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(72) Inventor: **HAYASHI, Katsuaki**
Osaka-shi
Osaka 537-8686 (JP)

(74) Representative: **TBK-Patent**
Bavariaring 4-6
80336 München (DE)

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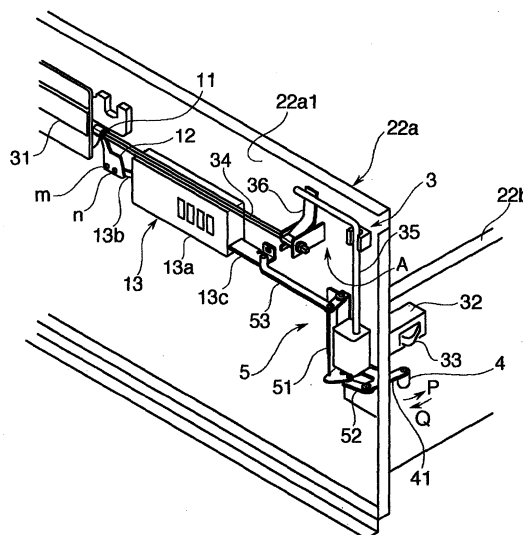
(71) Applicant: **Kokuyo Co., Ltd.**
1-1, Oimazato Minami 6-chome
Higashinari-ku
Osaka-shi
Osaka 537-8686 (JP)

(54) **LOCKING/UNLOCKING DEVICE**

(57) In order to make it possible to add a security function by the use of a dial lock relatively easily and to lessen a number of operation to lock and unlock the dial lock so as to improve usability, a lock and unlock device comprises a dial lock (13) and a moving body (4) arranged on a drawer (22) to open or close a cabinet (21), and the moving body (4) moves toward one direction at

a time when the drawer (22) is separated to be released from the cabinet (21) after a number of the dial lock (13) is verified and moves toward the other direction at a time when the drawer (22) approaches the cabinet (21) to be pressed into the cabinet (21), and the dial lock is reset to an unverified state by making use of the movement of the moving body (4).

F i g. 2



Description

FIELD OF THE ART

[0001] This invention relates to a lock and unlock device that can lock and unlock an open/close member such as a drawer or a door individually with a simple operation by the use of a dial lock appropriately.

BACKGROUND ART

[0002] Generally this kind of a dial lock device is attached to a door or the like having a latch, and the dial lock restricts the latch from being operated and releases the latch from restriction at a time of opening the door or the like by verifying a number of the dial lock.

[0003] As a concrete operation, the latch has to be returned to a restricted state again after verifying the number of the dial lock and opening the door. In consideration of this, known are a dial lock device having a conventional arrangement wherein a lock is released by verifying the number of the dial lock, a knob is rotated and then a grip is pulled, or a dial lock device having an arrangement as shown in the patent document 1 wherein a lock is released and reset to zero by verifying a number of the dial lock and a knob is rotated.

Patent document 1: Japan patent document laid-open number 6-60544

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0004] However, with this arrangement, at least two steps of operations are necessary such as an operation of verifying the number of the dial lock and an operation of rotating the knob at a time of opening the door. This will be troublesome. In addition, since it requires an operation to reset the number of the dial lock again and to set a latch at a time of closing the door, the operation will become furthermore troublesome. In addition, with the former arrangement, since the number of the dial lock is in a verified state while the door is open, from the viewpoint of security, there is a problem that the number of the dial lock to be verified is observed by a surrounding person in a state that the door is open. Furthermore, with the conventional arrangement, in order to lock the door, since it is required to rotate the knob again after closing the door, or it is required to rotate the knob after closing the door and then to manually rotate the dial to other number, the operation will become troublesome. More specifically, the conventional arrangement of the dial lock requires quite a number of operations to unlock and lock the door again, thereby complicating usability.

[0005] The present claimed invention intends to solve all of the problems and a main object of this invention is to provide a lock and unlock device that can add a security

function using a dial lock relatively easily and that improves usability with reducing a number of operations to lock and unlock the dial lock.

5 MEANS TO SOLVE THE PROBLEMS

[0006] In order to attain the object, the present claimed invention takes the following measures.

[0007] More specifically, a lock and unlock device is characterized by comprising a dial lock and a moving body that are arranged in either one of a cabinet or an open/close member to open or close the cabinet, wherein the moving body is so arranged to move toward one direction at a time when the open/close member is separated to be released from the cabinet after the number of the dial lock is verified and to move toward the other direction by being pressed at a time when the open/close member approaches the cabinet, and the dial lock is reset to an unverified state by making use of the movement of the moving body.

[0008] With this arrangement, since the moving body is operated to move by making use of a relative movement between the open/close member and the cabinet after the number of the dial lock is verified and the number of the dial lock is reset to the unverified state by the movement of the moving body, there is no need of additional operation to reset the number of the dial lock in addition to the operation of opening or closing the open/close member, thereby reducing a number of the action by one. In addition, since the moving body is arranged between the cabinet and the open/close member and moves by being pushed by or released from either the open/close member or the cabinet and both the dial lock and the moving body are arranged on either one of the open/close member or the cabinet, it is possible to effectively avoid a structure that is complicated and disturbing the storage space such that a link is arranged between the moving body and the dial lock by making use of the open and close movement of the open/close member.

[0009] To reset to the unverified state includes to reset to a specific number or to release the verified state in random order in addition to, so called, reset to zero. Hereinafter, the same applies to a general meaning of reset.

[0010] As a preferable embodiment of the moving body represented is the moving body that is pressed and accumulates a repulsive force at a time when the moving body moves toward the other direction and that moves to the one direction by making use of the repulsive force.

[0011] In order to realize the movement of the moving body with ease, it is preferable that the moving body is so arranged to be buried into a boundary portion between the open/close member and the cabinet by being pressed when the open/close member is closed, and to project from the boundary portion by being released. Alternatively, it is also preferable that the moving body is so arranged to be housed in a space closed by the cabinet and the open/close member by being pressed at a time when the open/close member is closed, and to be re-

leased from the space by moving to a direction opposite to a direction when the open/close member is pressed at a time when the open/close member is open. In this case, it is preferable that the moving body is pressed by bumping against an inner wall of a storage space of the cabinet.

[0012] In order to improve a security function effectively, it is preferable that the dial lock is reset to an unverified state by making use of the movement of the moving body at a time when the open/close member is separated from the cabinet.

[0013] In order to avoid an unnecessary operation, it is preferable that a locked state of the open/close member is released by verifying the number of the dial lock.

[0014] Similarly, in order to avoid an unnecessary operation, it is efficient that the open/close member is automatically locked by making use of the movement of the moving body just by moving the open/close member to a closed position next time.

[0015] In order to further improve operability, it is preferable that a latch mechanism containing a grip is arranged on the open/close member and the dial lock and the moving body are also arranged on the open/close member.

[0016] As a preferable embodiment of the latch mechanism represented is that an operating force input through the grip is transmitted to the latch through a transmission system containing a rotational axis so as to enable releasing the latch, and a clutch is arranged so as to make a part of the transmission system switch to disconnection, and the dial lock and the clutch are directly or indirectly related each other so as to disconnect the clutch at a time when the number of the dial lock is unverified and to connect the clutch at a time when the number of the dial lock is verified.

[0017] It is possible to apply the present claimed invention to various open/close members. In case that the open/close member is a drawer, the moving body is arranged on either one of the back surface of a panel board of the drawer and a corresponding front surface of the cabinet. In case that the open/close member is a door, the moving body is arranged on either one of a back surface of an edge part or near the edge part locating on a hinge side of the door or a corresponding front surface of the cabinet, or on either one of a back surface of an edge part or near the edge part locating on a side opposite to the hinge side of the door or a corresponding front surface of the cabinet.

EFFECT OF THE INVENTION

[0018] In accordance with the above-mentioned arrangement of the present claimed invention, since the dial lock can be reset to an unverified state again just by opening the open/close member after verifying the number of the dial lock without any additional operation and the locked state can be reset to the unverified state by making use of the movement of pressing or releasing

the moving body accompanied by opening or closing the open/close member, it is possible to provide a superior lock and unlock device whose arrangement can be configured easily by incorporating the moving body into either open/close member or the cabinet so as to simplify the arrangement and to reduce the cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

Fig. 1 is a perspective view of a storage to which one embodiment of this invention is applied.

Fig. 2 is a partially exploded perspective view of a part of the storage.

Fig. 3 is an enlarged cross-sectional plan view showing a part of a latch mechanism of this embodiment.

Fig. 4 is a partially enlarged front view showing inside of a panel board of this embodiment.

Fig. 5 is a partially enlarged cross-sectional plan view showing a clutch part of this embodiment.

Fig. 6 is a view corresponding to Fig. 4 showing an operation of this embodiment.

Fig. 7 is a partially enlarged perspective view showing a moving body and its peripheral structure of this embodiment.

Fig. 8 is an operation explanatory view showing a behavior of the moving body together with an operation of a drawer of this embodiment.

Fig. 9 is a function explanatory view of a dial lock of this embodiment.

Fig. 10 is a view showing a modified embodiment of this invention.

Fig. 11 is a further different modified embodiment of this invention.

