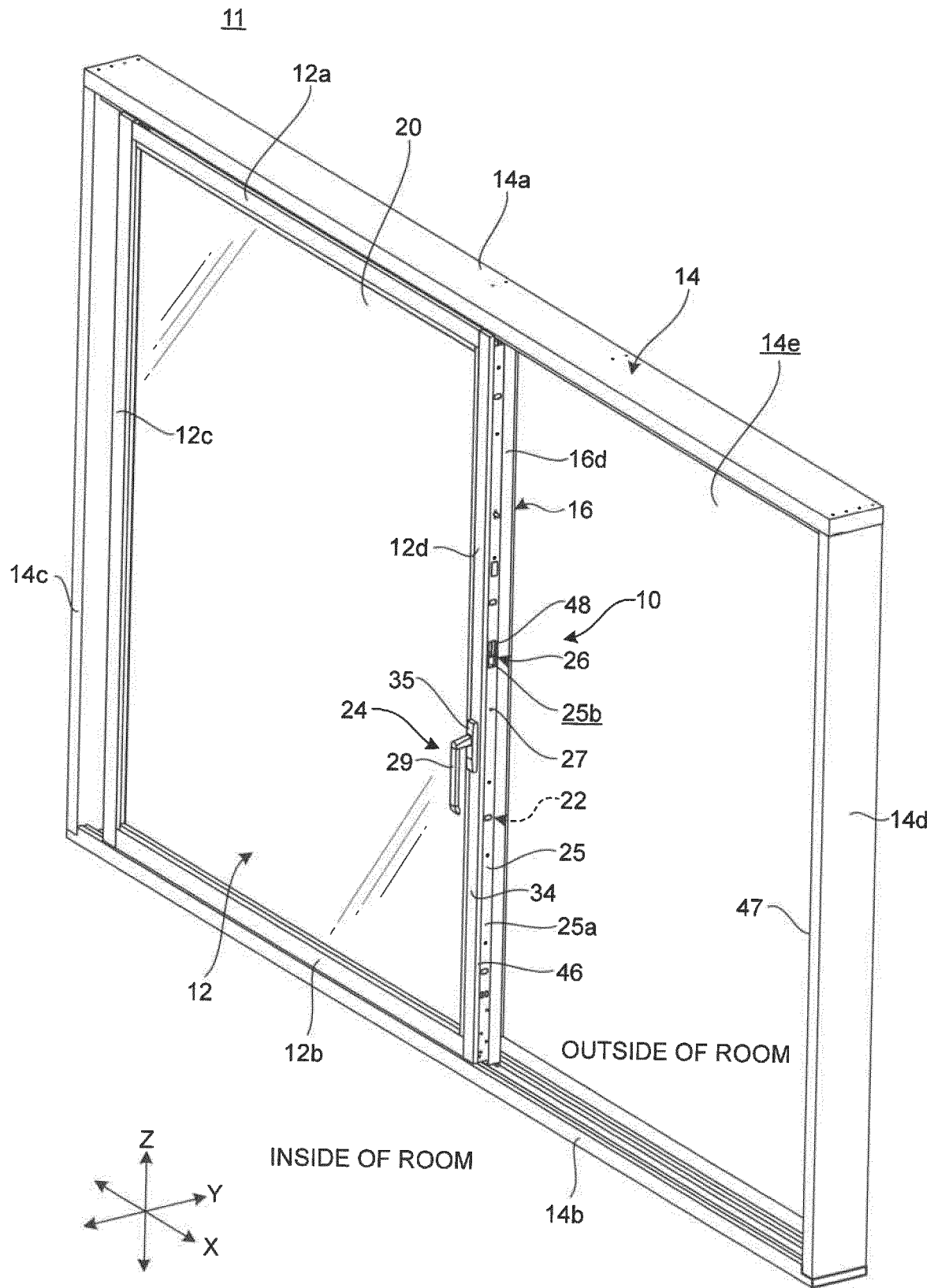


FIG.3

