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(54) **LOCK DEVICE FOR AUTOMATIC VENDING MACHINE**

(57) Provided is a locking device of an automatic vending machine including: a locking member R; and a slider 31 having an approximately C-shaped transverse section and arranged so as to be movable between a locking position at which the slider 31 is capable of engaging the lock member having entered through a slider opening 3111 formed on the slider 31 and a releasing

position at which the engagement with the locking member is released, wherein the slider 31 has an abutting piece 3122 which is integrally formed at a predetermined location of an extending end portion of the slider 31 and which abuts a tip of a tool K that is an elongated rod-like body when the tool K is entered through the slider opening 3111.

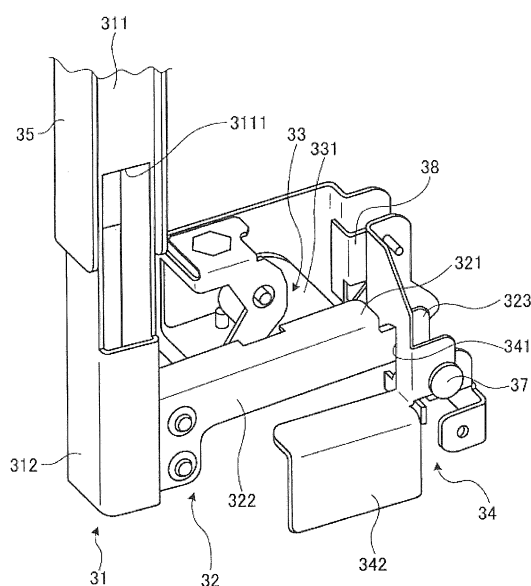


FIG. 3

Description

TECHNICAL FIELD

[0001] The present invention relates to a locking device of an automatic vending machine and, more specifically, to a locking device of an automatic vending machine which maintains a state where a door body closes a front opening of an automatic vending machine main body due to an engagement between a locking member arranged on one of the automatic vending machine main body and the door body and a slider arranged on the other of the automatic vending machine main body and the door body, and which allows the door body to perform an opening movement and the front opening of the automatic vending machine main body to be opened due to a release of the engagement between the locking member and the slider.

BACKGROUND ART

[0002] Generally, an automatic vending machine includes an automatic vending machine main body which has a cuboid shape with an open front surface and which internally stores products, and a door body arranged so as to be capable of opening and closing the front opening of the automatic vending machine main body. A rectangular opening is formed on the door body, and a slider supported by a supporting member so as to be slidable in a vertical direction between a locking position and a releasing position is arranged on the door body. The slider has an approximately C-shaped transverse section and is provided with a rectangular opening which allows entry by a locking member that is a hook-like metal fixture arranged on the automatic vending machine main body. In addition, a rectangular hole is formed on the slider and a rod (an elongated columnar portion) of a cylinder lever is inserted into the rectangular hole. The cylinder lever is coupled to an inner cylinder of a cylinder lock which is arranged on a front surface of the door body and which has a key insertion slot. The cylinder lever performs an unlocking movement around its own axis in response to an unlocking operation of a key inserted into the key insertion slot and performs a locking movement around its own axis in response to a locking operation of the key. The slider moves from the locking position to the releasing position as the rod abuts an upper edge portion of the rectangular hole due to an unlocking movement of the cylinder lever, and moves from the releasing position to the locking position as the rod abuts a lower edge portion of the rectangular hole due to a locking movement of the cylinder lever.

[0003] In a state where the door body blocks the front opening of the automatic vending machine main body, the locking member enters the rectangular opening of the slider which has descended to the locking position and engages an upper edge portion of the rectangular opening. Subsequently, when an ascending movement

of the slider to the releasing position is performed via the cylinder lever due to an unlocking operation of the key, the engagement between the locking member and the slider is released. Therefore, by having the door body perform an opening movement, the front opening of the automatic vending machine main body is opened and restocking of products and the like can be performed. Moreover, the slider having performed an ascending movement to the releasing position is held at the releasing position due to an engagement of a slider holding member with the rectangular opening.

[0004] On the other hand, by causing the door body to perform a closing movement so as to close the front opening of the automatic vending machine main body, the locking member enters the rectangular opening of the slider held at the releasing position by the slider holding member, the locking member presses down the slider holding member to release the engagement by the slider holding member, and the slider automatically moves from the releasing position to the locking position due to the slider's own weight. Accordingly, the upper edge portion of the rectangular opening of the slider and the locking member abut each other and the slider and the locking member engage each other. Due to the engagement between the slider and the locking member in this manner, a state where the door body closes the front opening of the automatic vending machine main body is retained.

[0005] As shown, the slider holding member which holds the slider at a releasing position is equipped with a function for automatically engaging the slider and the locking member with each other by closing the door body to cause the slider to descend to the locking position. Therefore, an inconvenience of performing an unlocking operation of the key when closing the door body to cause the slider to descend and engage the locking member can be eliminated (for example, refer to Patent Document 1).

[0006] Patent Document 1: Japanese Patent Application Laid-open No. 2002-342827

[0007] When a tool that is an elongated rod-like body such as a driver is entered through the rectangular opening of the slider by taking off an anti-theft plate provided on the door body in the event that a state is maintained in which the door body closes the front opening of the automatic vending machine main body, since the slider has an approximately C-shaped transverse section, a tip of the tool unintentionally abuts a slider holding member or a supporting member (hereinafter also referred to as a "slider holding member or the like") and a middle part of the tool abuts an edge portion of the rectangular opening of the slider. In this state, when the tool is swung in, for example, a vertical direction using the tip of the tool as a fulcrum, there is a risk that the slider may separate from the slider holding member or the like due to the principle of leverage and a sliding movement of the slider from the locking position to the releasing position may occur. When a sliding movement of the slider from the locking position to the releasing position occurs in this

manner, the engagement between the slider and the locking member is released and the front opening of the automatic vending machine main body can be opened due to the door body performing an opening movement, which is inappropriate.

[0008] Meanwhile, a rectangular hole is formed in the slider and a rod (an elongated columnar portion) of a cylinder lever is inserted into the rectangular hole. The cylinder lever performs an unlocking movement around its own axis in response to an unlocking operation of a key inserted into a key insertion slot arranged on a front surface of the door body and performs a locking movement around its own axis in response to a locking operation of the key. The slider moves from the locking position to the releasing position as the rod abuts an upper edge portion of the rectangular hole due to an unlocking movement of the cylinder lever, and moves from the releasing position to the locking position as the rod abuts a lower edge portion of the rectangular hole due to a locking movement of the cylinder lever.

[0009] Therefore, when a state is maintained in which the door body closes the front opening of the automatic vending machine main body or, in other words, when the slider and the locking member are engaged with each other, due to an unlocking operation of a key inserted into the key insertion slot, the cylinder lever performs an unlocking movement and the slider moves from the locking position to the releasing position. The slider having moved to the releasing position is held by the slider holding member. Once the slider is held at the releasing position, an engaged state with the locking member is released and the front opening of the automatic vending machine main body can now be opened by having the door body perform an opening movement.

[0010] Generally, a key is inserted into the key insertion slot by a routeman who is responsible for restocking products, maintenance, and the like. In addition, with a cylinder lock, a position at which a key is inserted and removed is set to a fixed position (for example, the position of 12 o'clock on a clock). Therefore, when an unlocking operation is performed by inserting a key into the key insertion slot or, in other words, when an unlocking operation is performed by inserting a key into the key insertion slot and turning the key clockwise by 90 degrees, the key cannot be removed in this state. In order to remove the key, a locking operation (which involves turning the key counter-clockwise by 90 degrees to restore the key to the original position) must be performed. However, the slider, to which the cylinder lever is coupled, has ascended to a releasing position due to the unlocking operation and is held by the slider holding member. Therefore, the key cannot be removed from the key insertion slot unless either the door body is closed or the maintained state of the slider by the slider holding member is released. Furthermore, the routeman generally carries the key together with keys of other automatic vending machines on a mounting portion such as a dedicated cord or the like on a belt loop of his/her own uniform.

[0011] Therefore, in order to perform restocking of products, the routeman first inserts a key into the key insertion slot and performs an unlocking operation. Accordingly, the slider moves from the locking position to the releasing position via the cylinder lever and an engagement between the slider and the locking member is released. Consequently, while the front opening of the automatic vending machine main body can be opened by having the door body perform an opening operation, since the key is attached to the routeman's own uniform via a mounting member such as a cord as described above, the key must be removed from the key insertion slot in order to perform restocking of products or the like. In order to do so, after releasing the held state of the slider at the releasing position by the slider holding member, a locking operation of the key is performed in order to remove the key from the key insertion slot. Since a locking operation is performed to remove the key from the key insertion slot in this manner, the slider has made a sliding movement from the releasing position to the locking position via the cylinder lever. While the front opening of the automatic vending machine main body must be closed by having the door body perform a closing operation after the restocking of products or the like, a locking operation has been performed in order to remove the key from the key insertion slot and the slider has moved to the locking position. Therefore, since the locking member is unable to enter the rectangular opening of the slider even if a closing movement is performed as is by the door body, the routeman must once again insert the key into the key insertion slot and perform an unlocking operation, move the slider from the locking position to the releasing position, and while maintaining this state, have the door body perform a closing movement to close the front opening of the automatic vending machine main body and have the slider and the locking member engage each other in order to remove the key from the key insertion slot.

[0012] As shown, when performing restocking of products or the like, closing the front opening of the automatic vending machine main body by having the door body perform a closing operation after opening the front opening of the automatic vending machine main body by having the door body perform an opening operation requires that the key is once again inserted into the key insertion slot to perform an unlocking operation, making servicing such as restocking of products a hassle. Aside from the above, there are always demands for locking devices which maintain a state where the door body closes the front opening of the automatic vending machine main body and which have superior anti-theft performance.

[0013] The present invention has been made in consideration of the above circumstances, and an object thereof is to provide a locking device of an automatic vending machine which is capable of preventing a slider from moving from a locking position to a releasing position even if an elongated rod-like body such as a tool is entered through a rectangular opening.

DISCLOSURE OF THE INVENTION

[0014] In addition, in consideration of the above circumstances, another object of the present invention is to provide a locking device of an automatic vending machine which is capable of securing favorable anti-theft performance while improving efficiency of servicing such as restocking of products.

[0015] In order to achieve the object described above, a locking device of an automatic vending machine according to claim 1 of the present invention includes: a locking member attached to one of an automatic vending machine main body which has a cuboid shape with an open front surface and which internally stores products, and a door body arranged so as to be capable of opening and closing the front opening of the automatic vending machine main body; and a slider having an approximately C-shaped transverse section and arranged on the other of the automatic vending machine main body and the door body so as to be movable between a locking position at which the slider is capable of engaging the lock member having entered through a rectangular opening formed on the slider and a releasing position at which the engagement with the locking member is released, the locking device of an automatic vending machine maintaining a state where the door body closes the front opening of the automatic vending machine main body due to the engagement between the locking member and the slider and allowing the door body to perform an opening movement and the front opening of the automatic vending machine main body to be opened due to a release of the engagement between the locking member and the slider, wherein the slider has an abutting piece which is integrally formed at a predetermined location of an extending end portion of the slider and which abuts a tip of an elongated rod-like body when the rod-like body is entered through the rectangular opening.