Fig. 12 is a partially exploded perspective view of a storage to which a second embodiment of this invention is applied.

Fig. 13 is an operation explanatory view of the second embodiment.

Fig. 14 is an operation explanatory view of the second embodiment.

Fig. 15 is a partially exploded perspective view of a storage to which a third embodiment of this invention is applied.

Fig. 16 is an operation explanatory view of the third embodiment.

Fig. 17 is an operation explanatory view of the third embodiment.

BEST MODES OF EMBODYING THE INVENTION

[0020] One embodiment of this invention will be explained with reference to drawings.

[0021] Fig. 1 shows a storage 2 to which a lock and unlock device 1 of this embodiment is applied. The storage 2 comprises a cabinet 21, a drawer 22 as being an open/close member arranged in the cabinet 21, and a

latch mechanism 3 incorporated into the drawer 22 so that the drawer 22 can be engaged with the cabinet 21 and the drawer 22 can be disengaged from the cabinet 21 by means of a grip 31 arranged on the panel board 22a of the drawer 22. The lock and unlock device 1 is arranged inside of a panel board 22a of the drawer 22 to lock and unlock the drawer 22 by making use of the latch mechanism 3. In case that multiple drawers 22 are arranged, the lock and unlock device 1 locks and unlocks each drawer 22 respectively, which is useful for a case that each drawer 22 is used by a different user.

[0022] The drawer 22 is, as shown in Fig. 2, so arranged that the panel board 22a is integrally mounted on a front surface of a drawer main body 22b. Fig. 2 shows a state that a decorative sheet locating a front surface constituting the panel board 22a is dismounted, and each element member is mounted on a back surface panel 22a1 constituting the panel board 22a.

[0023] The latch mechanism 3 is, as shown in Fig. 2 and Fig. 3(a), so arranged that a latch 33 elastically projects toward a lateral direction from a resin member 32 arranged on a boundary between the panel board 22a and the drawer main body 22b, and the latch 33 makes an engagement with a concave part 21b arranged on an inner surface of a side panel 21a of the cabinet 21 constituting the storage 2 as shown in Fig. 3(a) at a time when the drawer 22 is pushed into the cabinet 21 and the latch 33 is operated to move toward a buried direction through a transmission system A containing a rotational axis 34 at a time when an operating force is applied to the grip 31.

[0024] The transmission system A comprises, as shown in Fig. 2 and Fig. 3(a), the rotational axis 34, an intermediate body 35 in a shape of a reversed "L" character arranged near an end part of the rotational axis 34, an arm 36 to change a rotation on a horizontal axis of the rotational axis 34 to a rotation on a vertical axis of the intermediate body 35, and a changing part 37 to change a normal and reverse rotation on the vertical axis of the intermediate body 35 to a movement toward one direction around a vertical axis of the latch 33 so that the latch 33 can be moved toward the buried direction at a time when the grip 31 is operated toward either direction such as upward or downward. Fig. 3(b) shows an example of a principle of the changing part 37. Even though a balancing member 37a makes a rotation either counterclockwise or clockwise due to the rotation of the intermediate body 35, an oscillating member 37b in a shape of an "L" character rotates in the same direction so that the latch 33 that makes an engagement with a distal end of the oscillating member 37b is rotated toward the buried direction. In case of Fig. 3(b), the oscillating member 37b is pushed toward a direction to project the latch 33 by an elastic body 37c such as a spring.

[0025] Meanwhile, the lock and unlock device 1 of this embodiment has an arrangement that a clutch 11 is arranged between the grip 31 and the rotational axis 34 in the panel board 22a of the drawing 22 shown in Fig. 2

and Fig. 4, a cam 12 makes an engagement with the clutch 11, and a dial lock 13 as being an input part is arranged near the grip 31 of the drawer 22 in order to provide the cam 12 with a switch movement from a locked state to an unlocked state.

[0026] The grip 31 is loosely fitted over the rotational axis 34 in a rotatable manner as shown in Fig. 5(a), (b). The clutch 11 is arranged at a position adjacent to the grip 31 in a state that can be rotatable integrally with the rotational axis 34 and slidable in an axial direction. A rotation of the grip 31 is transmitted to the rotational axis 34 through the clutch 11 in a state of Fig. 5(c) (a clutched state) where a relating part 11a arranged at a part of the clutch 11 engages a related part 31a arranged at a part of the grip 31 at a position displaced from the center of the axis of the rotational axis 34, and a rotation of the grip 31 is not transmitted to the rotational axis 34 so as to be in an idling state in a state of Fig. 5(a) (an unclutched state) where the relating part 11a is released from an engagement with the related part 31a.

[0027] The cam 12 is, as shown in Fig. 2 and Fig. 4, of a plate shape mounted on the back surface panel 22a1 of the panel board 22a around a horizontal axis m, and a distal end part 12a displaced from the horizontal axis m makes an engagement with an engaged part 11b arranged at a part of the clutch 11 as shown in Fig. 4 and Fig. 5 on a constant basis. The cam 12 flips on the clutch 11 to be disconnected as shown in Fig. 5(a) at a locked position in Fig. 6 where the cam 12 is rotated clockwise viewed from its front, and to be connected as shown in Fig. 5(c) at an unlocked position in Fig. 4 where the cam 12 is rotated counterclockwise viewed from its front. In this embodiment, the cam 12 is elastically urged toward the unlocked position in Fig. 4 by an elastic member 15 such as a spring or the like.

[0028] Since a fundamental mechanism of the dial lock 13 is general, a main part of an internal mechanism is omitted to explain. The dial lock 13 is so arranged that a lever 13b rotatably projects toward one side direction from the casing 13a as shown in Fig. 4 and a distal end of the lever 13b is connected to a portion displaced from the horizontal axis m of the cam 12 through a connecting rod n so that the lever 13b rotates downward and is kept at this position at a time when a number of the dial lock 13 is not verified as shown in Fig. 6 and a force to keep the lever 13b is released at a time when the number of the dial lock 13 is verified as shown in Fig. 4. More specifically, at a time when the number of the dial lock 13 is not verified as shown in Fig. 6, since the cam 12 is kept at the locked position with acting against the elastic member 15, the grip 31 and the rotational axis 34 are separated so that the lock and unlock device 1 is in a locked state where the grip 31 moves in vain even though the grip 13 is operated. Meanwhile, at a time when the force to keep the lever 13b is released, the cam 12 moves to the unlocked position as shown in Fig. 6 → Fig. 4 triggered by the time when the force is released because the cam 12 is elastically urged toward the unlocked po-

sition by the elastic member 15 and then the grip 31 is connected with the rotational axis 34 by the clutch 11 so that the latch 33 is in a state of being able to be released by the grip 31.

[0029] In this embodiment, the dial lock 13 and the moving body 4 are arranged at a part of the drawer 22 as shown in Fig. 2 and Fig. 4, the moving body 4 is operated to move in one direction (a direction to project rearward from the panel board 22a) shown by an arrow P in Fig. 2 at a time when the drawer 22 is separated from the cabinet 21 to open after the number of the dial lock 13 is verified, and the moving body 4 is operated to move in the other direction (a direction to be buried in the panel board 22a) shown by an arrow Q in Fig. 2 due to a pushing reactive force at a time when the drawer 22 approaches the cabinet 21, and the dial lock 13 is reset to the unverified state by making use of the movement of the moving body 4.

[0030] If explained more concretely, as shown in Fig. 2, Fig. 7 and Fig. 8, the moving body 4 is of a cylindrical shape made of resin or the like arranged near a side edge of a back surface of the back surface panel 22a1 constituting the panel board 22a, and is mounted on a supporting body 41 in a shape of a "T" character and the supporting body 41 is rotatably mounted on a portion near the back surface of the back surface panel 22a1 through a vertical axis L1. The moving body 4 crushes against the front surface 21x of the side plate 21a of the cabinet 21 and then pushed into the panel board 22a due to its reactive force as shown in Fig. 8(a)→(b)→(c)→(d) at a time when the drawer 22 is pushed into the cabinet 21, and the moving body 4 projects rearward due to disappearance of the pushing force as shown in Fig. 8(d)→(c)→(b)→(a) at a time when the drawer 22 is separated from the cabinet 21. The projecting movement may use an elastic force of an elastic body 130 (refer to Fig. 9), to be described later, or an elastic body may be incorporated at an appropriate position.

[0031] Then the moving body 4 moves in conjunction with a reset rod 13c projecting toward other side direction from the dial lock 13 through an interlocking mechanism 5. The interlocking mechanism 5 comprises, as shown in Fig. 2, Fig. 7 and Fig. 8, a movable bracket 51 rotatably mounted on a front surface of the back surface panel 22a1 of the panel board 22a through a supporting axis L2, a first link 52 that interlocks a rotation of the supporting body 41 and a rotation of the movable bracket 51 by connecting a portion displaced from the axis L2 of the movable bracket 51 and a portion displaced from the axis L1 of the supporting body 41 in the "T" character shape and a second link 53 that interlocks a rotating movement of the bracket 51 and a projecting movement of the reset rod 13c from the casing 13a.