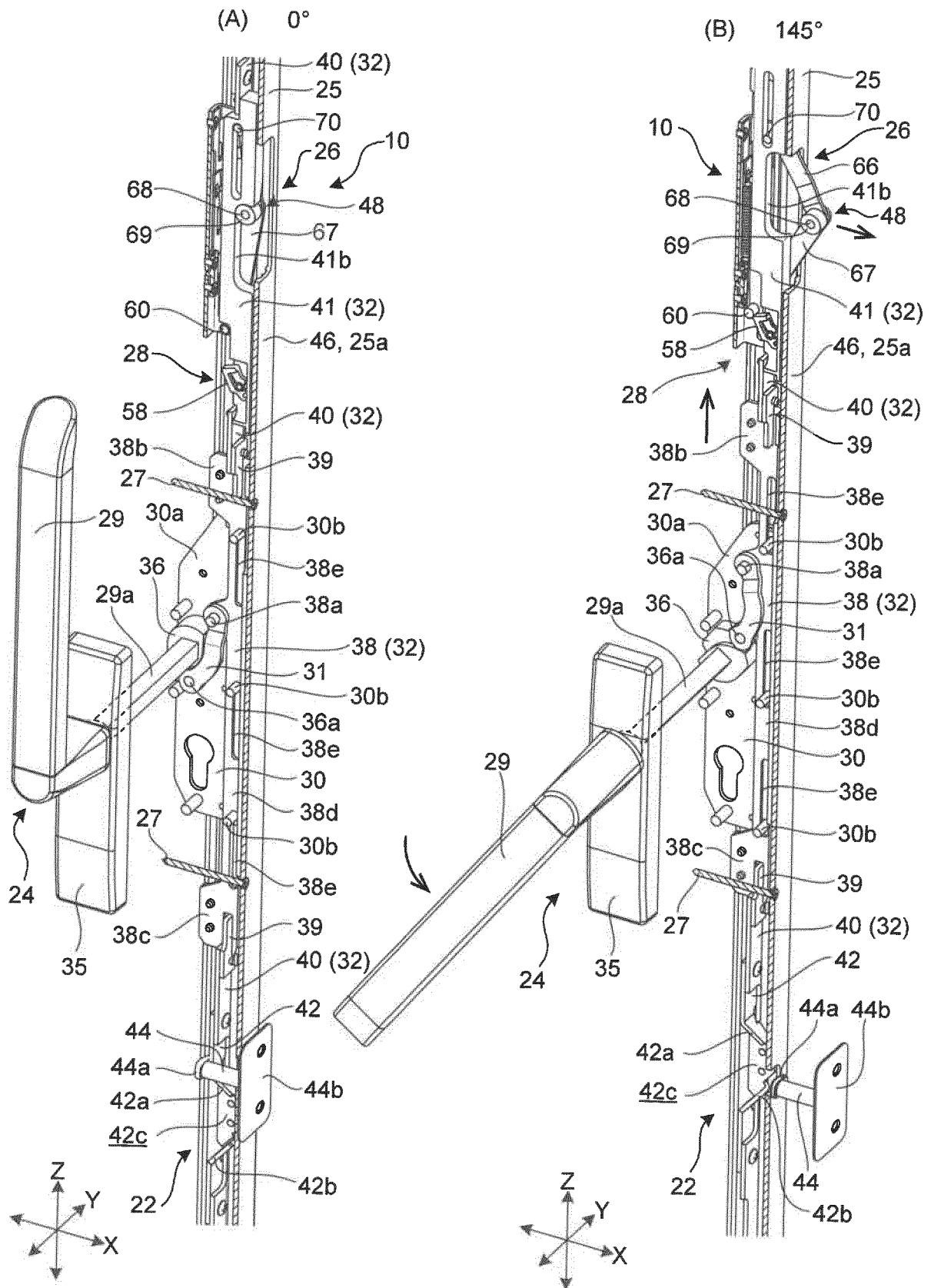


FIG.4