[0016] In addition, a locking device of an automatic vending machine according to claim 2 of the present invention is the locking device of an automatic vending machine according to claim 1, further including a slider holding member which holds the slider at the releasing position when the slider moves from the locking position to the releasing position and which releases holding of the slider and allows the slider to move from the releasing position to the locking position when the locking member enters the slider positioned at the releasing position and the slider holding member is pressed down by the locking member, wherein the slider holding member is formed with a notched portion which causes a tip of an elongated rod-like body to abut the abutting piece when the rod-like body is entered through the rectangular opening.

[0017] A locking device of an automatic vending machine according to claim 3 of the present invention includes: a locking member attached to one of an automatic vending machine main body which has a cuboid shape with an open front surface and which internally stores products, and a door body arranged so as to be capable

of opening and closing the front opening of the automatic vending machine main body; and a slider having an approximately C-shaped transverse section and arranged on the other of the automatic vending machine main body and the door body so as to be movable between a locking position at which the slider is capable of engaging the lock member having entered through a rectangular opening formed on the slider and a releasing position at which the engagement with the locking member is released, the locking device of an automatic vending machine maintaining a state where the door body closes the front opening of the automatic vending machine main body due to the engagement between the locking member and the slider and allowing the door body to perform an opening movement and the front opening of the automatic vending machine main body to be opened due to a release of the engagement between the locking member and the slider, the locking device of an automatic vending machine further including: a cylinder lever which respectively performs a locking movement and an unlocking movement around its own axis in response to a locking operation and an unlocking operation of a key inserted into a predetermined key insertion slot; a coupling member which is integrally arranged with the slider, which is displaced by being abutted by the cylinder lever and moves the slider from the locking position to a releasing position when the cylinder lever performs the unlocking movement, and which constantly allows the locking movement by the cylinder lever when the cylinder lever performs the locking movement; and a restricting member which normally restricts displacement of the coupling member and suppresses movement of the slider from the locking position to the releasing position and which allows displacement of the coupling member when the cylinder lever performs the unlocking movement.

[0018] In addition, a locking device of an automatic vending machine according to claim 4 of the present invention is the locking device of an automatic vending machine according to claim 3, wherein the restricting member is arranged so as to be swingable around its own axis between a restricting position and an allowing position, restricts displacement of the coupling member and suppresses movement of the slider from the locking position to the releasing position when the restricting member is positioned at the restricting position, and allows displacement of the coupling member when the restricting member is positioned at the allowing position, and the locking device of an automatic vending machine further includes a guiding member which is interposed between the cylinder lever and the restricting member and which is abutted by the cylinder lever and causes the restricting member to swing from the restricting position to the allowing position when the cylinder lever performs the unlocking movement.

[0019] Furthermore, a locking device of an automatic vending machine according to claim 5 of the present invention is the locking device of an automatic vending machine according to claim 3 or 4, further including a

slider holding member which holds the slider at the releasing position when the slider moves from the locking position to the releasing position and which releases holding of the slider and allows the slider to move from the releasing position to the locking position when the locking member enters the slider positioned at the releasing position and the slider holding member is pressed down by the locking member.

[0020] According to the present invention, since the slider has an abutting piece which is integrally formed at a predetermined location of an extending end portion of the slider and which abuts a tip of an elongated rod-like body when the rod-like body is entered through the rectangular opening, both the tip and a middle part of the rod-like body abut the slider that is a same member. Therefore, even if the rod-like body is swung with its tip as a fulcrum, only the slider deforms due to the principle of leverage and there is no risk of the slider separating from the slider holding member or the like and performing a sliding movement from the locking position to the releasing position. As a result, an advantageous effect is achieved in that the slider can be prevented from moving from the locking position to the releasing position.

[0021] In addition, according to the present invention, a coupling member integrally arranged with the slider is displaced by being abutted by the cylinder lever and moves the slider from the locking position to the releasing position when the cylinder lever performs an unlocking movement and constantly allows a locking movement by the cylinder lever when the cylinder lever performs a locking movement. Therefore, when a closing movement of the door body is performed after performing servicing such as restocking of products, there is no longer a need to once again insert a key into the key insertion slot and servicing such as restocking of products becomes hassle-free. Furthermore, since a restricting member normally restricts displacement of the coupling member and suppresses movement of the slider from the locking position to the releasing position and allows displacement of the coupling member when the cylinder lever performs an unlocking movement, anti-theft performance can be secured when a state is maintained where the door body closes the front opening of the automatic vending machine main body. As a result, an advantageous effect is achieved in that anti-theft performance can be favorably secured while improving efficiency of servicing such as restocking of products.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a perspective view showing an internal structure of an automatic vending machine to which a locking device according to an embodiment of the present invention has been applied;

FIG. 2 is a perspective view showing substantial parts that constitute a locking device including a slid-

er arranged inside a pocket portion of an outer door shown in FIG. 1;

FIG. 3 is a perspective view schematically showing an enlargement of the substantial parts of the locking device shown in FIG. 2;

FIG. 4 is an exploded perspective view which shows a breakdown of the slider shown in FIG. 2 and which is a view from an opposite side to FIGS. 2 and 3;

FIG. 5 is an enlarged plan view showing a case where the slider shown in FIG. 2 is viewed from above;

FIG. 6 is a perspective view schematically showing a part of the substantial parts of the locking device shown in FIG. 3;

FIG. 7 is a perspective view schematically showing an enlargement of an operation of the substantial parts of the locking device shown in FIG. 2;

FIG. 8 is a perspective view schematically showing an enlargement of an operation of the substantial parts of the locking device shown in FIG. 2;

FIG. 9 is a perspective view schematically showing an enlargement of an operation of the substantial parts of the locking device shown in FIG. 2;

FIG. 10 is a perspective view schematically showing a part of the substantial parts of the locking device shown in FIG. 9;

FIG. 11 is a perspective view schematically showing an enlargement of an operation of the substantial parts of the locking device shown in FIG. 2;

FIG. 12 is a perspective view schematically showing a part of the substantial parts of the locking device shown in FIG. 11; and

FIG. 13 is a plan view showing a case where a tool is inserted in FIG. 5.

BEST MODE FOR CARRYING OUT THE INVENTION

[0023] Hereinafter, a preferred embodiment of a locking device of an automatic vending machine according to the present invention will be described in detail with reference to the accompanying drawings where appropriate.

[0024] FIG. 1 is a perspective view showing an internal structure of an automatic vending machine to which a locking device according to an embodiment of the present invention has been applied. The automatic vending machine exemplified here is for sales of a product that is a canned beverage, a beverage in a plastic bottle, a beverage in a carton, or the like in a refrigerated or heated state, and includes a main body cabinet 1 that is an automatic vending machine main body.

[0025] The main body cabinet 1 is shaped as a cuboid with an open front surface. An interior of the main body cabinet 1 is partitioned into halves, with an upper half constituting a product storage chamber 2 and a lower half constituting a machine room 3. The product storage chamber 2 is a chamber having an interior kept at a preset temperature condition, and wall members constituting

the product storage chamber 2 are respectively formed of insulating material. In addition, although not shown in the drawing, cooling means for cooling internal atmosphere such as an evaporator that constitutes a refrigeration cycle and heating means for heating the internal atmosphere such as an electrical heater are provided.

[0026] Although details will be omitted, the product storage chamber 2 described above is provided with a product rack 4 and bucket driving means 5. The product rack 4 is constituted by juxtaposing a plurality of product storage columns in a horizontal direction, wherein each product storage column is capable of storing a plurality of products aligned in a front-back direction in a product storage passage that is demarcated in each product storage column. A plurality of these product racks 4 is provided in a vertical direction so as to bridge between rack supporting side plates (not shown) which are mounted to the product storage chamber 2 as a left and right pair. Moreover, in the present specification, a left side indicates leftward when the automatic vending machine is viewed from front, and a right side indicates rightward when the automatic vending machine is viewed from front.

[0027] The bucket driving means 5 is configured as an assembly of an x-axis conveying mechanism and a y-axis conveying mechanism. The x-axis conveying mechanism includes a rail member that extends in a horizontal direction in an area in front of the product rack 4 inside the main body cabinet 1, and moves a mounted bucket in a direction in which the rail member extends (the horizontal direction) due to driving of an x-axis motor.

[0028] The y-axis conveying mechanism is provided on a pair of left and right conveyance support frames. A pulley is rotatably arranged in a vicinity of an upper end portion of the conveyance support frames. A belt that is an elongated cord-like body is wound around the pulley. A waiter is connected to one end of the belt and a holding member for holding the rail member is connected to another end of the belt. As the pulley rotates due to driving by a y-axis motor, the y-axis conveying mechanism moves the rail member held by the holding member and the x-axis conveying mechanism mounted with a bucket in a vertical direction.

[0029] A refrigerator (a compressor and a condenser) that constitutes a refrigeration cycle together with the evaporator and various control devices are provided in the machine room 3.

[0030] An inner door 10 and an outer door (door body) 20 are provided on the front surface of the main body cabinet 1. The inner door 10 is formed by inlaying a transparent plate material such as insulated glass and is large enough to cover the front surface of the product storage chamber 2. When the inner door 10 performs a closing movement and blocks the front surface of the product storage chamber 2, the inner door 10 becomes an insulating member that constitutes the front surface of the product storage chamber 2.

[0031] A rectangular product discharge port 11 is

formed and a discharge flapper 12 for opening and closing the product discharge port 11 is provided in a lower area on a right-hand side of a central portion of the transparent plate of the inner door 10. The discharge flapper 12 is axially supported so as to be swingable in a front-back direction with its lower end being a free end, and normally closes the product discharge port 11 due to its own weight.

[0032] The outer door 20 is for opening and closing the front opening of the main body cabinet 1 and is constituted using an insulating material as necessary, and includes a window 21 made by inlaying a transparent plate such as insulated glass. Therefore, the automatic vending machine being described is a so-called glass-front vending machine with its interior viewable through the window 21 of the outer door 20. In addition, although not shown, arranged on the front surface of the outer door 20 are components necessary for automatic sales of products such as a selection switch for selecting sold products and a coin acceptor into which coins are inserted.

[0033] A locking member R and a slider 31 (refer to FIG. 2) which constitute a locking device are respectively arranged on the main body cabinet 1 and the outer door 20. As shown in FIG. 1, the locking member R is arranged at a predetermined location at a front end on a right-hand side of the main body cabinet 1. The locking member R is conventionally known and is a metal fixture shaped like a hook. The slider 31 is arranged inside a pocket portion 22 formed at an open end of the outer door 20. Reference numeral 23 in FIG. 1 denotes an opening of the pocket portion 22 which is formed at a same height level as the locking member R and which allows entry of the locking member R.

[0034] FIG. 2 is a perspective view showing substantial parts that constitute the locking device including the slider 31 arranged inside the pocket portion 22 of the outer door 20 shown in FIG. 1. FIG. 3 is a perspective view schematically showing an enlargement of the substantial parts of the locking device shown in FIG. 2. FIG. 4 is an exploded perspective view which shows a breakdown of the slider 31 shown in FIG. 2 and which is a view from an opposite side to FIGS. 2 and 3. FIG. 5 is an enlarged plan view showing a case where the slider 31 shown in FIG. 2 is viewed from above. As exemplified in FIGS 2 to 5, the locking device is configured so as to include a coupling member 32, a cylinder lever 33, and a restricting member 34 in addition to the slider 31.