[0032] As shown in Fig. 9, the reset rod 13c is urged toward a direction to project from the casing 13a of the dial lock 13 to an outside direction by the elastic body 130 such as a spring arranged inside, and the reset rod 13c does not influence on a dialed state of the dial lock

13 at a time when the reset rod 13c is buried with acting against the elastic body 130 and the reset rod 13c resets the number of the dial lock 13 to zero at a time when the reset rod 13c projects from the casing 13a because the reset rod 13c is urged by the elastic body 130. The lever 13b projecting from an opposite direction is kept at a downward rotated position at a time when the number of the dial lock is unverified including at a time of reset to zero, and the lever 13b is released from the kept state by the force at a time when the number of the dial lock is verified as mentioned above.

[0033] More specifically, the reset rod 13c is in a pushed state through the interlocking mechanism 5 at a time when the drawer 22 locates at a closed position and the moving body 4 is pushed inside the panel board 22a by the front surface 21x of the cabinet 21 and locates at the buried position shown in Fig. 8(d). At a time when the dial lock 13 is in the unverified state, the keeping force is applied to the lever 13b at a downward rotated position and the cam 12 is kept at a locked position to disconnect the clutch 11 as shown in Fig. 6. Next, at a time when the number of the dial lock 13 is verified, a force to keep the lever 13b is released, which triggers the cam 12 to move to the unlocked position shown in Fig. 4 so that the grip 31 and the rotational axis 34 are connected by the clutch 11, and then the grip 31 becomes in a state of being able to be operated. At a time when the latch 33 is released by the use of the grip 31 and the drawer 22 is drawn, the moving body 4 locating at the buried position projects to the back surface side from a back surface of the panel board 22a as shown in Fig. 8(d)→(c)→(b)→(a), and then the reset rod 13c that used to be pushed inward through the interlocking mechanism 5 is pushed outward by the elastic force accumulated by the elastic body 130 shown in Fig. 9. With this movement, the number of the dial lock 13 is reset to zero. At this time of zero reset, since it is so arranged that the lever 13b rotates to the downward rotated position and is kept at this position, the cam 12 moves like from Fig. 4 to Fig. 6 with acting against the elastic member 15 so that the clutch 11 becomes in a disconnected state again. Since the clutch 11 is in a disconnected state at a time when the drawer 22 is pushed into the cabinet 21, the drawer 22 is engaged at a storage position with the latch 33 temporarily pressed. At this time, the moving body 4 moves inward like Fig. 8(a)→(b)→(c)→(d), and the reset rod 13c is again pushed inward with acting against the elastic body 130 and the number of the dial lock 13 is kept in a zero reset state.

[0034] As mentioned, the lock and unlock device 1 of this embodiment comprises the dial lock 13 and the moving body 4 arranged on the drawer 22 drawn from the cabinet 21, and the moving body 4 moves toward one direction at a time when the drawer 22 is separated and released from the cabinet 21 after the number of the dial lock 13 is verified, and the moving body 4 moves toward the other direction at a time when the drawer 22 approaches the cabinet 21 so that the dial lock 13 is reset

to the unverified state by making use of the movement of the moving body 4.

[0035] As mentioned, since the moving body 4 is operated to move by making use of a relative movement between the drawer 22 and the cabinet 21 after the number of the dial lock 13 is verified and the dial of the dial lock 13 is reset to the unverified state by the movement of the moving body 4, there is no need of additional operation to reset the dial lock 13 in addition to the operation of opening or closing the drawer 22, thereby reducing a number of the action by one. In addition, since the moving body 4 is arranged between the cabinet 21 and the drawer 22 and moves by being pushed by the cabinet 21 or by being released from the cabinet 21 and both the dial lock 13 and the moving body 4 are arranged on the drawer 22, it is possible to effectively avoid a structure that is complicated and disturbing the storage space such that a link is arranged between the moving body 4 and the dial lock 13 by making use of the open and close movement of the drawer 22.

[0036] In this case, since the moving body 4 accumulates a repulsive force in the elastic body 130 at a time when the moving body 4 is pushed inside to move toward the other direction and the moving body 4 moves toward the one direction by making use of the repulsive force, it is possible to move the moving body 4 toward one direction and the other direction easily just by applying the elastic force of the elastic body 130 to the moving body 4.

[0037] Especially, since the moving body 4 is arranged to be buried in the boundary portion between the drawer 22 and the cabinet 21 at a time when the drawer 22 is closed by being pushed by the cabinet 21 and to project from the boundary portion by being released, it is possible to directly use the front surface 21x of the cabinet 21 as being the other end to push the moving body 4. As a result, an assembling process can be facilitated just by incorporating the moving body 4 only in the drawer 22.

[0038] From a view point of security, since the dial lock 13 is so arranged to be reset to the unverified state by making use of the movement of the moving body 4 at a time when the drawer 22 is separated from the cabinet 21, a number of the dial lock 13 to be verified is reset at a time of initiating an operation of opening the drawer 22 so that it is possible to effectively avoid a case that the number of the dial lock 13 to be verified is observed by a surrounding person in a state that the drawer 22 is open.

[0039] In addition, from a view point of operability, since a locked state of the drawer 22 is automatically released at a time when the number of the dial lock 13 is verified so that the locked state of the drawer 22 can be released instantly after the number of the dial lock 13 is verified in spite of a dial lock mechanism, no additional operation such as rotating a knob is required to unlock the drawer 22. This arrangement also reduces a number of the action by one.

[0040] Alternatively, since the drawer 22 can be automatically locked just by moving the drawer 22 to a closed position next time by making use of the movement of the

moving body 4, it is possible to lock the drawer 22 smoothly again without any additional operation in spite of the dial lock mechanism.

[0041] Furthermore, since the latch mechanism 3 including the grip 31 is arranged on the drawer 22 and the dial lock 13 and the moving body 4 also are arranged on the drawer 22, it is possible to realize an arrangement of the dial lock 13 and the grip 31 that enables conducting an operation of the dial lock 13 and an operation of the grip 31 successively, thereby improving the operability dramatically.

[0042] Since the latch mechanism 3 has an arrangement that an operating force input through the grip 31 to the latch 33 is transmitted through the transmission system A containing the rotational axis 34 so as to enable releasing the latch 33 and the clutch 11 is arranged at a position where a part of the transmission system A is switched to disconnection, and the dial lock 13 and the clutch 11 are related each other so that the clutch 11 is disconnected at a time when the number of the dial lock 13 is unverified and the clutch 11 is connected at a time when the number of the dial lock 13 is verified, it is possible to effectively conduct an operation of releasing the locked state of the drawer 22 by verifying the number of the dial lock 13 or an operation of making the drawer 22 in a state that the drawer 22 can be locked by resetting the number of the dial lock 13 to the unverified state by making use of a part of the existing latch mechanism 3 so that a switch between the locked state and the unlocked state also can be conducted with an extremely minor movement. In addition, while locked, since the grip 31 moves in vain and the force to operate the grip 31 is not transmitted to the latch 33 even though the grip 31 is operated, it is possible to effectively avoid a case that the latch 33 gets damaged due to an unreasonable force applied to the latch 33.

[0043] Since the open/close member is the drawer 22 and the moving body 4 is arranged on the back surface of the panel board 22a of the drawer 22 and the front surface of the cabinet 21 is used directly, a position at which the moving body 4 is arranged is not limited to a position near the side edge of the back surface of the panel board 22a as shown in drawings and the position may be a back surface locating at the upper edge or a back surface locating at the lower edge, thereby increasing freedom in design.

[0044] A concrete arrangement of each part is not limited to the above-mentioned embodiment, and may be variously modified without departing from the spirit of the invention.

[0045] For example, in the above-mentioned embodiment, the dial lock 13 and the moving body 4 are arranged on the drawer 22 as being the open/close member, however, the dial lock 13 and the moving body 4 may be arranged on the cabinet 21.

[0046] In addition, it is possible to produce a fundamental operation and effect of this invention also for an arrangement wherein the moving body 4 is moved by

making use of the movement (more specifically, a movement of closing the drawer 22) of the drawer 22 to approach the cabinet 21 after the number of the dial lock 13 is verified and then the drawer 22 is drawn, and the number of the dial lock 13 is reset to the unverified state.

[0047] Furthermore, the open/close member is not limited to the drawer, and it may be, for example, a door 122 as shown in Fig. 10 and Fig. 11. The door 122 shown in Fig. 10 is so arranged that the moving body 4 is arranged on a back surface of an edge part locating on a hinge side or on a back surface near the edge part and the moving body 4 is pushed into a front surface 121x of a cabinet 121 locating at a position corresponding to the moving body 4. It is a matter of course that the moving body 4 may be arranged on the cabinet 121 and pushed by the door 122. Alternatively, as shown in Fig. 11, the moving body 4 may be arranged on a back surface of an edge part locating on a side opposite to the hinge side or on a back surface near the edge part and the moving body 4 is pushed into a front surface 121x of the cabinet 121 locating at a position corresponding to the moving body 4. It is a matter of course that the moving body 4 may be arranged on the cabinet 121 and pushed by the door 122. A dial lock and a transmission system connecting the dial lock and the moving body 4 are omitted to show in drawings, and it goes without saying that the dial lock is reset to the unverified state by making use of the movement of the moving body 4.