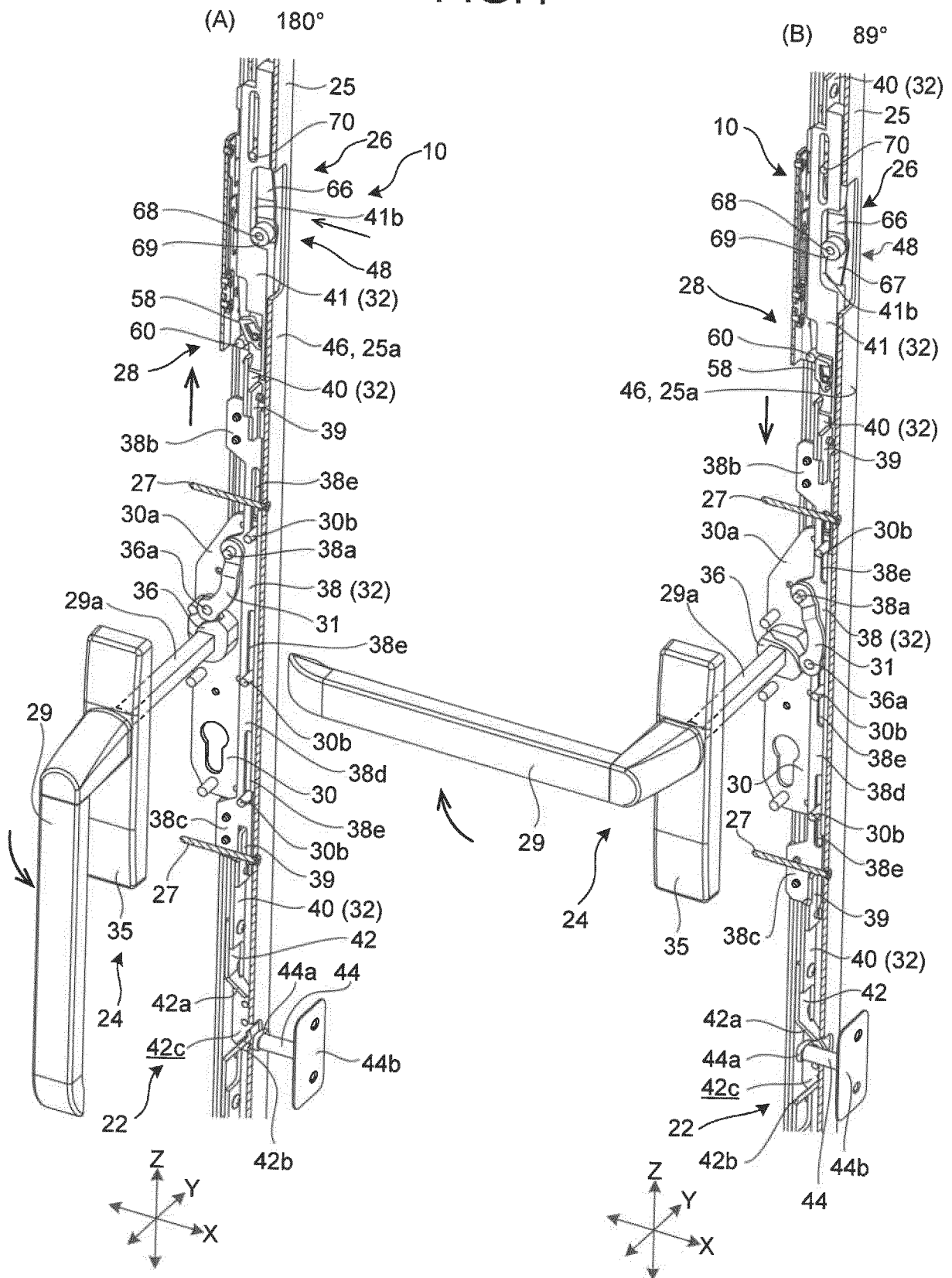


FIG.5

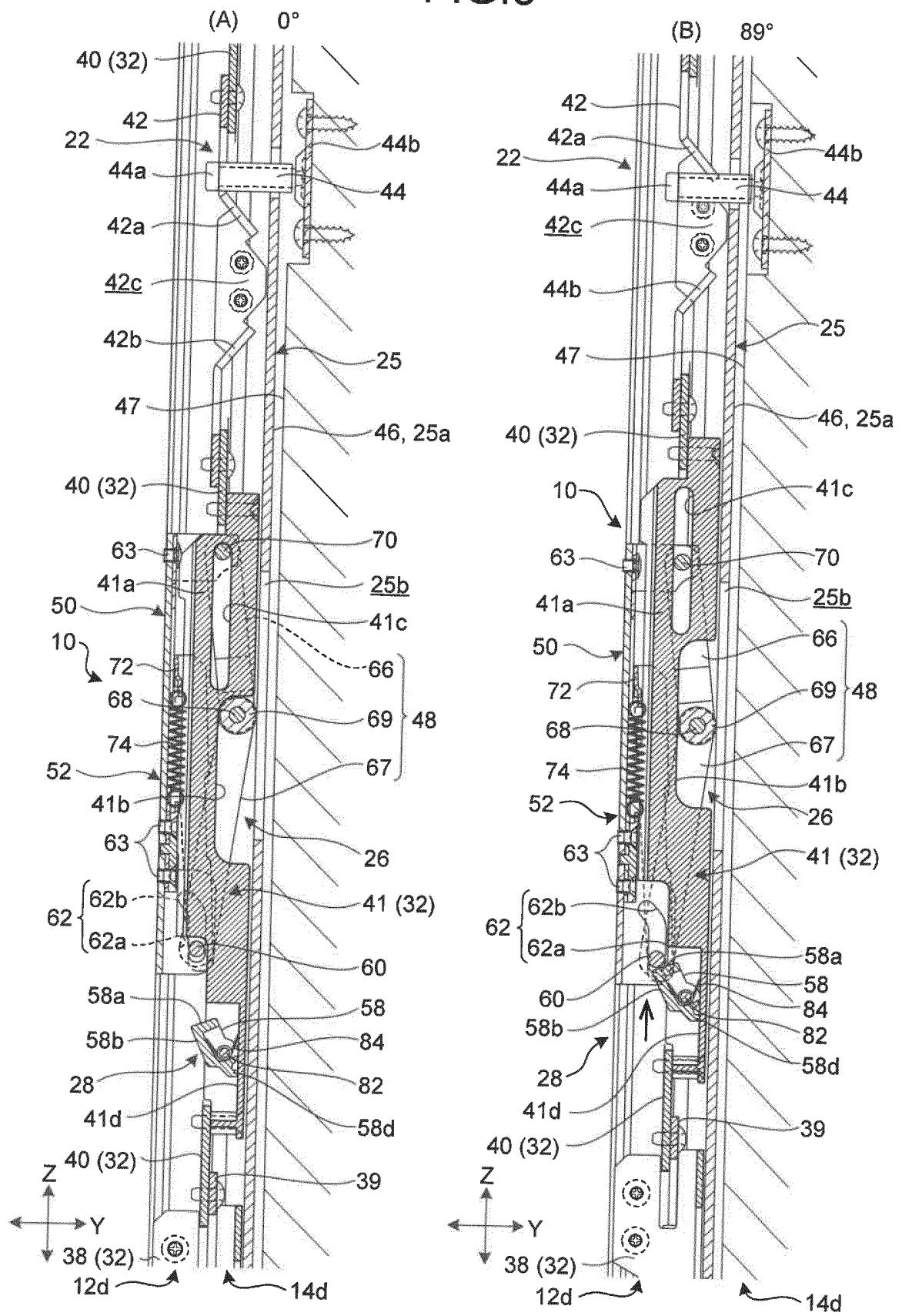