[0035] The slider 31 is formed by appropriately bending a plate material such as a steel plate and has an approximately C-shaped transverse section. A rectangular opening (hereinafter also referred to as a slider opening) 3111 is formed at a position in a base portion 311 corresponding to the opening 23 of the pocket portion 22. A long hole 3121 whose longitudinal direction is a vertical direction is formed above both end side portions 312 of the slider 31. The slider 31 is arranged so as to be slidable in a vertical direction in a state where the slider 31 has

entered into a slider supporting piece (supporting member) 35 which has a C-shaped transverse section and which is fastened to the pocket portion 22 of the outer door 20. More specifically, a through hole 3511 is formed in both side portions 351 of the slider supporting piece 35 and, due to a slider pin member (not shown) being inserted into the through hole 3511 and the long hole 3121, the slider 31 is arranged so as to be slidable in a vertical direction. In this case, a position where the slider pin member and a lower edge portion of the long hole 3121 abut each other is an upper limit position of upward movement of the slider 31, and a position where the slider pin member and an upper edge portion of the long hole 3121 abut each other is a lower limit position of downward movement of the slider 31. The upper limit position is a releasing position and the lower limit position is a locking position. In other words, the slider 31 is arranged so as to be movable between the locking position and the releasing position.

[0036] A slider holding member 36 is axially supported inside the slider 31 described above so as to be swingable around an axis of the slider pin member while being inserted by the slider pin member. The slider holding member 36 is formed by appropriately bending a plate material such as a steel plate and has an approximately C-shaped transverse section. A latch portion 3611 that protrudes toward the base portion 311 of the slider 31 (a rear surface-side of the outer door 20) is formed on a downward-extending end portion of the side portion 361 positioned on the open end-side of the outer door 20, and is constantly biased toward the base portion 311 of the slider 31 by a spring member B constituted by a coil spring wound around the slider pin member.

[0037] With the slider holding member 36 described above, when the slider 31 performs an upward sliding movement and is positioned at the upper limit position or, in other words, the releasing position, the latch portion 3611 protrudes from the slider opening 3111 and engages with an upper edge portion of the slider opening 3111, and the slider holding member 36 holds the slider 31 in a state where the slider 31 is positioned at the releasing position.

[0038] On the other hand, although the locking member R arranged in the main body cabinet 1 passes through the opening 23 of the pocket portion 22 and then enters into the slider 31 through the slider opening 3111 when the front opening of the main body cabinet 1 is closed by a closing movement of the outer door 20, the slider holding member 36 swings against a biasing force of the spring member B so as to separate from the base portion 311 of the slider 31 due to the locking member R having entered inside abutting an abutting portion 3621 formed at a base portion 362 of the slider holding member 36. When the slider holding member 36 swings so as to separate from the base portion 311 of the slider 31 in this manner, the engagement between the latch portion 3611 and the upper edge portion of the slider opening 3111 is released and the slider 31 performs a downward sliding

movement due to its own weight and reaches the lower limit position or, in other words, the locking position. Accordingly, the upper edge portion of the slider opening 3111 and the locking member R abut each other and the slider 31 engages with the locking member R at the locking position.

[0039] With the slider 31 described above, an abutting piece 3122 is integrally formed by welding at a predetermined location of an extended end portion of the side portion 312 positioned on an opposite side to the open end of the outer door 20 or, in other words, a location with approximately a same height level as the slider holding member 36. The abutting piece 3122 is provided so as to extend from the extended end portion of the side portion 312 toward the side portion 312 on the open end side. In addition, in the base portion 362 of the slider holding member 36, a notched portion 3622 is formed in an area on an opposite side to the open end of the outer door 20 or, in other words, an area opposing the abutting piece 3122.

[0040] The coupling member 32 is formed by appropriately bending a plate material such as a steel plate and is integrally formed at a lower end portion of the slider 31 so as to protrude in an opposite direction to the open end of the outer door 20. As shown in FIG. 6, this coupling member 32 has a horizontal portion 321 that extends in a horizontal direction and a suspended portion 322 that extends downward from an end portion of the horizontal portion 321. A hook portion 323 is formed at an extended end portion of the suspended portion 322.

[0041] The cylinder lever 33 is axially supported so as to be swingable around an axis of its own shaft portion by an inner cylinder of a key cylinder which rotationally moves in accordance with a locking operation and an unlocking operation of a key inserted into a key insertion slot (not shown) provided on a front surface of the outer door 20 (an outer cylinder of the key cylinder is fastened to a frame member of the outer door 20). More specifically, the cylinder lever 33 performs an upward unlocking movement due to an unlocking operation of the key inserted into the key insertion slot and performs a downward locking movement due to a locking operation of the key. The cylinder lever 33 has an elliptically-shaped portion 331, and a rod member 332 is provided so as to protrude toward the suspended portion 322 of the coupling member 32 at a portion other than a shaft portion of the elliptically-shaped portion 331. The rod member 332 is positioned in an area below the horizontal portion 321 of the coupling member 32.

[0042] The restricting member 34 is formed by appropriately bending a plate material such as a steel plate and is arranged on a frame member of the outer door 20 via a restricting pin member 37 so as to be swingable around its own axis that is consistent with a central axis of the restricting pin member 37. A groove portion 341 opened to below and a weight portion 342 are respectively formed on the restricting member 34, and the restricting member 34 is positioned at a restricting position

due to the weight portion 342 as shown in FIG. 3. When the restricting member 34 is positioned at the restricting position, entry by the hook portion 323 of the coupling member 32 into the groove portion 341 is allowed. In other words, when the restricting member 34 is positioned at the restricting position, the groove portion 341 is positioned in an area above the hook portion 323.

[0043] A guiding member 38 is interposed between the restricting member 34 and the cylinder lever 33. The guiding member 38 is coupled to the restricting member 34. When the cylinder lever 33 performs an unlocking movement, the guiding member 38 is abutted against a part of a peripheral edge portion of the elliptically-shaped portion 331 of the cylinder lever 33 and, as shown in FIG. 7, swings the restricting member 34 positioned at the restricting position upward against a force of gravity of the weight portion 342 and moves the restricting member 34 to the allowing position. In this case, when the cylinder lever 33 performs an unlocking movement, an adjustment is made in advance so that a part of the peripheral edge portion of the elliptically-shaped portion 331 of the cylinder lever 33 abuts the guiding member 38 before the rod member 332 of the cylinder lever 33 abuts a lower surface of the horizontal portion 321 of the coupling member 32. Accordingly, the restricting member 34 is positioned at the allowing position before the rod member 332 of the cylinder lever 33 abuts the horizontal portion 321 of the coupling member 32 and, as a result, the hook portion 323 of the coupling member 32 disengages from the groove portion 341 of the restricting member 34.

[0044] With an automatic vending machine to which a locking device configured as described above is applied, servicing such as restocking of products with respect to the inside of the main body cabinet 1 can be performed as follows.

[0045] First, a case where the locking device maintains a state where the outer door 20 closes the front opening of the main body cabinet 1 will be described. In this case, the slider 31 constituting the locking device is positioned at the locking position and is in engagement with the locking member R, and the restricting member 34 is positioned at the restricting position.

[0046] In such a case, when an anti-theft plate 24 (refer to FIG. 5) of the outer door 20 is taken off by a mindless third party attempting to cause an upward sliding movement of the slider 31 positioned at the locking position by inserting a foreign object into the slider opening 3111 of the slider 31, as shown in FIG. 8, the hook portion 323 of the coupling member 32 integrally formed with the slider 31 abuts the restricting member 34 positioned at the restricting position and restricts further upward sliding movement of the slider 31.

[0047] In addition, when a key is inserted into the key insertion slot of the automatic vending machine by a routeman performing servicing such as restocking of products and an unlocking operation of the key is performed, the cylinder lever 33 performs an upward unlocking movement as shown in FIG. 7. Due to the guiding

member 38 being abutted by a part of the peripheral edge portion of the cylinder lever 33 in the process of unlocking, the restricting member 34 swings from the restricting position toward the allowing position against a force of gravity of the weight portion 342. Accordingly, the hook portion 323 of the coupling member 32 disengages from the groove portion 341 of the restricting member 34. In other words, when the restricting member 34 is positioned at the restricting position, the restricting member 34 restricts upward displacement of the coupling member 32 and suppresses a sliding movement of the slider 31 from the locking position to the releasing position, and when the restricting member 34 is positioned at the allowing position, the restricting member 34 allows displacement of the coupling member 32.

[0048] Subsequently, as shown in FIGS. 9 and 10, as a result of the lower surface of the horizontal portion 321 of the coupling member 32 being abutted by the rod member 332 of the cylinder lever 33 performing an unlocking movement and the coupling member 32 displaced upward by being pressed by the rod member 332, the slider 31 with which the coupling member 32 is integrally formed also performs a sliding movement from the locking position to the releasing position.

[0049] When the slider 31 performs an upward sliding movement as described above and is positioned at the releasing position, the latch portion 3611 of the slider holding member 36 protrudes from the slider opening 3111 toward the rear surface side and engages with the upper edge portion of the slider opening 3111, and holds the slider 31 in a state where the slider 31 is positioned at the releasing position. When the slider 31 is held at the releasing position in this manner, an engaged state between the slider 31 and the locking member R is released.

[0050] As described earlier, the coupling member 32 is constituted by the horizontal portion 321 and the suspended portion 322 and is shaped such that the coupling member 32 is opened to below. Therefore, even when the routeman performs a locking operation of the key in order to remove the key from the key insertion slot, a downward locking movement of the cylinder lever 33 is allowed in a state where the slider 31 is positioned at the releasing position as shown in FIGS. 11 and 12.

[0051] In other words, the coupling member 32 is integrally arranged with the slider 31. When the cylinder lever 33 performs an unlocking movement, the coupling member 32 is displaced due to being abutted by the cylinder lever 33 and moves the slider 31 from the locking position to the releasing position, and when the cylinder lever 33 performs a locking movement, the coupling member 32 constantly allows the locking movement.

[0052] As described above, since the coupling member 32 constantly allows the locking movement of the cylinder lever 33, the routeman is able to open the front opening of the main body cabinet 1 by performing an opening movement of the outer door 20 after removing the key from the key insertion slot, and can subsequently

perform servicing such as restocking of products by performing an opening movement of the inner door 10.

[0053] In this case, even when the cylinder lever 33 has performed a locking movement, the restricting member 34 is positioned at the allowing position due to being abutted by a tip of the hook portion 323 of the coupling member 32 that is integrally formed with the slider 31 positioned at the releasing position.

[0054] After performing servicing such as restocking of products, when the routeman performs a closing movement of the outer door 20 to close the front opening of the main body cabinet 1, the locking member R of the main body cabinet 1 enters the slider 31 through the slider opening 3111 and abuts the abutting portion 3621 formed on the base portion 362 of the slider holding member 36. Accordingly, the slider holding member 36 swings so as to separate from the base portion 311 of the slider 31 and the engagement between the latch portion 3611 and the upper edge portion of the slider opening 3111 is released. The slider 31 performs a downward sliding movement due to its own weight and reaches the lower limit position or, in other words, the locking position, the upper edge portion of the slider opening 3111 and the locking member R abut each other, the slider 31 engages with the locking member R at the locking position and, as a result, a state where the outer door 20 closes the front opening of the main body cabinet 1 can be maintained. In other words, when a closing movement of the outer door 20 is performed to close the front opening of the main body cabinet 1 after performing servicing such as restocking of products, there is no longer a need to perform an unlocking operation or the like by once again inserting the key into the key insertion slot as was conventional.