(Second embodiment)

[0048] Fig. 12 through Fig. 14 shows a second embodiment of this invention. Each of the same components such as the drawer 22, the latch mechanism 3, the transmission system A, the grip 31, the lock and unlock device 1 and the dial lock 13 that is fundamentally the same as that of the above-mentioned embodiment will be given the same numerical code, and an explanation is omitted for the components that require no special explanation.

[0049] In this embodiment, a moving body 104 is arranged on a part of the drawer 22 together with the dial lock 13, the moving body 104 moves toward a direction shown by an arrow R in Fig. 12 (a direction to make a sliding movement rearward apart from the panel board 22a) at a time when the drawer 22 is released and separated from the cabinet 21 after a number of the dial lock 13 is verified, and the moving body 104 moves toward a direction shown by an arrow S in Fig. 12 (a direction to approach the panel board 22a) by a reactive force against the pushing force at a time when the drawer 22 approaches the cabinet 21, and the dial lock 13 is reset to the unverified state by making use of the movement of the moving body 104.

[0050] With a concrete explanation, the moving body 104 is made of a resin or the like arranged to make an engagement with a guide bore (not shown in drawings) arranged on a side surface of the side plate 22bb of the drawer 22 by a sliding movement back and forth, and

has an engaging nail 104a that makes an engagement with the front surface 21x of the side plate 21a of the cabinet 21 at a time when the drawer 22 is pushed toward the cabinet 21. When the drawer 22 is drawn further forward from a state in Fig. 13(a), the engaging nail 104a is separated from the front surface 21x of the side plate 21a of the cabinet 21. At a time when the drawer 22 is pushed into the cabinet 21 like Fig. 13(a)→(b)→Fig. 14 (a)→(b), the engaging nail 104a makes an abutting contact with the front surface 21x of the side plate 21a of the cabinet 21 and the moving body 104 makes a relative movement on the side plate 22bb toward a direction to approach the panel board 22a due to the reactive force, and contrary at a time when the drawer 22 is separated from the cabinet 21 like the Fig. 14 (b)→(a)→Fig. 13(b)→(a), the pushing force disappears and the moving body 104 makes a relative movement on the side plate 22bb toward a direction to be separated from the panel board 22a. At a time when the drawer 22 further opens from the state in Fig. 13(a), the moving body 104 is again separated completely from the front surface 21x of the side plate 21a of the cabinet 21 forward. The projecting movement of the moving body 104 may use the elastic force of the elastic body 130 shown in Fig. 9 or an elastic member may be incorporated at an appropriate position.

[0051] In addition, the reset rod 13c projecting from the dial lock 13 toward the other side direction makes a movement in conjunction with the movement of the moving body 104 through an interlocking mechanism 105. The interlocking mechanism 105 comprises, as shown in Fig. 12 through Fig. 14, a movable bracket 151, a third link 152 and a second link 153. The movable bracket 151 is rotatably mounted around a supporting axis L3 in a front surface side of the back surface panel 22a1 of the panel board 22a, the third link 152 interlocks a sliding movement of the moving body 104 and a rotating movement of the movable bracket 151 by connecting a supporting axis L4 set at a portion displaced from the supporting axis L3 of the movable bracket 151 and a supporting axis L5 set on the moving body 104, and the second link 153 interlocks a rotating movement of the movable bracket 151 and the projecting movement of the reset rod 13c from the casing 13a through a supporting axis L6.

[0052] As explained based on Fig. 9, the reset rod 13c is urged toward a direction to project from the casing 13a of the dial lock 13 to an outside direction by the elastic body 130 such as a spring arranged inside. And the reset rod 13c does not influence on a dialed state of the dial lock 13 at a time when the reset rod 13c is buried with acting against the elastic body 130 and the reset rod 13c resets the number of the dial lock 13 to zero at a time when the reset rod 13c projects from the casing 13a because the reset rod 13c is urged by the elastic body 130. The lever 13b projecting from an opposite direction is kept at the downward rotated position at a time when the number of the dial lock 13 is unverified including at a time of reset to zero, and the force to keep the lever 13b is

released at a time when the number of the dial lock 13 is verified as mentioned above.

[0053] More specifically, the reset rod 13c is in a state of being pushed toward the left direction in Fig. 14(b) through the interlocking mechanism 105 at a time when the drawer 22 locates at a closed position and the moving body 104 slides to a position where the moving body 104 is supported by the front surface 21x of the cabinet 21 and makes an abutting contact with the back surface 22ax of the panel board 22a as shown in Fig. 14(b). At a time when the dial lock 13 is in the unverified state, the keeping force is applied to the lever 13b at the downward rotated position and the cam 12 is kept at a locked position to disconnect the clutch 11 as shown in Fig. 6. Next, at a time when the number of the dial lock 13 is verified, a force to keep the lever 13b is released, which triggers the cam 12 to move to the unlocked position shown in Fig. 4 so that the grip 31 and the rotational axis 34 are connected by the clutch 11, and then the grip 31 becomes in a state of being able to be operated. At a time when the latch 33 is released by the use of the grip 31 and the drawer 22 is drawn, the moving body 104 locating at the front position is urged by the elastic body 130 shown in Fig. 9 and makes a sliding movement rearward from a back surface 22ax of the panel board 22a as shown in Fig. 14(b)→(a)→Fig. 13(b)→(a), and the reset rod 13c that used to be pushed inward through the interlocking mechanism 105 is pushed outward (right direction in Fig. 12). With this movement, the number of the dial lock 13 is reset to zero. At this time of zero reset, since it is so arranged that the lever 13b rotates to the downward rotated position and is kept at this position, the cam 12 moves like from Fig. 4 to Fig. 6 to the locked position with acting against the elastic member 15 so that the clutch 11 becomes in a disconnected state again. Since the clutch 11 is in a disconnected state at a time when the drawer 22 is pushed into the cabinet 21, the drawer 22 is engaged at a storage position with the latch 33 temporarily pressed. At this time, the moving body 104 makes a sliding movement toward the front on the drawing 22 like Fig. 13(a)→(b)→Fig. 14(a)→(b), and the reset rod 13c is again pushed inward with acting against the elastic body 130 and the number of the dial lock 13 is kept in a zero reset state.

[0054] As mentioned, the lock and unlock device 1 of this embodiment also comprises the dial lock 13 and the moving body 104 arranged on the drawer 22 that opens or closes the cabinet 21, and the moving body 104 is so arranged to move toward one direction at a time when the drawer 22 is separated and released from the cabinet 21 after the number of the dial lock 13 is verified and to move toward the other direction at a time when the drawer 22 approaches the cabinet 21 so that the dial lock 13 is reset to the unverified state by making use of the movement of the moving body 104.

[0055] As mentioned, since the moving body 104 is operated to move by making use of a relative movement between the drawer 22 and the cabinet 21 after the

number of the dial lock 13 is verified and the dial lock 13 is reset to the unverified state by the movement of the moving body 104, there is no need of additional operation to reset the number of the dial lock 13 in addition to the operation of opening or closing the drawer 22, thereby reducing a number of the action by one. In addition, since the moving body 104 is arranged between the cabinet 21 and the drawer 22 and moves by being pushed by the cabinet 21 or by being released from the cabinet 21 and both the dial lock 13 and the moving body 104 are arranged on the drawer 22, it is possible to effectively avoid a structure that is complicated and disturbing the storage space and that requires a link be arranged between the moving body 104 and the dial lock 13 by making use of the open and close movement of the drawer 22.

[0056] In this case, since the moving body 104 accumulates the repulsive force in the elastic body 130 at a time when the moving body 104 is pushed inside to move toward the other direction and the moving body 104 moves toward the one direction by making use of the repulsive force, it is possible to move the moving body 104 toward one direction and the other direction easily just by applying the elastic force of the elastic body 130 to the moving body 104.

[0057] Especially, since the moving body 104 is so arranged to be buried in the boundary portion between the drawer 22 and the cabinet 21 by being pushed by the cabinet 21 at a time when the drawer 22 is closed and to project from the boundary portion by being released from the cabinet 21, it is possible to directly use the front surface 21x of the cabinet 21 as being the other end to push the moving body 104. As a result, an assembling process can be facilitated just by incorporating the moving body 104 only in the drawer 22.

[0058] From a view point of security, since the dial lock 13 is so arranged to be reset to the unverified state by making use of the movement of the moving body 104 at a time when the drawer 22 is separated from the cabinet 21, the number of the dial lock 13 to be verified is reset at a time of initiating an operation of opening the drawer 22 so that it is possible to effectively avoid a case that the number of the dial lock 13 to be verified is observed by a surrounding person in a state that the drawer 22 is open.

[0059] In addition, from a view point of operability, since a locked state of the drawer 22 is automatically released at a time when the number of the dial lock 13 is verified so that the locked state of the drawer 22 can be released instantly after the number of the dial lock 13 is verified in spite of a dial lock mechanism, no additional operation such as rotating a knob is required to unlock the drawer 22. This arrangement also reduces a number of the action by one.

[0060] Alternatively, since the drawer 22 can be automatically locked just by moving the drawer 22 to a closed position next time by making use of the movement of the moving body 104, it is possible to lock the drawer 22 smoothly again without any additional operation in spite

of the dial lock mechanism.