FIG.6

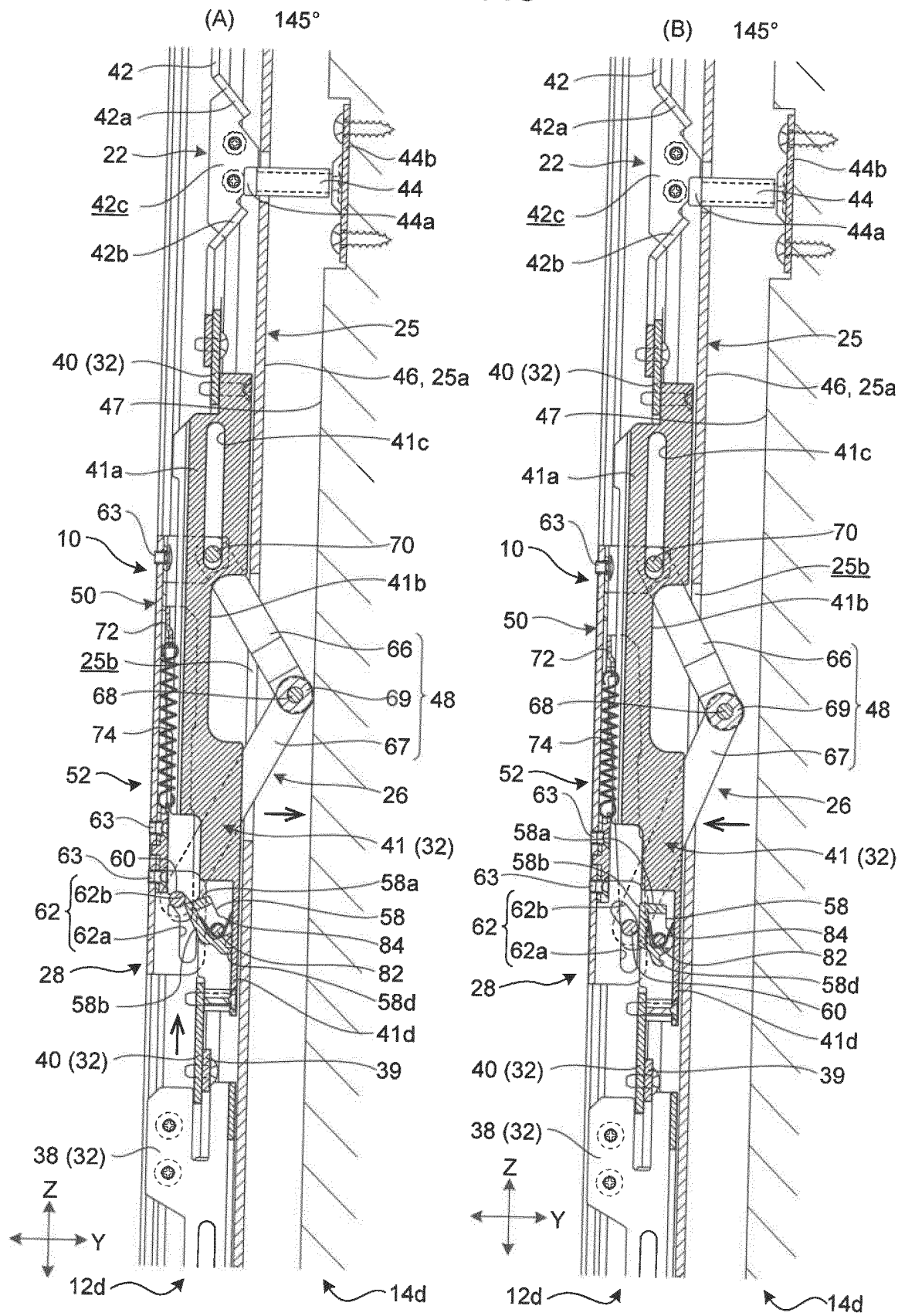