[0055] Meanwhile, with the slider 31 of the locking device described above, the abutting piece 3122 is integrally formed at an extended end portion of one side portion 312 (the side portion 312 positioned on an opposite side to the open end of the outer door 20), and the notched portion 3622 is formed in an area opposing the abutting piece 3122 among the base portion 362 of the slider holding member 36.

[0056] Accordingly, when a state is maintained in which the outer door 20 closes the front opening of the main body cabinet 1, for example, even if the anti-theft plate 24 provided on the outer door 20 is taken off by a mindless third party and a tool K that is an elongated rod-like body such as a driver is entered through the slider opening 3111, a tip of the tool K can be abutted against the abutting piece 3122 as shown in FIG. 13. Therefore, both the tip and a middle part of the tool K abut the slider 31 that is a same member, and even if the tool K is swung with its tip as a fulcrum in, for example, a vertical direction, only the slider 31 deforms due to the principle of leverage and there is no risk of the slider 31 separating from the slider holding member 36 or the like and performing a sliding movement from the locking position to the releasing position.

[0057] As described above, with the locking device of an automatic vending machine according to the present invention, when the cylinder lever 33 performs an unlocking movement, the coupling member 32 is displaced by being abutted by the cylinder lever 33 and moves the slider 31 from the locking position to the releasing position, and when the cylinder lever 33 performs a locking movement, the coupling member 32 constantly allows the locking movement by the cylinder lever. Therefore, when a closing movement of the outer door 20 is performed after performing servicing such as restocking of products, there is no longer a need to once again insert a key into the key insertion slot and servicing such as restocking of products becomes hassle-free. In addition, when the restricting member 34 is positioned at the restricting position, the restricting member 34 restricts upward displacement of the coupling member 32 and suppresses a sliding movement of the slider 31 from the locking position to the releasing position, and when the restricting member 34 is positioned at the allowing position, the restricting member 34 allows displacement of the coupling member 32. Therefore, anti-theft performance may be secured when a state is maintained where the outer door 20 closes the front opening of the main body cabinet 1. Consequently, anti-theft performance can be favorably secured while improving efficiency of servicing such as restocking of products.

[0058] Furthermore, according to the locking device described above, even if the tool K or the like is entered through the slider opening 3111, since the tip of the tool K or the like abuts the abutting piece 3122 integrally formed with the slider 31, there is no risk of the slider 31 separating from the slider holding member 36 or the like and performing a sliding movement from the locking position to the releasing position. Accordingly, the slider 31 can be prevented from moving from the locking position to the releasing position.

INDUSTRIAL APPLICABILITY

[0059] As described above, the locking device of an automatic vending machine according to the present invention is useful for maintaining a state where an outer door closes a front opening of an automatic vending machine main body.

EXPLANATION OF REFERENCE NUMERALS

[0060]

1	main body cabinet
20	outer door
31	slider
3111	slider opening
3122	abutting piece
32	coupling member
321	horizontal portion
322	suspended portion

323	hook portion	
33	cylinder lever	
331	elliptically-shaped portion	
332	rod member	
34	restricting member	5
341	groove portion	
342	weight portion	
35	slider supporting piece	
36	slider holding member	
3611	latch portion	10
3622	notched portion	
38	guiding member	
R	locking member	
K	tool	

Claims

1. A locking device of an automatic vending machine comprising:

a locking member attached to one of an automatic vending machine main body which has a cuboid shape with an open front surface and which internally stores products, and a door body arranged so as to be capable of opening and closing the front opening of the automatic vending machine main body; and

a slider having an approximately C-shaped transverse section and arranged on the other of the automatic vending machine main body and the door body so as to be movable between a locking position at which the slider is capable of engaging the lock member having entered through a rectangular opening formed on the slider and a releasing position at which the engagement with the locking member is released, the locking device of an automatic vending machine maintaining a state where the door body closes the front opening of the automatic vending machine main body due to the engagement between the locking member and the slider and allowing the door body to perform an opening movement and the front opening of the automatic vending machine main body to be opened due to a release of the engagement between the locking member and the slider, wherein the slider has an abutting piece which is integrally formed at a predetermined location of an extending end portion of the slider and which abuts a tip of an elongated rod-like body when the rod-like body is entered through the rectangular opening.
2. The locking device of an automatic vending machine according to claim 1, further comprising a slider holding member which holds the slider at the releasing position when the slider moves from the locking po-

sition to the releasing position and which releases holding of the slider and allows the slider to move from the releasing position to the locking position when the locking member enters into the slider positioned at the releasing position and the slider holding member is pressed down by the locking member, wherein the slider holding member is formed with a notched portion which causes a tip of an elongated rod-like body to abut the abutting piece when the rod-like body is entered through the rectangular opening.

3. A locking device of an automatic vending machine comprising:

a locking member attached to one of an automatic vending machine main body which has a cuboid shape with an open front surface and which internally stores products, and a door body arranged so as to be capable of opening and closing the front opening of the automatic vending machine main body; and

a slider having an approximately C-shaped transverse section and arranged on the other of the automatic vending machine main body and the door body so as to be movable between a locking position at which the slider is capable of engaging the lock member having entered through a rectangular opening formed on the slider and a releasing position at which the engagement with the locking member is released, the locking device of an automatic vending machine maintaining a state where the door body closes the front opening of the automatic vending machine main body due to the engagement between the locking member and the slider and allowing the door body to perform an opening movement and the front opening of the automatic vending machine main body to be opened due to a release of the engagement between the locking member and the slider,

the locking device of an automatic vending machine further comprising:

a cylinder lever which respectively performs a locking movement and an unlocking movement around its own axis in response to a locking operation and an unlocking operation of a key inserted into a predetermined key insertion slot; a coupling member which is integrally arranged with the slider, which is displaced by being abutted by the cylinder lever and moves the slider from the locking position to a releasing position when the cylinder lever performs the unlocking movement, and which constantly allows the locking movement by the cylinder lever when the cylinder lever performs the locking move-

ment; and

a restricting member which normally restricts displacement of the coupling member and suppresses movement of the slider from the locking position to the releasing position and which allows displacement of the coupling member when the cylinder lever performs the unlocking movement.

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4. The locking device of an automatic vending machine according to claim 3, wherein the restricting member is arranged so as to be swingable around its own axis between a restricting position and an allowing position, restricts displacement of the coupling member and suppresses movement of the slider from the locking position to the releasing position when the restricting member is positioned at the restricting position, and allows displacement of the coupling member when the restricting member is positioned at the allowing position, and the locking device of an automatic vending machine further comprises a guiding member which is interposed between the cylinder lever and the restricting member and which is abutted by the cylinder lever and causes the restricting member to swing from the restricting position to the allowing position when the cylinder lever performs the unlocking movement.
5. The locking device of an automatic vending machine according to claim 3 or 4, further comprising a slider holding member which holds the slider at the releasing position when the slider moves from the locking position to the releasing position and which releases holding of the slider and allows the slider to move from the releasing position to the locking position when the locking member enters into the slider positioned at the releasing position and the slider holding member is pressed down by the locking member.

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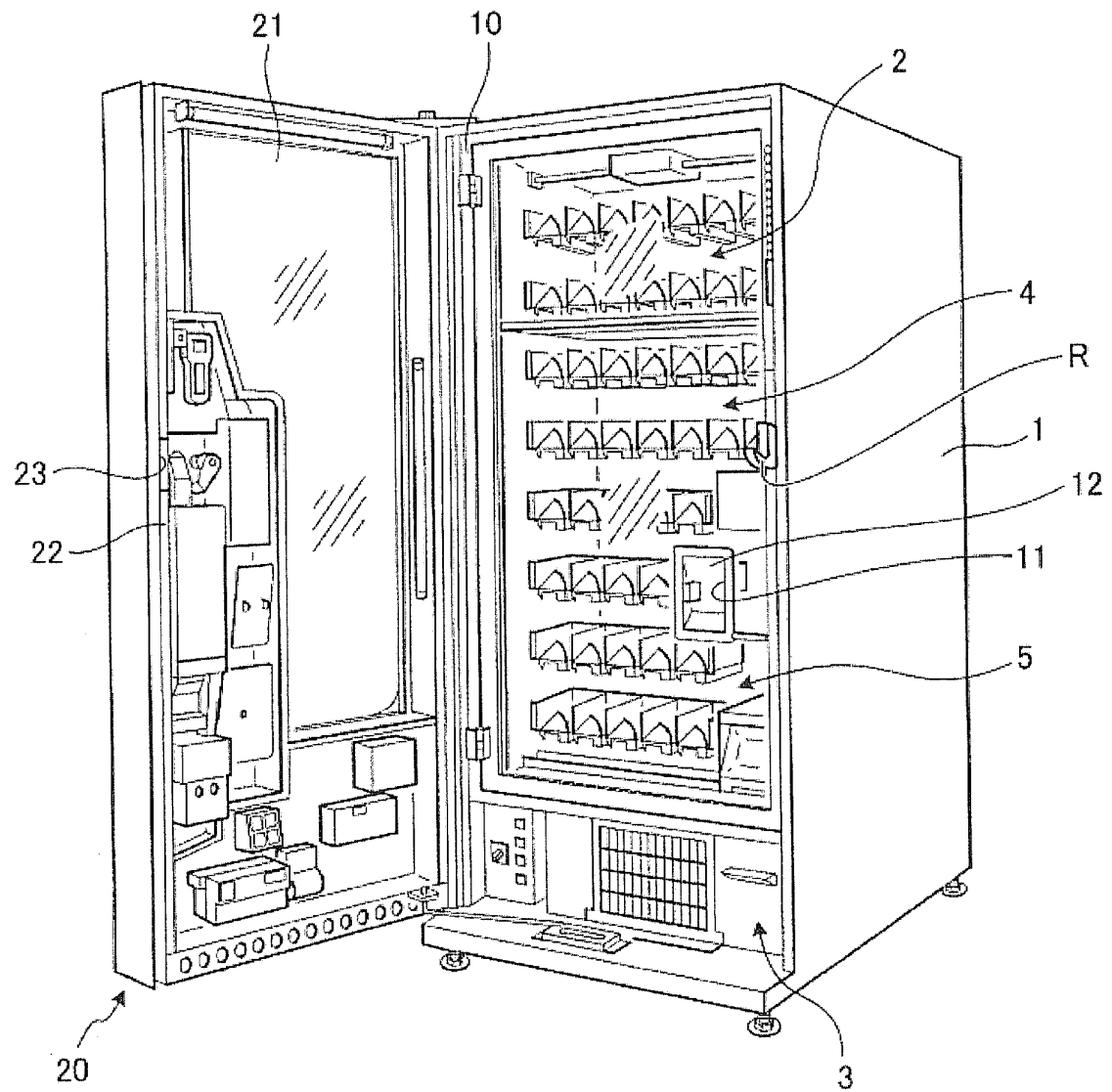