[0061] Furthermore, since the latch mechanism 3 including the grip 31 is arranged on the drawer 22 and the dial lock 13 and the moving body 104 also are arranged on the drawer 22, it is possible to realize an arrangement of the dial lock 13 and the grip 31 that enables conducting an operation of the dial lock 13 and an operation of the grip 31 successively, thereby improving the operability dramatically.

[0062] Since the latch mechanism 3 has an arrangement that an operating force input through the grip 31 to the latch 33 is transmitted through the transmission system A containing the rotational axis 34 so as to enable releasing the latch 33 and the clutch 11 is arranged at a position where a part of the transmission system A is switched to disconnection and the dial lock 13 and the clutch 11 are related each other so that the clutch 11 is disconnected at a time when the number of the dial lock 13 is unverified and the clutch 11 is connected at a time when the number of the dial lock 13 is verified, it is possible to effectively conduct an operation of releasing the locked state of the drawer 22 by verifying the number of the dial lock 13 or an operation of making the drawer 22 in a state that the drawer 22 can be locked by resetting the dial lock 13 to the unverified state by making use of a part of the existing latch mechanism 3 so that a switch between the locked state and the unlocked state also can be conducted with an extremely minor movement. In addition, while locked, since the grip 31 moves in vain and the force to operate the grip 31 is not transmitted to the latch 33 even though the grip 31 is operated, it is possible to effectively avoid a case that the latch 33 gets damaged due to an unreasonable force applied to the latch 33.

[0063] Since the open/close member is the drawer 22 and the moving body 104 is arranged on the back surface of the panel board 22a of the drawer 22 and the front surface of the cabinet 21 is used directly, a position at which the moving body 104 is arranged is not limited to a position near the side edge of the back surface of the panel board 22a as shown in drawings and may be a back surface locating at the upper edge or a back surface locating at the lower edge, which increases freedom in design. In addition, since the moving body 104 is housed in a space closed by the cabinet 21 and the panel board 22a of the drawer 22 by being pushed at a time when the drawer 22 is closed, it is possible to effectively improve the appearance of the storage.

(Third embodiment)

[0064] A third embodiment of this invention will be explained with reference to Fig. 15 through Fig. 17. Fig. 15 through Fig. 17 shows a storage 202 to which a lock and unlock device 201 of this embodiment is applied. The storage 202 has a door 222 as being the open/close member at a position to open or close a storage space of a cabinet 221, a latch mechanism 203 is incorporated

in the door 222, the door 222 can be engaged with the cabinet 221 and the engaged state can be released by the grip 231 arranged on the door, and a lock and unlock device 201 that locks or unlocks the door 222 is arranged in the door 222 by making use of the latch mechanism 203.

[0065] The door 222 is mounted on a side plate 221b of the cabinet 221 through a hinge mechanism H and the hinge mechanism H is, so called, a projecting butt hinge wherein a hinge axis projects forward according as the door 222 opens. A step part 221x forming a concave facing forward is formed on a front surface of the side plate 221b, and a thickness part of the side edge 222b of the door 222 is housed in the step part 221x as shown in Fig. 17(b) at a time when the door 222 is closed.

[0066] The latch mechanism 203 is so arranged to elastically project the latch 233 toward a side direction from a resin member 232 projecting toward a back surface from both upper and lower edges of the door 222, and the latch 233 makes an engagement with a concave part arranged at a portion, not shown in drawings, of a front surface of the cabinet 221 constituting the storage 202 at a time when the door 222 is pushed into the concave part, and the latch 233 is operated to move toward a buried direction through a transmission system containing the rotational axis 234 at a time when an operating force is input to the grip 231.

[0067] The transmission system operates the latch 233 to move toward the buried direction even though the grip 231 is operated either right or left by means of a principle that is the same as that of the converting part 37 shown in Fig. 3(b). In this case also, the latch 233 is pushed toward a direction to project by a spring or the like.

[0068] Meanwhile, the lock and unlock device 201 of this embodiment is so arranged that a clutch 211 is arranged between a grip 231 and the rotational axis 234 in the door 222, a link 212 makes an engagement with the clutch 211, and a dial lock 213 as being an input part is arranged near the grip 231 of the door 222 in order to provide the link 212 with a switch movement from a locked state to an unlocked state.

[0069] The grip 231 is loosely fitted over the rotational axis 234 by means of the same arrangement as that shown in Fig. 5 and the clutch 211 is arranged at a position adjacent to the grip 231 in a state that can be rotatable integrally with the rotational axis 234 and slidable in an axial direction so that a rotation of the grip 231 is transmitted to the rotational axis 234 through the clutch 211 in a state of Fig. 5(c) (a clutched state) where a relating part 211a arranged at a part of the clutch 211 engages a related part (omitted to draw in Fig. 15) arranged at a part of the grip 231 at a position displaced from the center of the axis of the rotational axis 234 and a rotation of the grip 231 is not transmitted to the rotational axis 234 so as to be in an idling state in a state of Fig. 5(a) (an unclutched state) where the relating part 211a is released from an engagement with the related part.

[0070] The link 212 is arranged in a state of being able

to make an up-and-down movement wherein one end of which is connected to the clutch 211 through an axis f and the other end of which is connected to a lever 213b, to be described next, and the link 212 disconnects the clutch 211 as shown in Fig. 5(a) at a locked position like in Fig. 6 where the link 212 moves downward, and connects the clutch 211 as shown in Fig. 5(c) at an unlocked position like in Fig. 4 where the link 212 moves upward.

[0071] The dial lock 213 is so arranged that a lever 213b rotatably projects toward one side direction from the casing 213a as shown in Fig. 4 and a distal end of the lever 213b is connected to the above-mentioned link 212 through an axis g so that the lever 213b moves downward and is kept at this position at a time when a number of the dial lock 213 is not verified as shown in Fig. 6 and a force to keep the lever 213b is released at a time when the number of the dial lock 213 is verified as shown in Fig. 4. More specifically, at a time when the number of the dial lock 213 is not verified, since the link 212 is kept at the locked position locating downward, the grip 231 and the rotational axis 234 are separated so that the lock and unlock device 201 is in a locked state where the grip 231 moves in vain even though the grip 213 is operated. Meanwhile, at a time when the force to keep the lever 213b is released, the link 212 moves upward to the unlocked position as shown in Fig. 6 → Fig. 4 triggered by the time when the force is released and then the grip 231 is connected with the rotational axis 234 by the clutch 211 so that the lock and unlock device 201 is in a state that the latch 233 can be released by the grip 231.

[0072] In this embodiment, the dial lock 213 and a moving body 204 are arranged on the hinge side of the door 222, the moving body 204 is operated to move in one direction (a direction to project obliquely rearward from the door 222) shown by an arrow T in Fig. 16 at a time when the door 222 is separated from the cabinet 221 to open after the number of the dial lock 213 is verified and the moving body 204 is operated to move in the other direction (a direction to be buried in the door 222) shown by an arrow U in Fig. 16 due to a pushing reactive force at a time when the door 222 approaches the cabinet 221, and the dial lock 213 is reset to the unverified state by making use of the movement of the moving body 204.

[0073] If explained more concretely, the moving body 204 is made of resin mounted on a distal end of a moving rod 204a that makes a back and forth movement along a width direction of the door 222 near a back surface of the door 222, a distal end of the moving body 204 is arranged at a position facing an inner side surface 221b of a side plate 221 of the cabinet 201, and a pressure receiving surface 204b of the moving body 204 is arranged to face a corner portion C between the step part 221x in a concave shape and the inner side surface 221b. The moving body 204 bumps against the corner portion C (the inner side surface 221b at the final position) of the side plate 221 of the cabinet 201 and is pushed toward a direction to be buried from the side edge 222b of the door 222 due to a reactive force at a time when the door

222 is closed as shown in Fig. 16(a)→(b)→Fig. 17(a)→(b), and contrary the moving body 204 projects obliquely rearward from the door 222 toward the corner portion C at a time when the door is open as shown in Fig. 17(b)→(a)→Fig. 16(b)→(a). At a time when the door 222 further opens from a state shown in Fig. 16(a), the moving body 204 is completely separated obliquely forward from the corner portion C. This projecting movement may use an elastic force of an elastic body 130 (refer to Fig. 9), to be described later, or an elastic body may be incorporated at an appropriate position.

[0074] Then a movement of the moving body 204 is in conjunction with a reset rod 213c by connecting a proximal end 204a of the moving body 204 with the reset rod 213c projecting toward other side direction from the dial lock 213 through an interlocking part 5.

[0075] Similar to the reset rod 13c shown in Fig. 9, the reset rod 213c is urged toward a direction to project from the casing 213a of the dial lock 213 to an outside direction by the elastic body 130 such as a spring arranged inside, and the reset rod 213c does not influence on a dialed state of the dial lock 213 at a time when the reset rod 213c is buried with acting against the elastic body 130 and the reset rod 213c resets the number of the dial lock 213 to zero at a time when the reset rod 213c projects from the casing 213a by being urged by the elastic body 130. The lever 213b projecting from an opposite direction is kept at a downward rotated position at a time when the number of the dial lock 213 is unverified including at a time of reset to zero, and the lever 213b is released from the kept state by the force at a time when the number of the dial lock 213 is verified as mentioned above.