FIG.7

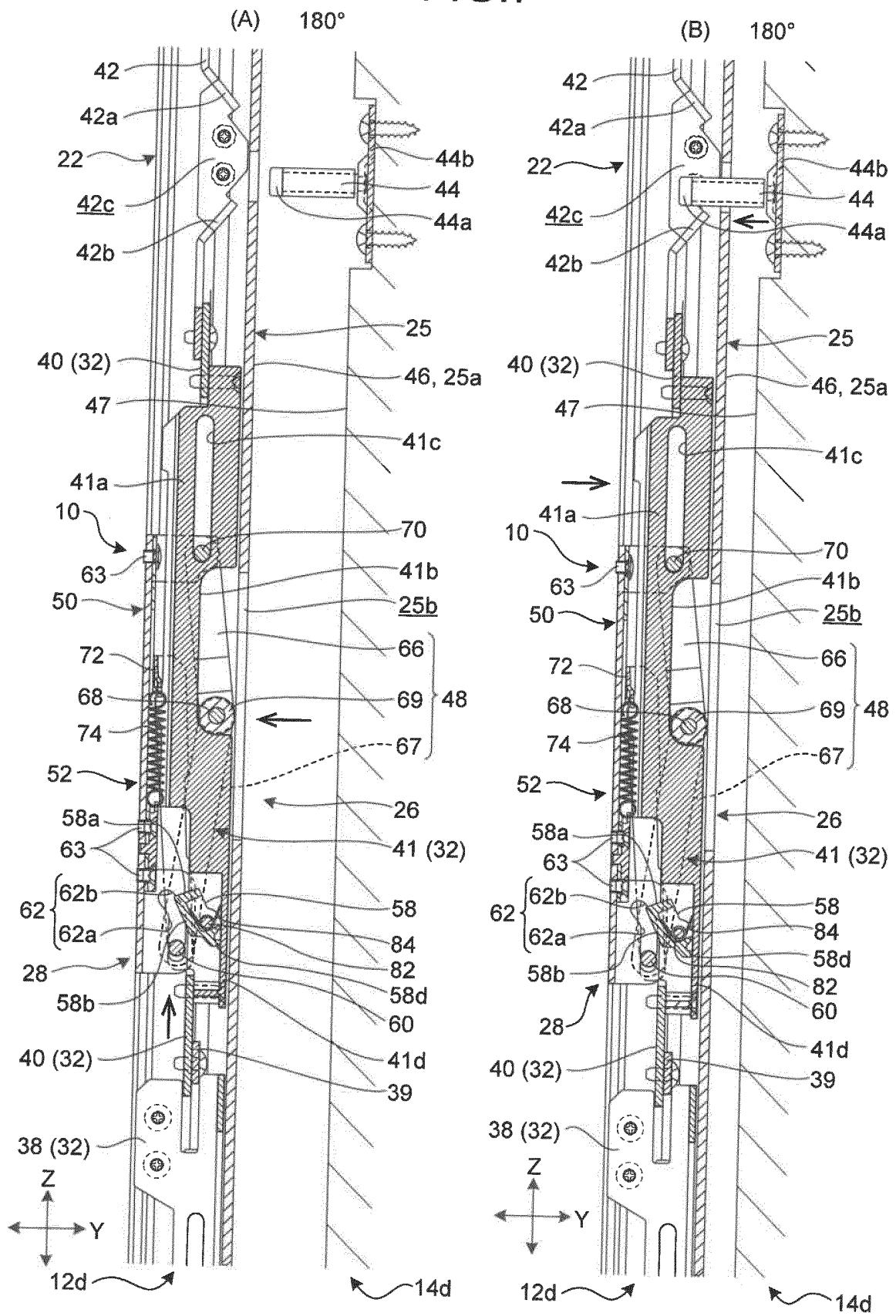