FIG. 1

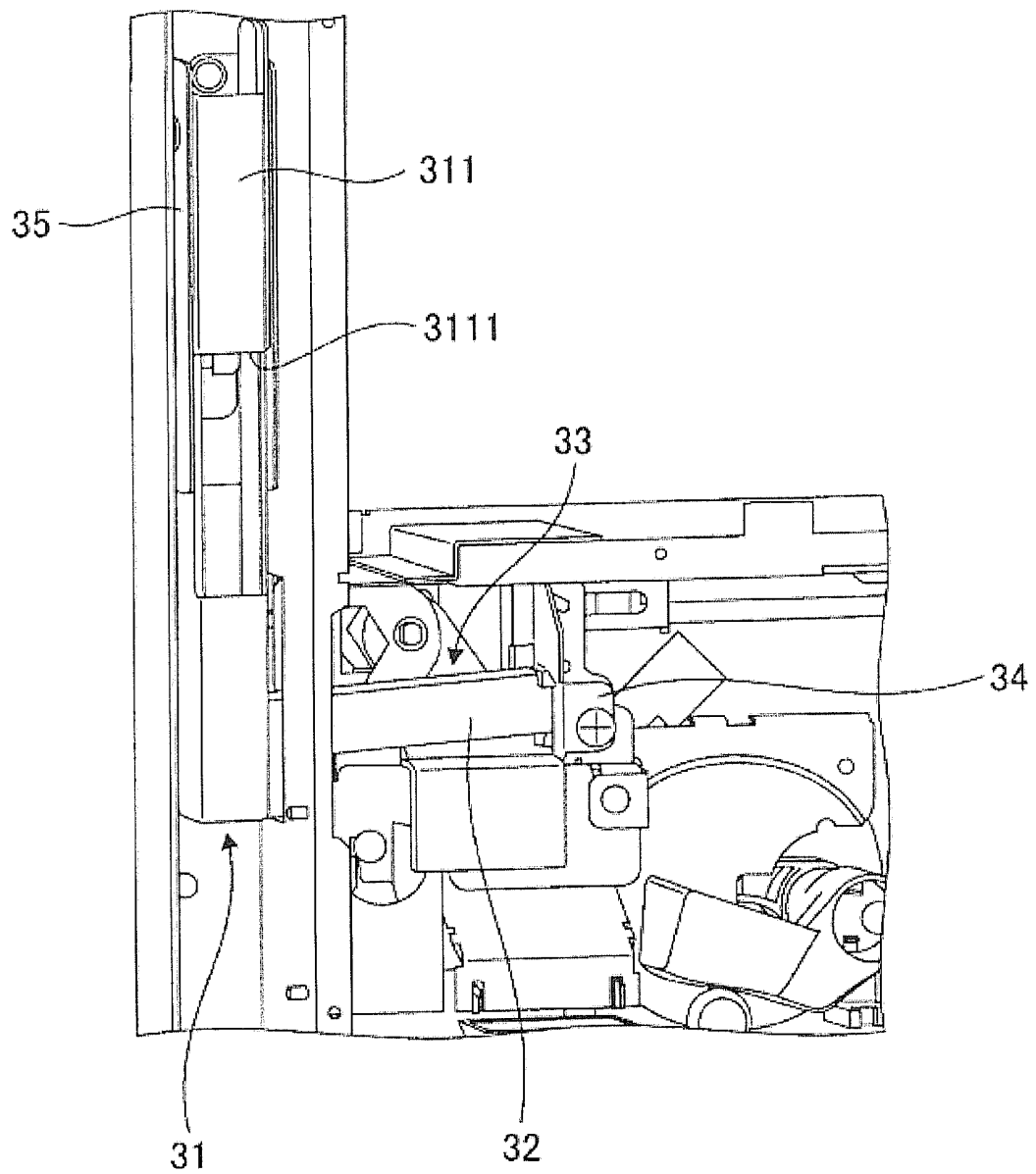


FIG. 2

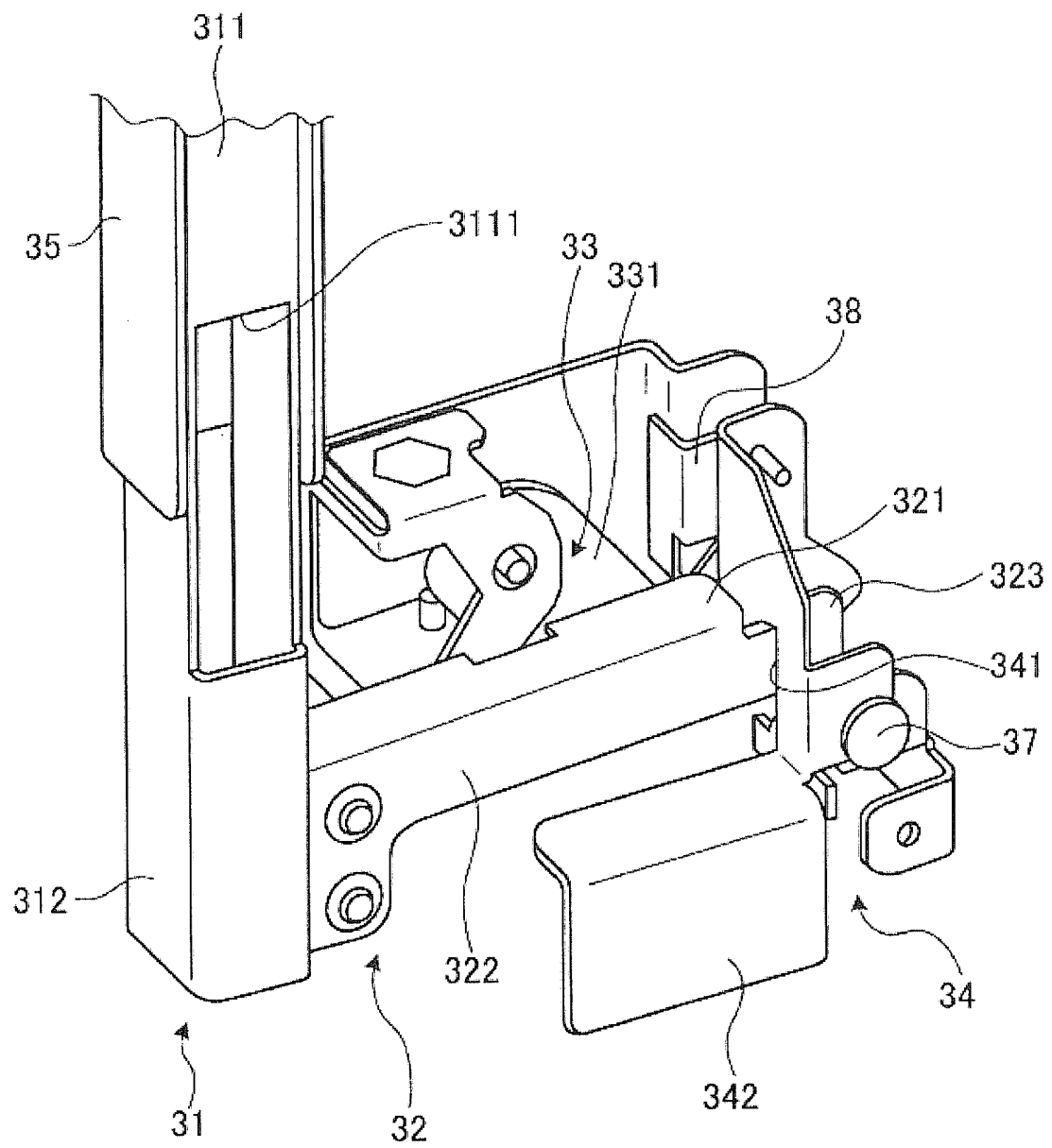


FIG. 3

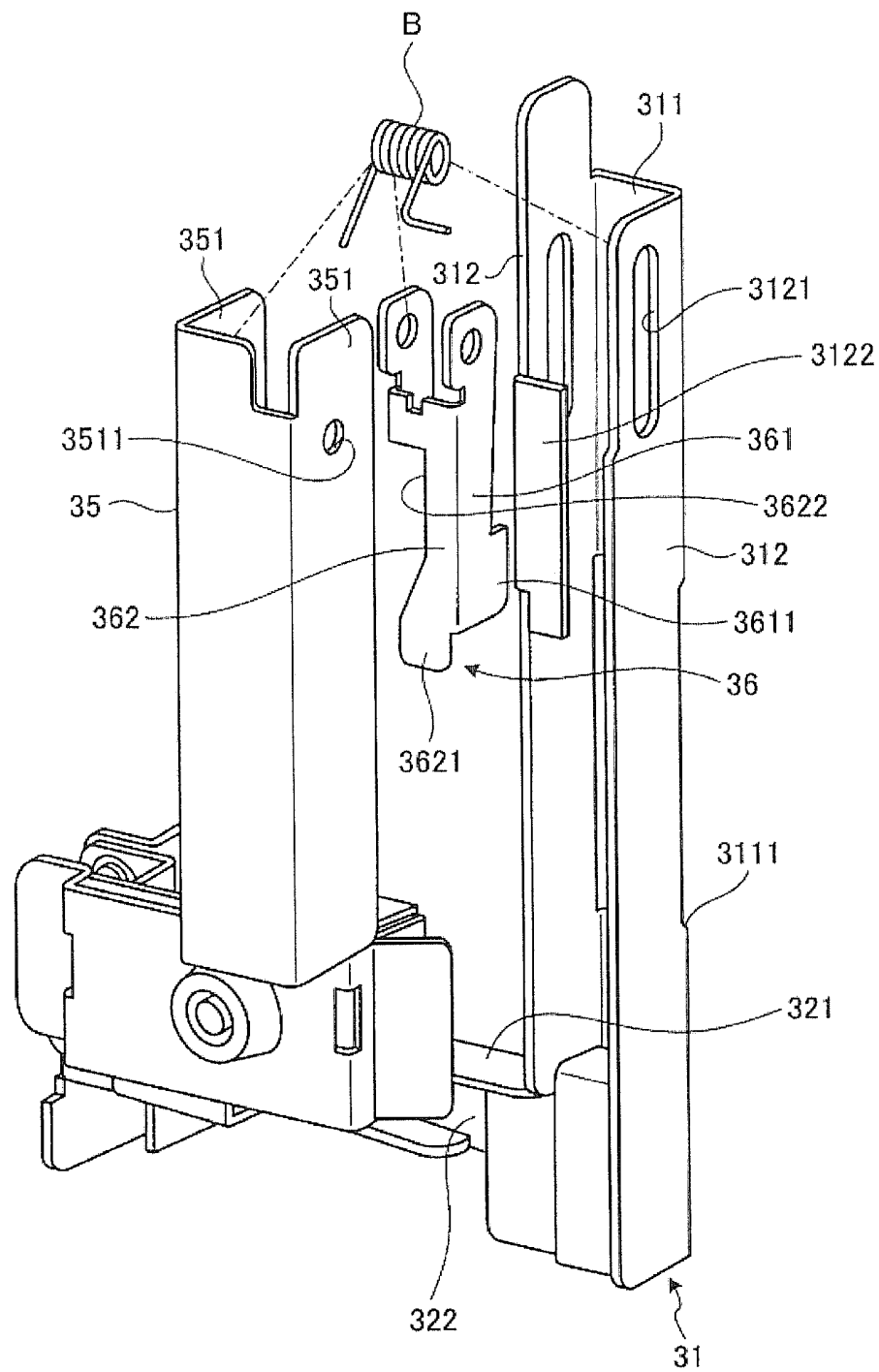


FIG. 4

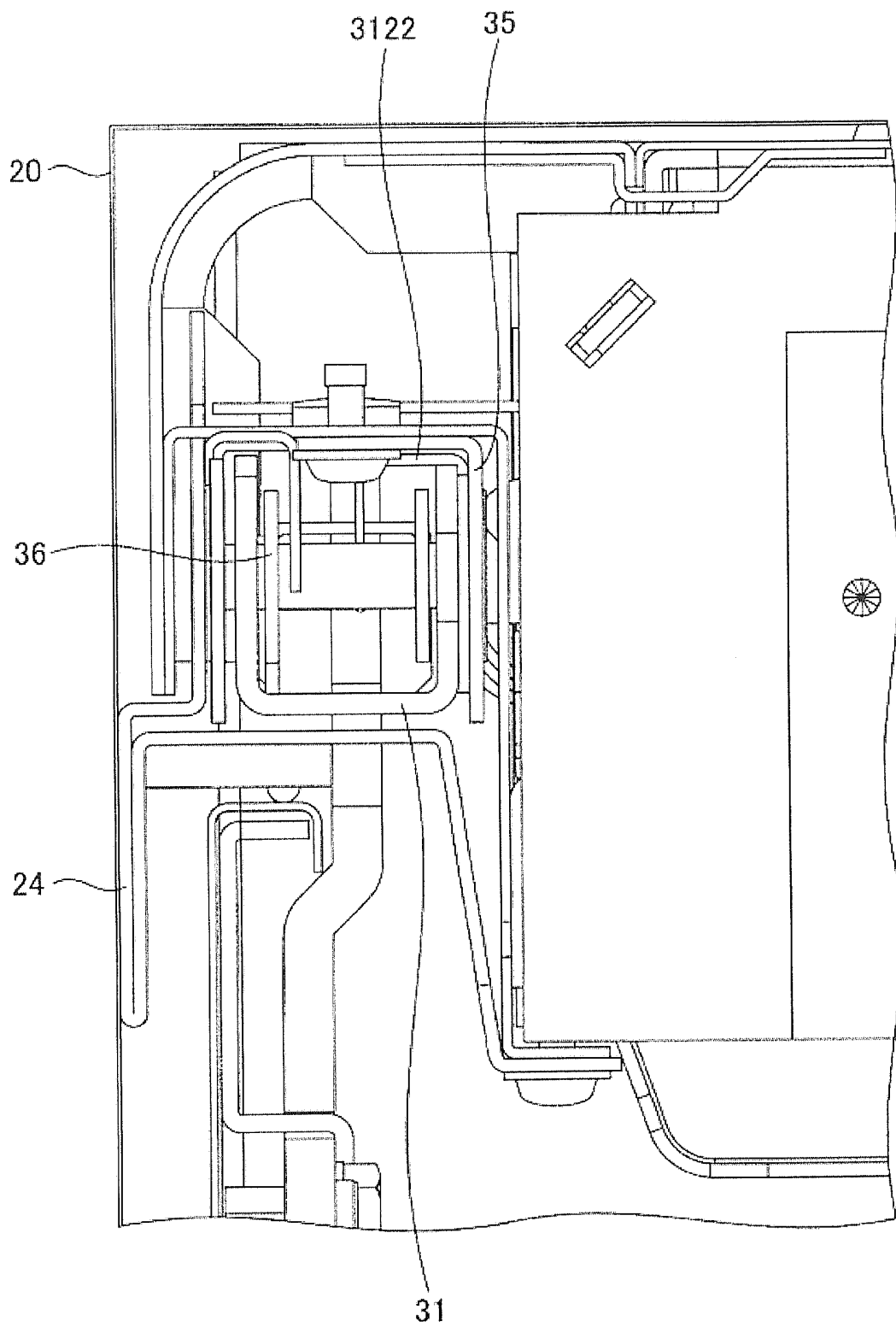


FIG. 5

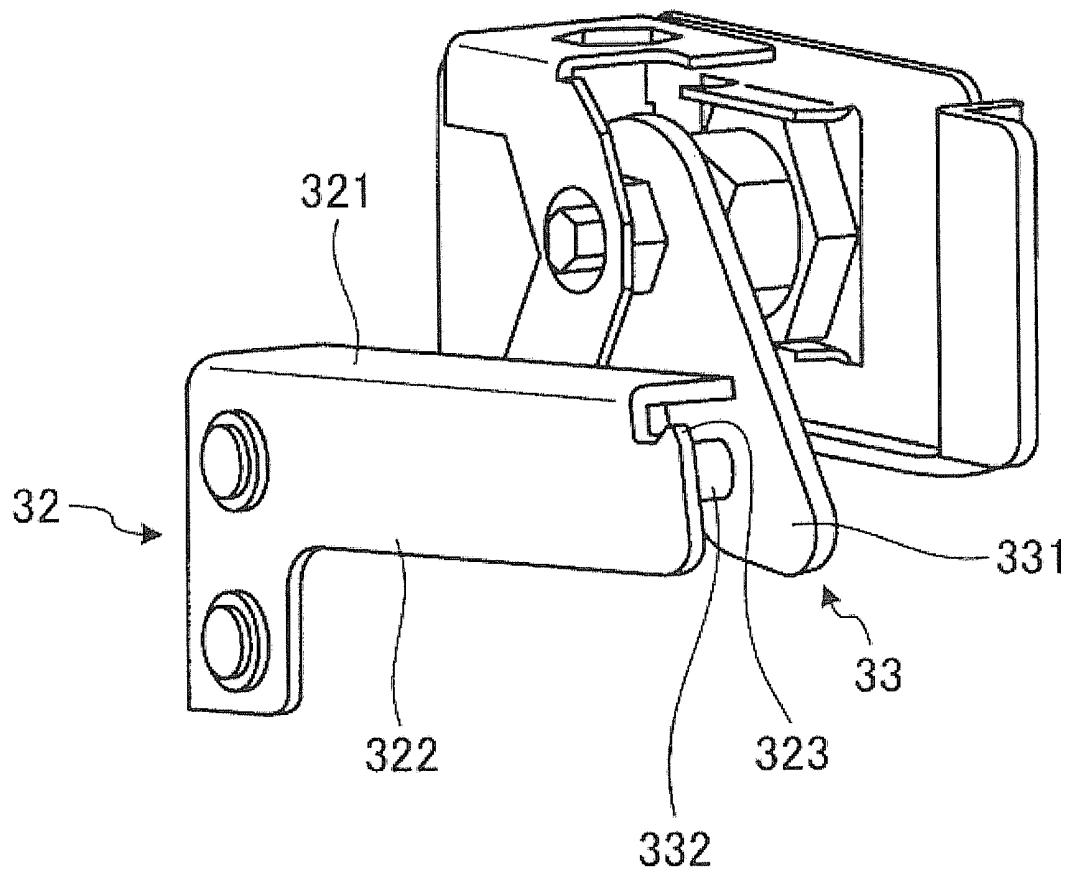


FIG. 6

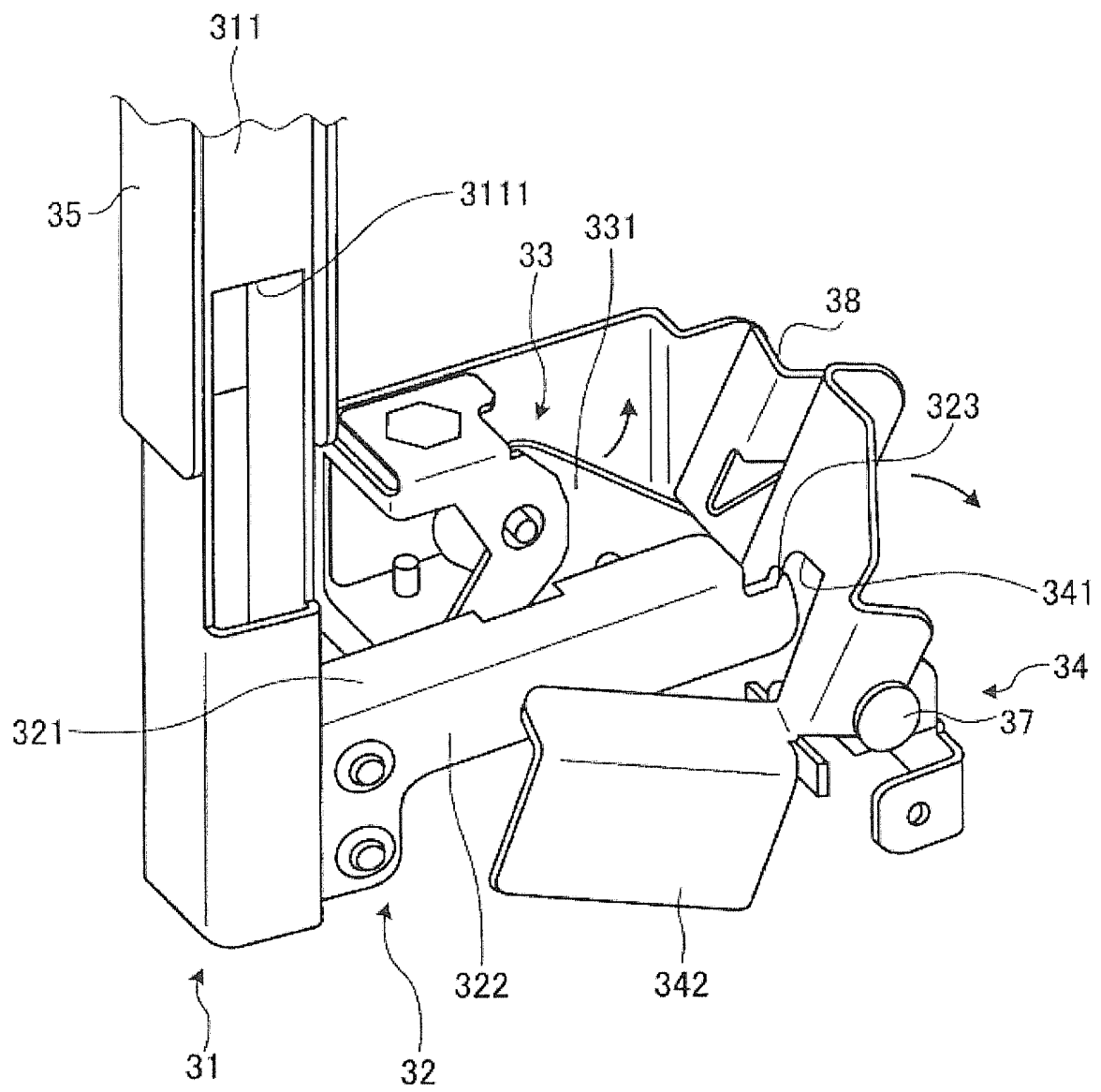


FIG. 7

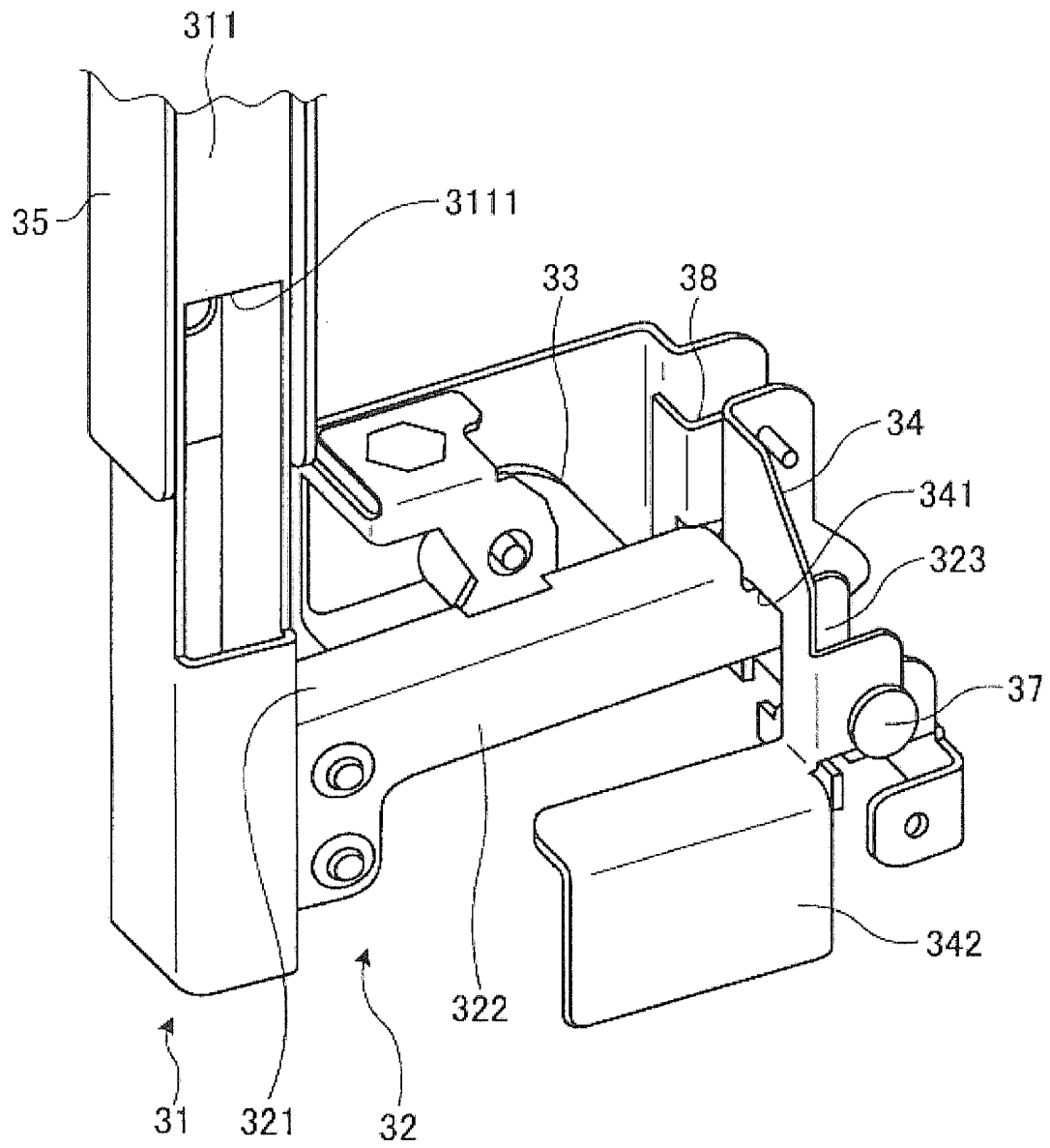


FIG. 8

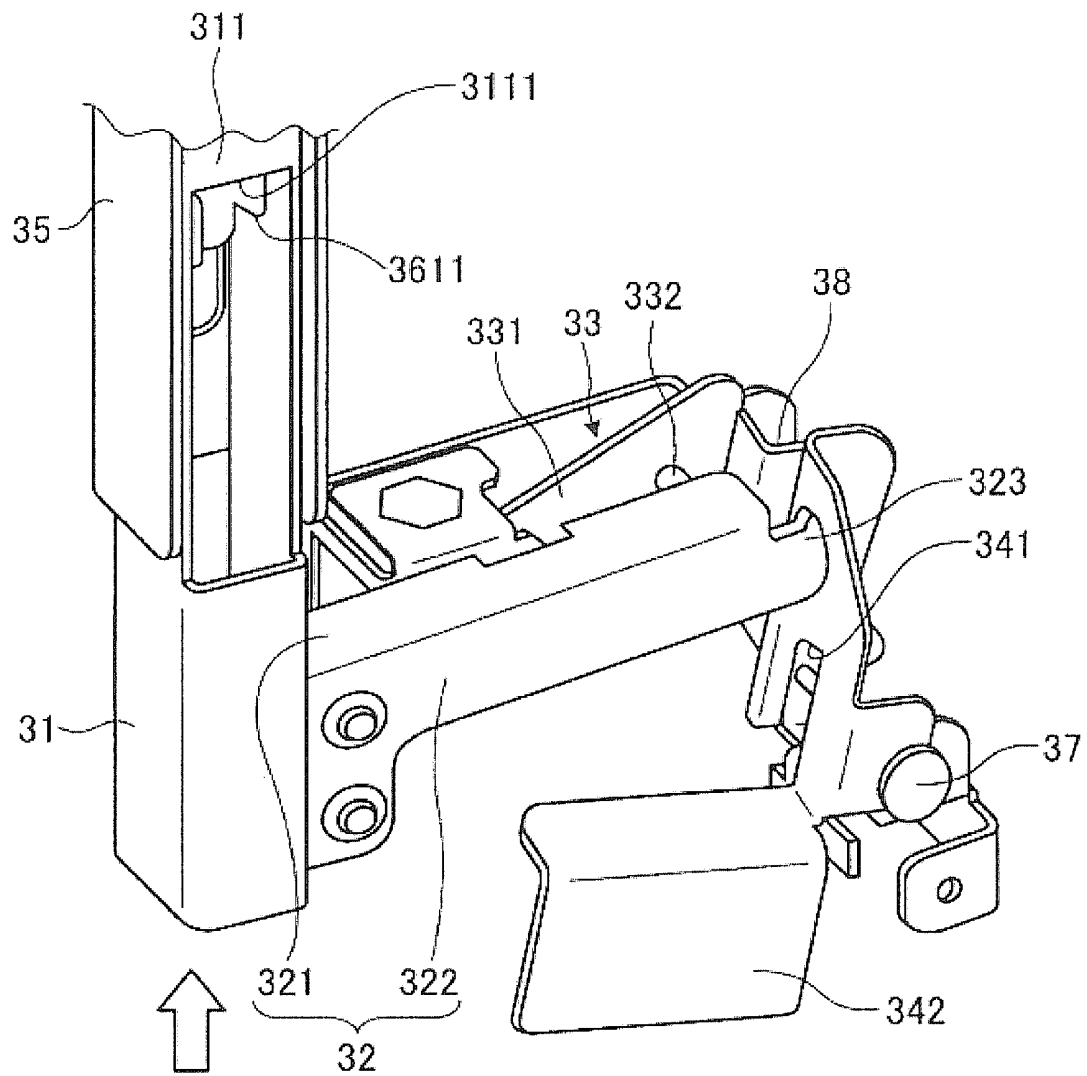


FIG. 9

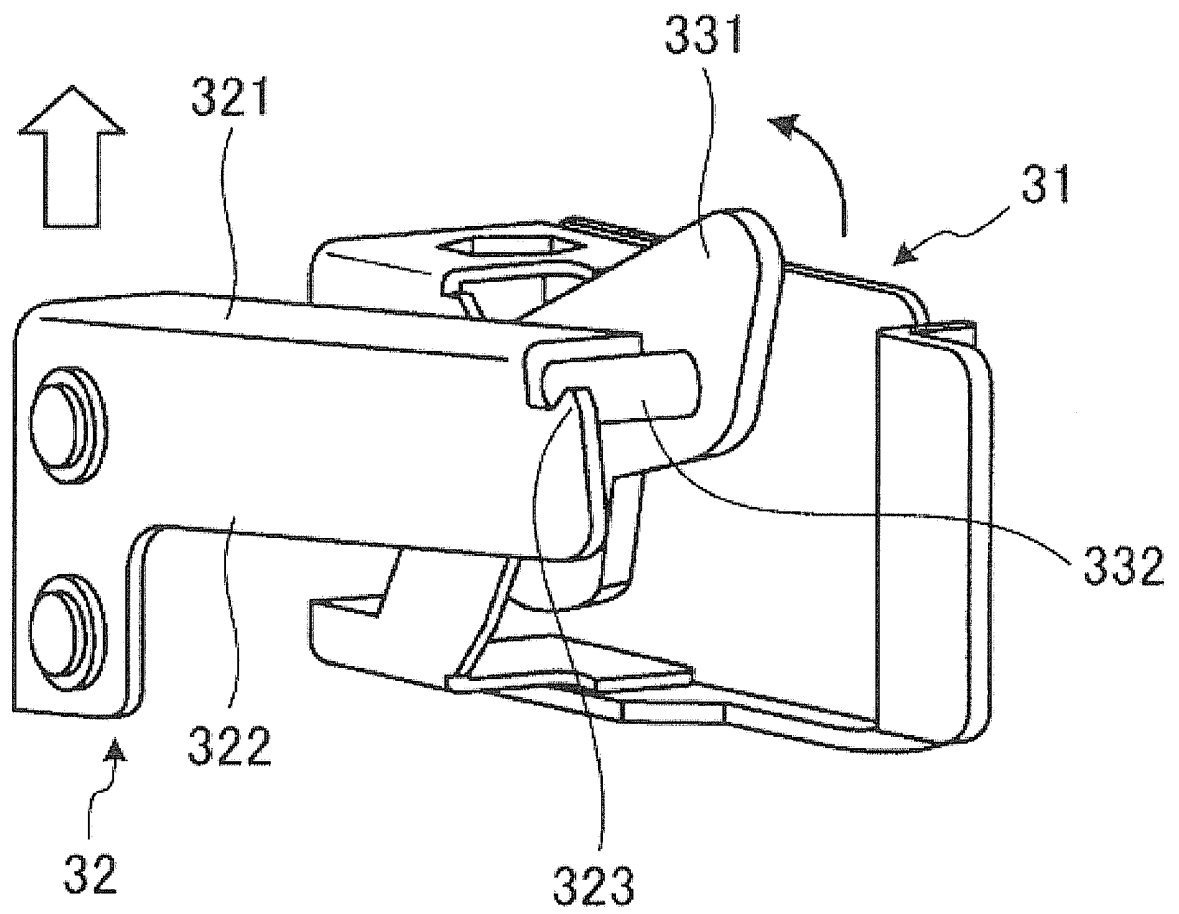


FIG. 10

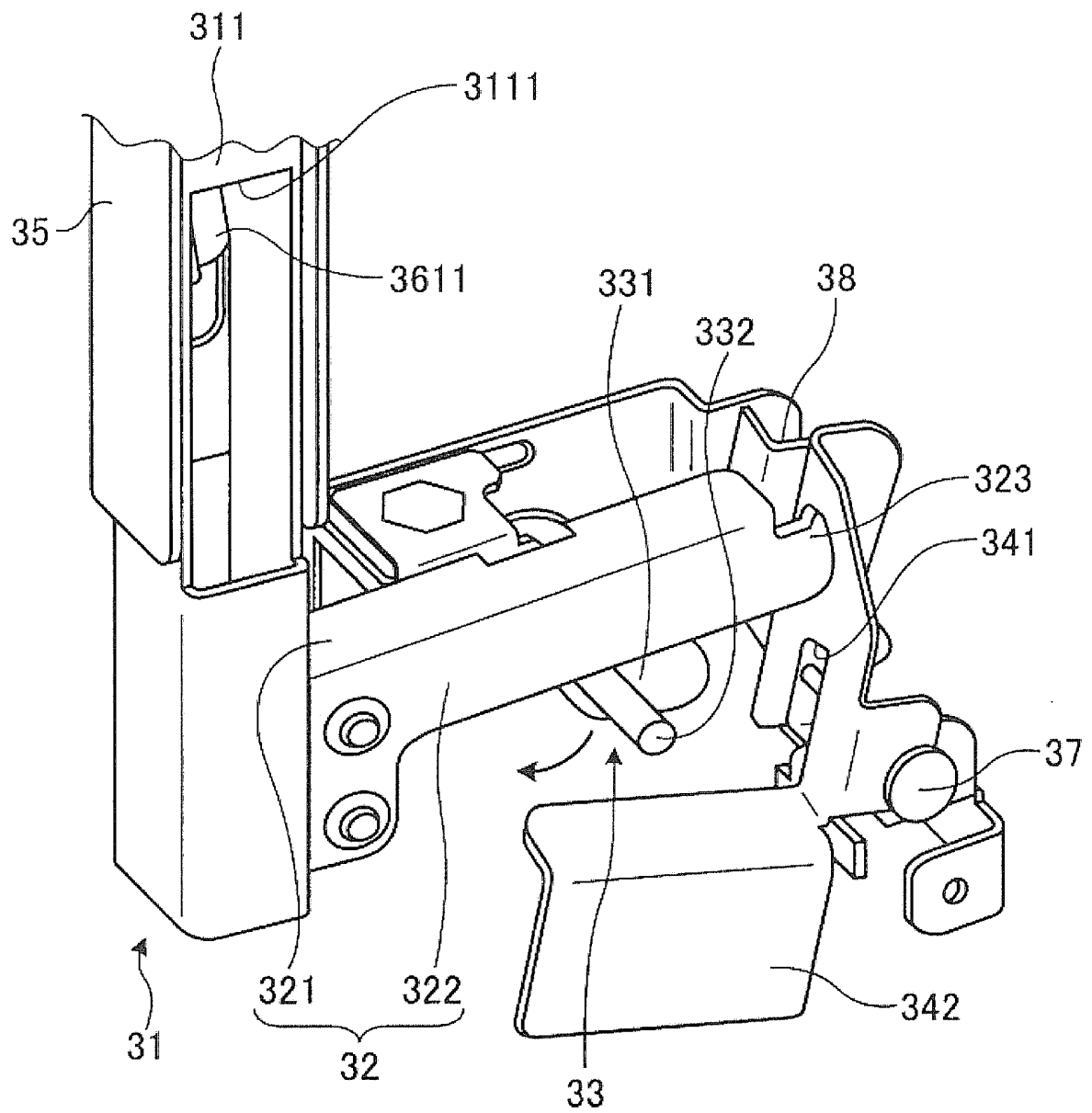


FIG. 11

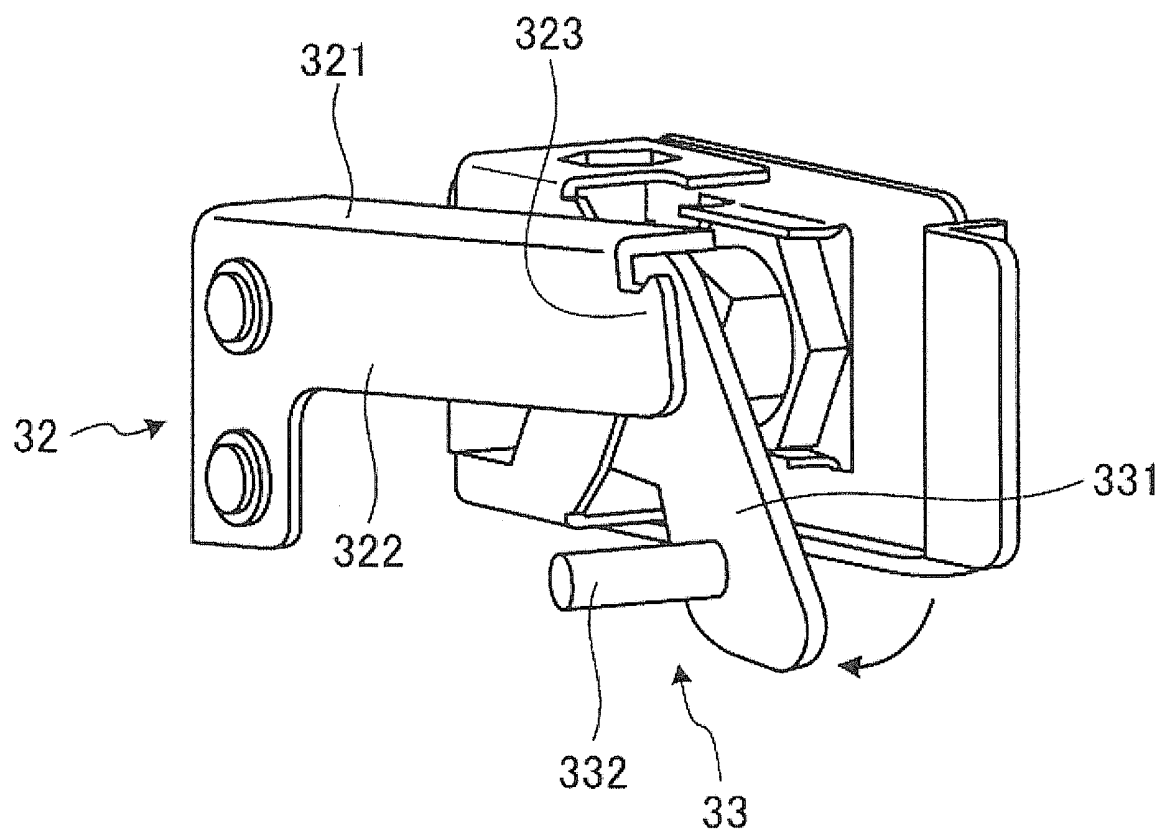


FIG. 12

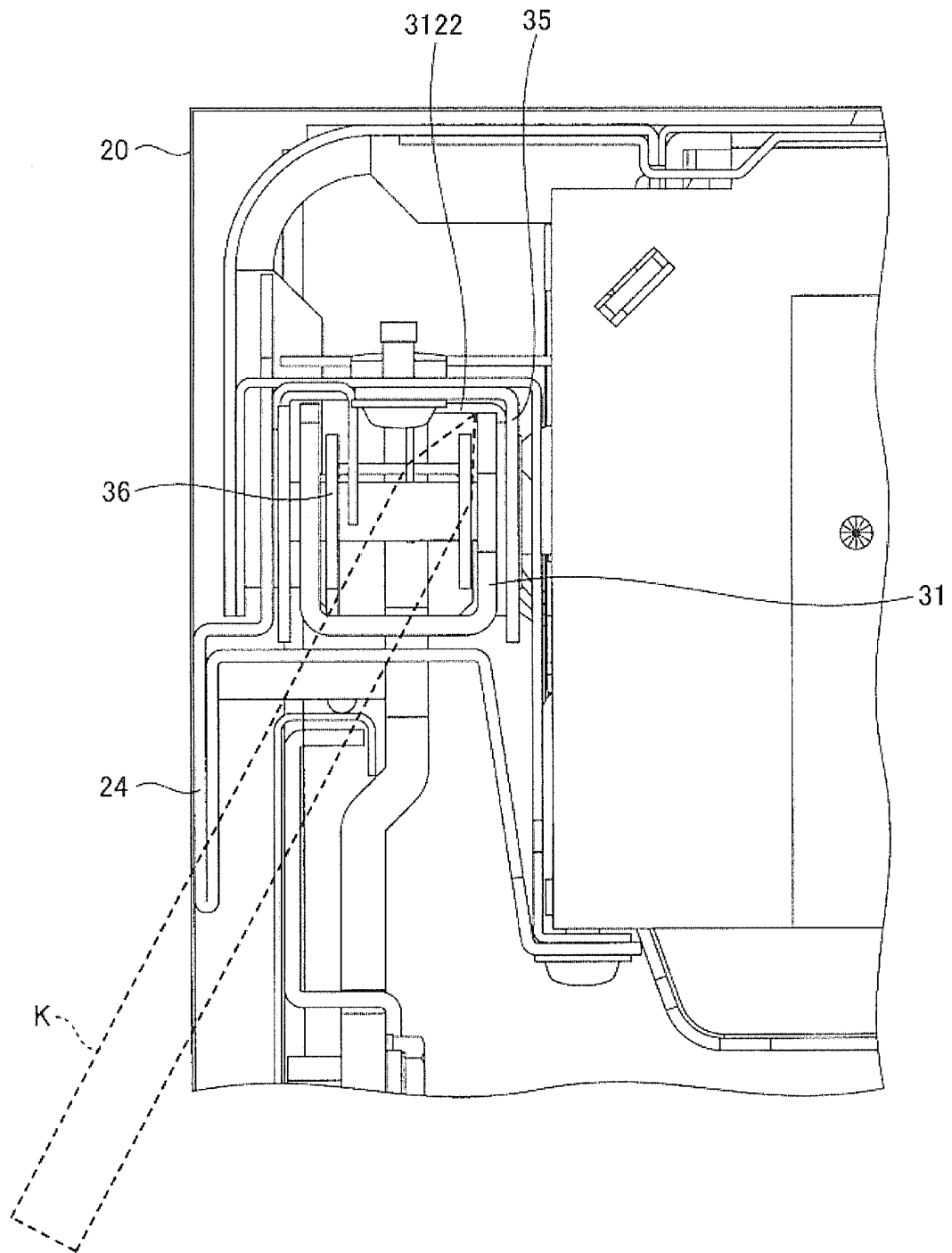


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/060838

A. CLASSIFICATION OF SUBJECT MATTER

G07F9/10(2006.01) i, E05B65/02(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)