[0076] More specifically, the reset rod 213c is in a pushed state through the interlocking part 5 at a time when the door 222 locates at a closed position and the moving body 204 is pushed inside of the door 222 by the corner portion C (or the inner side surface 221b) of the cabinet 221 and locates at the buried position shown in Fig. 17(b). At a time when the dial lock 213 is in the unverified state, the keeping force is applied to the lever 213b at a downward rotated position similar to a state shown in Fig. 6 and the link 212 is kept at a locked position (a drop position) to disconnect the clutch 211. Next, at a time when the number of the dial lock 213 is verified, a force to keep the lever 213b is released, which triggers the link 212 to move to the unlocked position (a rising position), similar to a state shown in Fig. 4, so that the grip 231 and the rotational axis 234 are connected by the clutch 211, and then the grip 231 becomes in a state of being able to be operated. At a time when the latch 233 is released by the use of the grip 231 and the door 222 is open, the moving body 204 locating at the buried position as shown in Fig. 17(b)→(a)→Fig. 16(b)→(a) projects toward the corner portion C of the cabinet 202 on a hinge side, and then the reset rod 213c that used to be pushed inward through the interlocking part 5 is pushed outward by the elastic force accumulated by the elastic body 130 shown in Fig. 9. With this movement,

the number of the dial lock 213 is reset to zero. At this time of zero reset, since it is so arranged that the lever 213b rotates to the downward rotated position and is kept at this position, the link 212 descends similar to a change of the state shown in Fig. 4 → Fig. 6 so as to move to the locked position and then the clutch 211 becomes in a disconnected state again. Since the clutch 211 is in a disconnected state at a time when the door 222 closed, the door 222 is engaged at a storage position with the latch 233 temporarily pressed. At this time, the moving body 204 moves inward like Fig. 16(a)→(b)→Fig. 17(a)→(b), and the reset rod 213c is again pushed inward with acting against the elastic body 130 and the number of the dial lock 213 is kept in a state of the zero reset.

[0077] As mentioned, the lock and unlock device 201 of this embodiment comprises the dial lock 213 and the moving body 204 arranged on the door 222 that opens or closes the cabinet 221, and the moving body 204 moves toward one direction at a time when the door 222 is separated and released from the cabinet 221 after the number of the dial lock 213 is verified, and the moving body 204 is pushed inward and moves toward the other direction at a time when the door 222 approaches the cabinet 221 so that the dial lock 213 is reset to the unverified state by making use of the movement of the moving body 204.

[0078] As mentioned, since the moving body 204 is operated to move by making use of a relative movement between the door 222 and the cabinet 221 after the number of the dial lock 213 is verified and the number of the dial lock 213 is reset to the unverified state by the movement of the moving body 204, there is no need of additional operation to reset the number of the dial lock 213 in addition to the operation of opening or closing the door 222, thereby reducing a number of the action by one. In addition, since the moving body 204 is arranged between the cabinet 221 and the door 222 and moves by being pushed by the cabinet 221 or by being released from the cabinet 221 and both the dial lock 213 and the moving body 204 are arranged on the door 222, it is possible to effectively avoid a structure that is complicated and disturbing the storage space such that a link is arranged between the moving body 204 and the dial lock 213 by making use of the open and close movement of the door 222.

[0079] In this case, since the moving body 204 accumulates the repulsive force in the elastic body 130 at a time when the moving body 204 is pushed inside to move toward the other direction and the moving body 204 moves toward the one direction by making use of the repulsive force, it is possible to move the moving body 204 toward one direction and the other direction easily just by applying the elastic force of the elastic body 130 to the moving body 204.

[0080] Especially, since the moving body 204 is arranged to be housed in a space closed by the cabinet 221 and the door 222 by being pushed at a time when the door 222 is closed and to be released from the space

with moving toward a direction opposite to a direction of being pushed, it is possible to keep an appearance of the storage 202 good at a time when the door 222 is closed without losing a required function. In addition, since it is possible to directly use the inner wall of the storage space such as the corner portion C or the inner side surface 221b of the cabinet 221 as being the other end to push the moving body 204, an assembling process can be facilitated just by incorporating the moving body 204 only in the door 222.

[0081] From a view point of security, since the dial lock 213 is so arranged to be reset to the unverified state by making use of the movement of the moving body 204 at a time when the door 222 is separated from the cabinet 221, the number of the dial lock 213 to be verified is reset at a time of initiating an operation of opening the door 222 so that it is possible to effectively avoid a case that the number of the dial lock 213 to be verified is observed by a surrounding person in a state that the door 222 is open.

[0082] In addition, from a view point of operability, since a locked state of the door 222 is automatically released at a time when the number of the dial lock 213 is verified so that the locked state of the door 222 can be released instantly after the number of the dial lock 213 is verified in spite of a dial lock mechanism, no additional operation such as rotating a knob is required to unlock the door 222. This arrangement also reduces a number of the action by one.

[0083] Alternatively, since the door 222 can be automatically locked just by moving the door 222 to a closed position next time by making use of the movement of the moving body 204, it is possible to lock the door 222 smoothly again without any additional operation in spite of the dial lock mechanism.

[0084] Furthermore, since the latch mechanism 203 including the grip 231 is arranged on the door 222 and the dial lock 213 and the moving body 204 also are arranged on the door 222, it is possible to realize an arrangement of the dial lock 213 and the grip 231 that enables conducting an operation of the dial lock 213 and an operation of the grip 231 successively, thereby improving the operability dramatically.

[0085] Since the latch mechanism 203 has an arrangement that an operating force input through the grip 231 to the latch 233 is transmitted through the rotational axis 234 so that the latch 233 can be released and the clutch 211 is arranged at a position where a part of the transmission system is switched to disconnection and the dial lock 213 and the clutch 211 are related each other so that the clutch 211 is disconnected at a time when the number of the dial lock 213 is unverified and the clutch 211 is connected at a time when the number of the dial lock 213 is verified, an operation of releasing the locked state of the door 222 by verifying the number of the dial lock 213 or an operation of making the door 222 in a state of being able to be locked by resetting the dial lock 213 to the unverified state can be conducted effectively by

making use of a part of the existing latch mechanism 203 so that a switch between the locked state and the unlocked state also can be conducted with an extremely minor movement. In addition, while locked, since the grip 231 moves in vain and the force to operate the grip 231 is not transmitted to the latch 233 even though the grip 231 is operated, it is possible to effectively avoid a case that the latch 233 gets damaged due to an unreasonable force applied to the latch 233.

[0086] Especially, the open/close member is the door 222 and the moving body 204 is arranged in a manner of being able to project or recede near the edge part on the hinge side on the back surface of the door 222, and the moving body 204 is concealed at a position that can not be seen from outside at a time when the door 222 is closed and the moving body 204 is arranged in the edge portion 222b on the hinge side of the door 222 so as not to be highly visible at a time when the door 222 is open. As a result, it is possible to keep an appearance of the storage good.

POSSIBLE APPLICATIONS IN INDUSTRY

[0087] In accordance with the above-mentioned invention, since the dial lock can be reset to the unverified state again just by opening the open/close member after the dial lock is set to a verified state without conducting an additional operation and the number of the dial lock can be reset by making use of the movement of pushing or releasing the moving body that accompanies an operation of opening or closing the open/close member, it is possible to simplify an assembling process by incorporating the moving body into either the open/close member or the cabinet, thereby being able to provide a superior lock and unlock device that can simplify an arrangement and reduce a cost.

Claims

1. A lock and unlock device comprising a dial lock and a moving body that are arranged in either one of a cabinet or an open/close member to open or close the cabinet, wherein the moving body is so arranged to move toward one direction at a time when the open/close member is separated to be released from the cabinet after a number of the dial lock is verified and to move toward the other direction by being pressed at a time when the open/close member approaches the cabinet, and the dial lock is reset to an unverified state by making use of the movement of the moving body.
2. The lock and unlock device described in claim 1, wherein the moving body is pressed and accumulates a repulsive force at a time when the moving body moves toward the other direction and moves to the one direction by making use of the repulsive

force.

3. The lock and unlock device described in claim 2, wherein the moving body is so arranged to be buried into a boundary portion between the open/close member and the cabinet by being pressed when the open/close member is closed, and to project from the boundary portion by being released.
4. The lock and unlock device described in claim 2, wherein the moving body is so arranged to be housed in a space closed by the cabinet and the open/close member by being pressed at a time when the open/close member is closed, and to be released from the space by moving to a direction opposite to a direction when the open/close member is pressed at a time when the open/close member is open.
5. The lock and unlock device described in claim 3, wherein the moving body is pressed by bumping against an inner wall of a storage space of the cabinet.
6. The lock and unlock device described in claim 1 through 5, wherein the dial lock is reset to an unverified state by making use of the movement of the moving body at a time when the open/close member is separated from the cabinet.
7. The lock and unlock device described in claim 1 through 6, wherein a locked state of the open/close member is released by verifying the number of the dial lock.
8. The lock and unlock device described in claim 7, wherein the open/close member is automatically locked by making use of the movement of the moving body just by moving the open/close member to a closed position next time.
9. The lock and unlock device described in claim 7 or 8, wherein a latch mechanism containing a grip is arranged on the open/close member and the dial lock and the moving body are also arranged on the open/close member.
10. The lock and unlock device described in claim 9, wherein the latch mechanism transmits an operating force input through the grip to the latch through a transmission system containing a rotational axis so as to enable releasing the latch, a clutch is arranged so as to make a part of the transmission system switch to disconnection, and the dial lock and the clutch are directly or indirectly related each other so as to disconnect the clutch at a time when the number of the dial lock is unverified and to connect the clutch at a time when the number of the dial lock is verified.