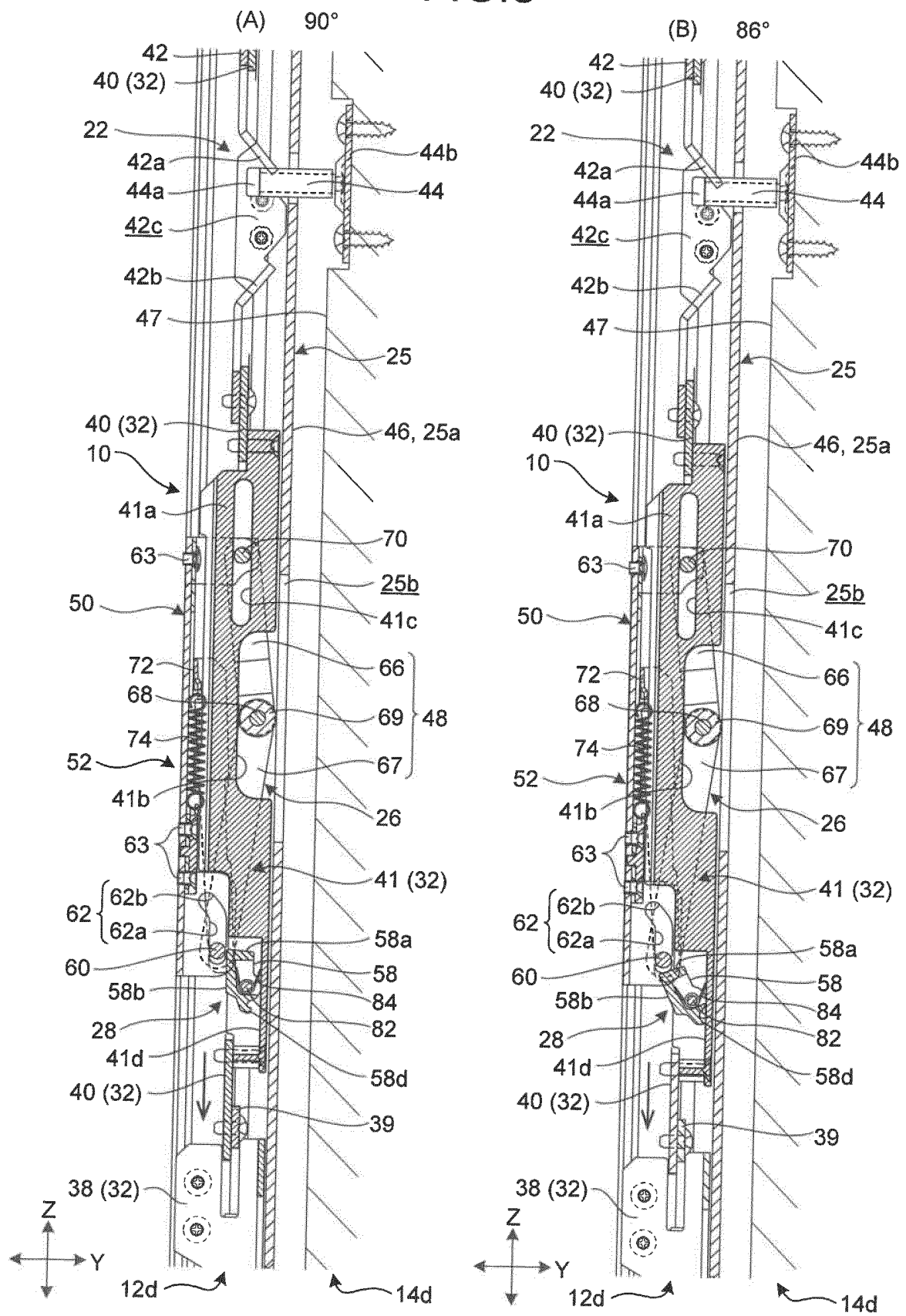
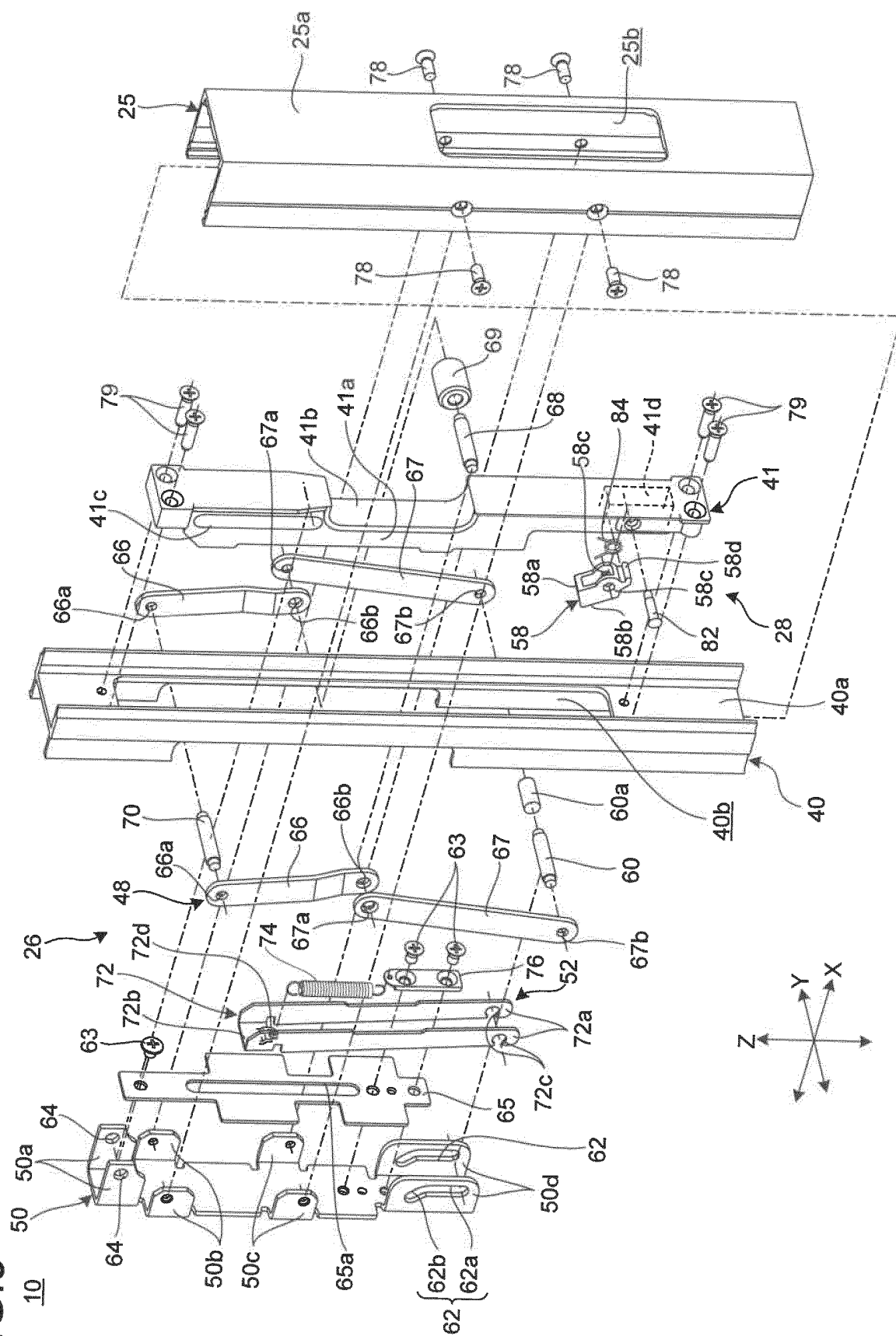


FIG.8





REFERENCES CITED IN THE DESCRIPTION

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