G07F5/00-9/10, E05B65/02

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	1996-2010
Kokai Jitsuyo Shinan Koho	1971-2010	Toroku Jitsuyo Shinan Koho	1994-2010

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.
X A	JP 2006-63762 A (Opnus Co., Ltd.), 09 March 2006 (09.03.2006), paragraph [0046]; fig. 1 to 5 (Family: none)	1 2-5
A	JP 11-293986 A (Sanpo Lock Hanbai Kabushiki Kaisha), 26 October 1999 (26.10.1999), all drawings & JP 2871678 B	2, 5
A	JP 2002-342827 A (Fuji Electric Co., Ltd.), 29 November 2002 (29.11.2002), all drawings (Family: none)	2, 5

☒ 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
16 July, 2010 (16.07.10)Date of mailing of the international search report
27 July, 2010 (27.07.10)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/060838

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001-6035 A (Toshiba Electric Appliances Co., Ltd.), 12 January 2001 (12.01.2001), abstract; all drawings (Family: none)	3-5
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 35784/1983 (Laid-open No. 140661/1984) (Hoshizaki Denki Kabushiki Kaisha), 20 September 1984 (20.09.1984), all drawings (Family: none)	3-5

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/060838

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:

The search revealed that the matter described in claim 1 as a matter common to the inventions in claims 1 - 5 is not novel, since the matter is disclosed in the following document 1. As a result, the matter common to the inventions in claims 1 - 5 is not a "special technical feature" in the meaning of the second sentence of PCT Rule 13.2, since the common matter does not make contribution over the prior art. Therefore, it is not recognized that there is a technical relationship involving same or corresponding "special technical feature" among the inventions in claims 1 - 5.

(continued to extra sheet)

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.:

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)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/060838

Continuation of Box No.III of continuation of first sheet (2)

Consequently, the inventions in claims 1 - 5 do not satisfy the requirement of unity of invention.

Document 1: JP 2006-63762 A (Opnus Co., Ltd.), 9 March 2006 (09.03.2006), paragraph [0046], [fig. 1] - [fig. 5], (Family: none)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2002342827 A [0006]