11. The lock and unlock device described in claim 1 through 10, wherein the open/close member is a drawer and the moving body is arranged on either one of the back surface of a panel board of the drawer and a corresponding front surface of the cabinet. 5

12. The lock and unlock device described in claim 1 through 10, wherein the open/close member is a door and the moving body is arranged on either one of a back surface of an edge part or near the edge part locating on a hinge side of the door or a corresponding front surface of the cabinet, or on either one of a back surface of an edge part or near the edge part locating on a side opposite to the hinge side of the door or a corresponding front surface of the cabinet. 10 15

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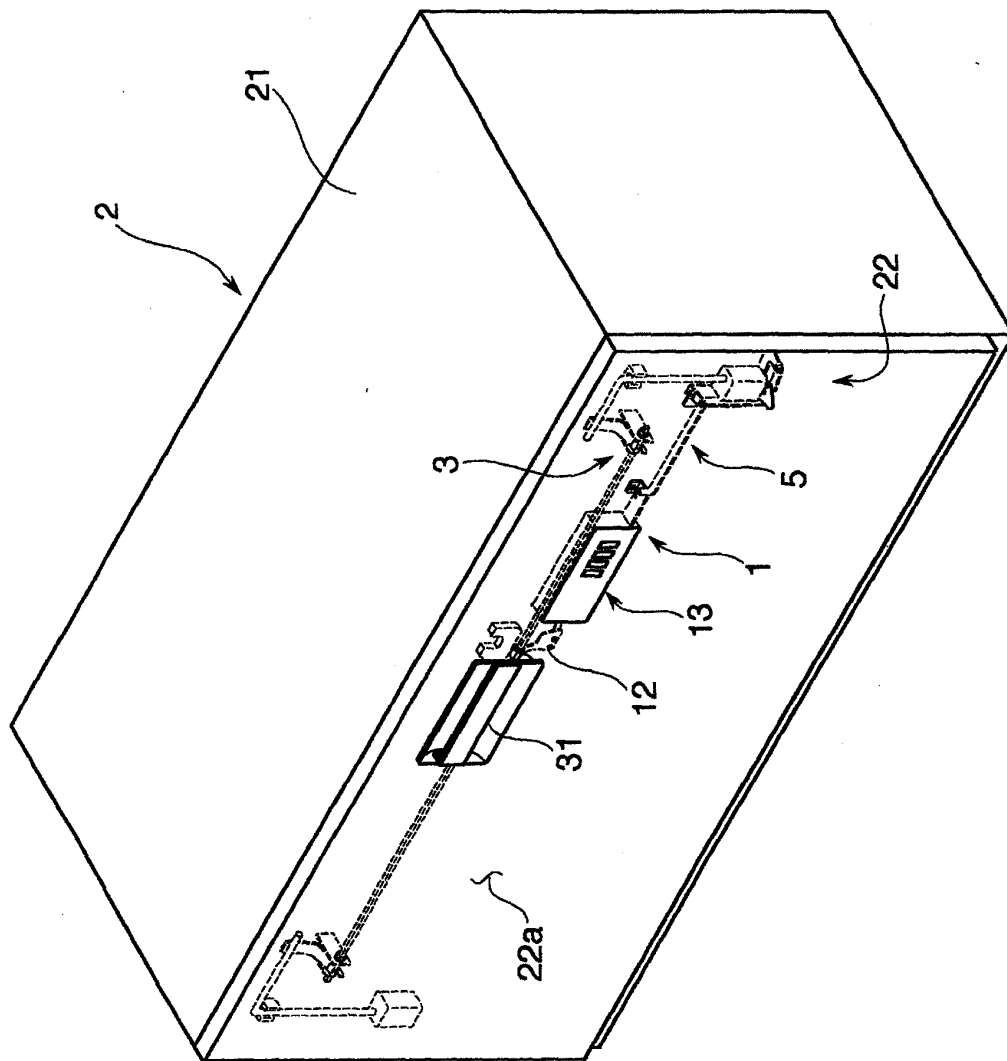
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Fig. 1



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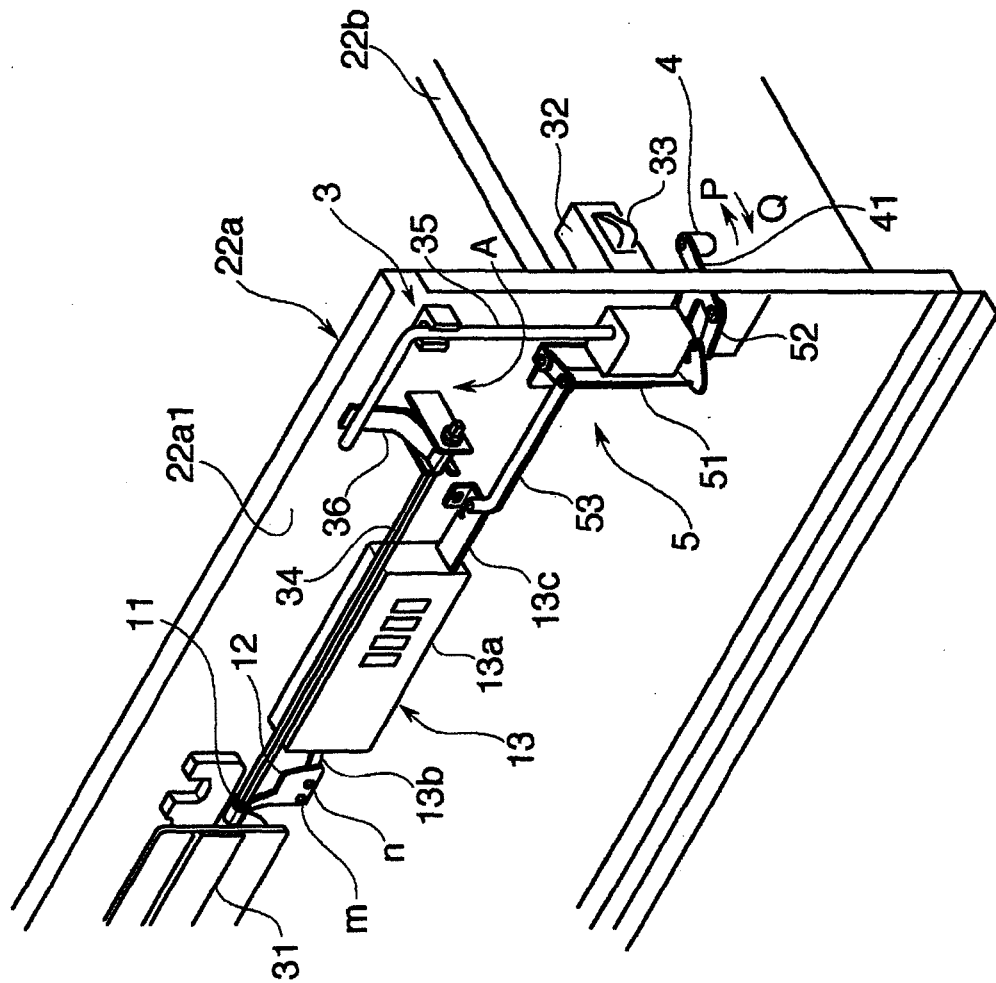
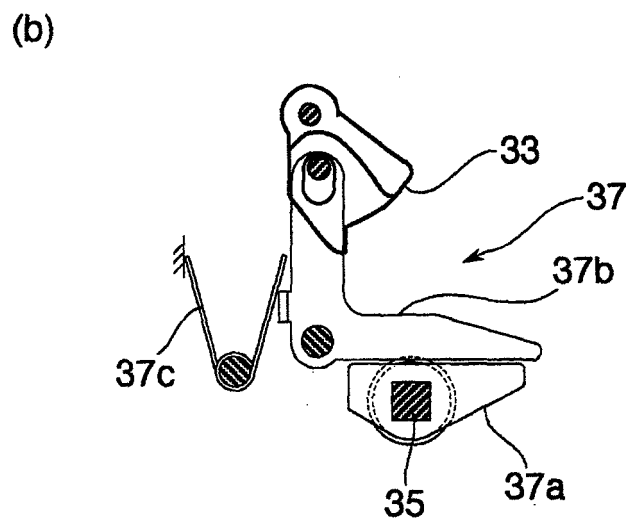
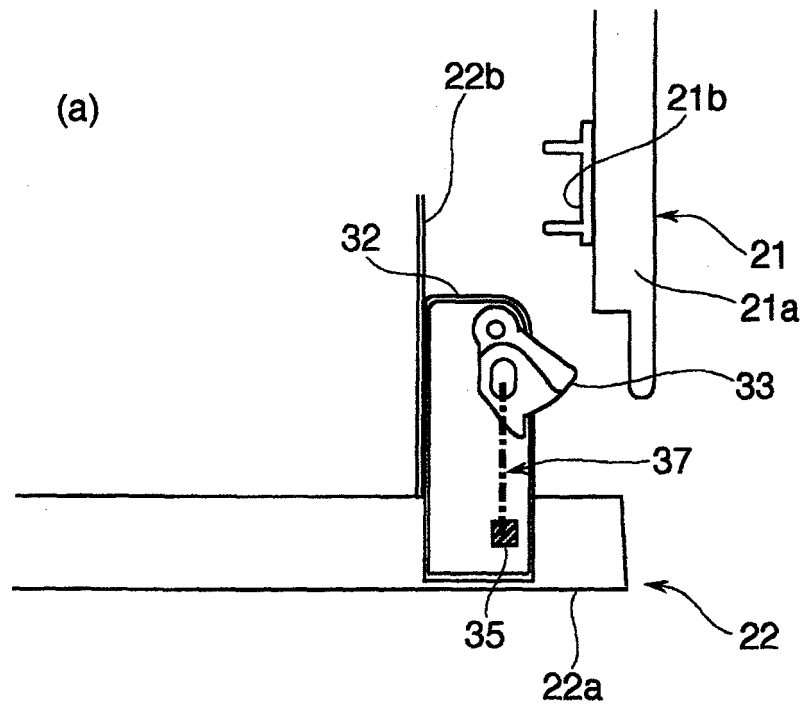


Fig. 3



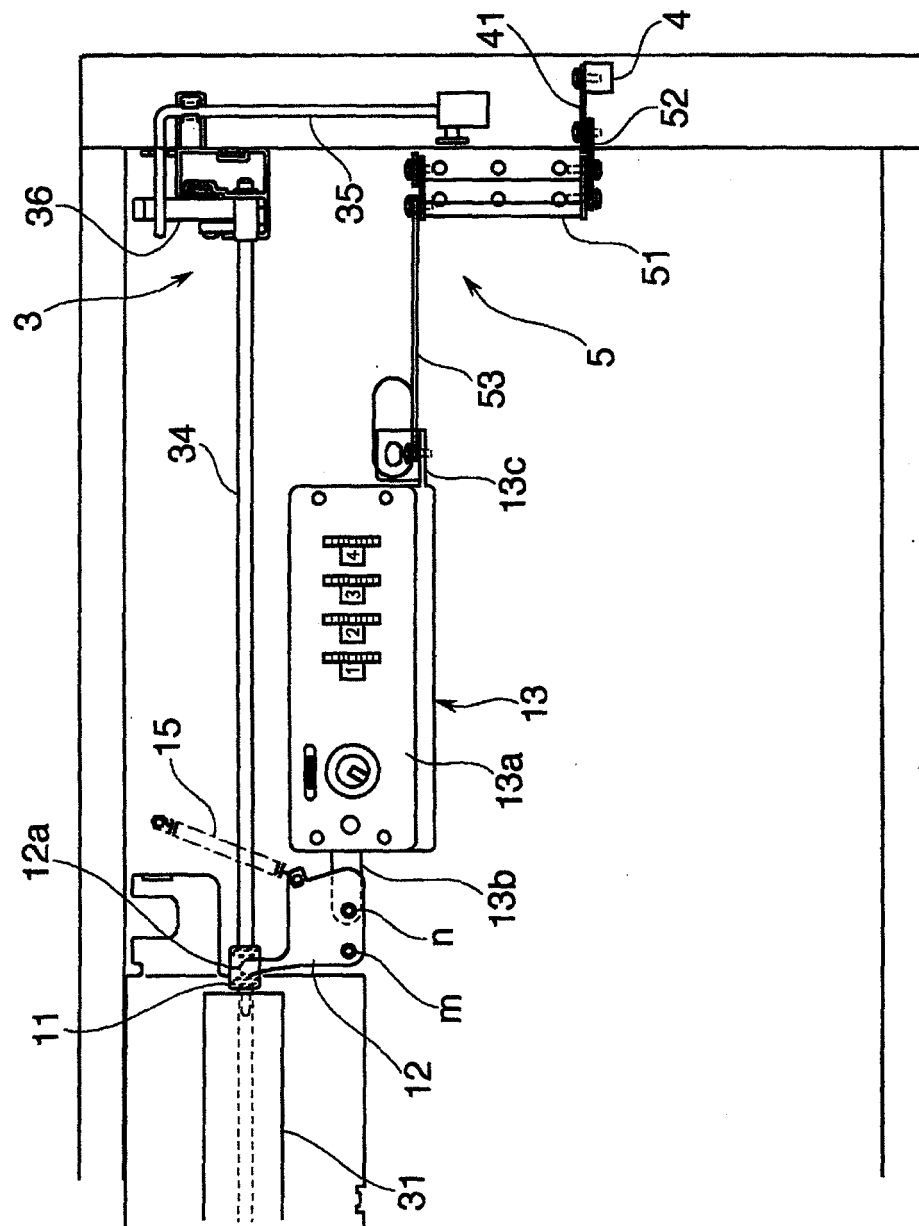
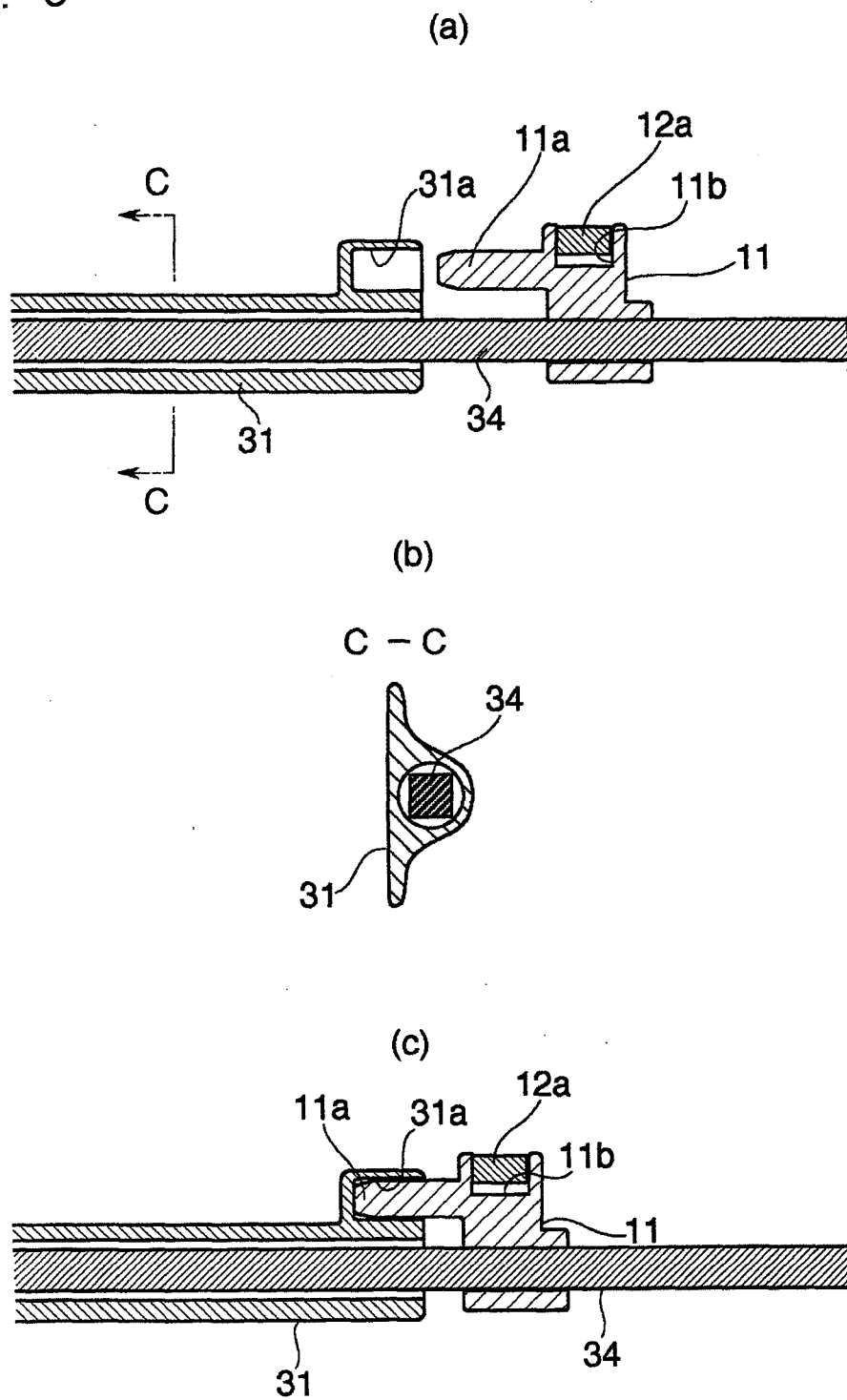
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Fig. 5



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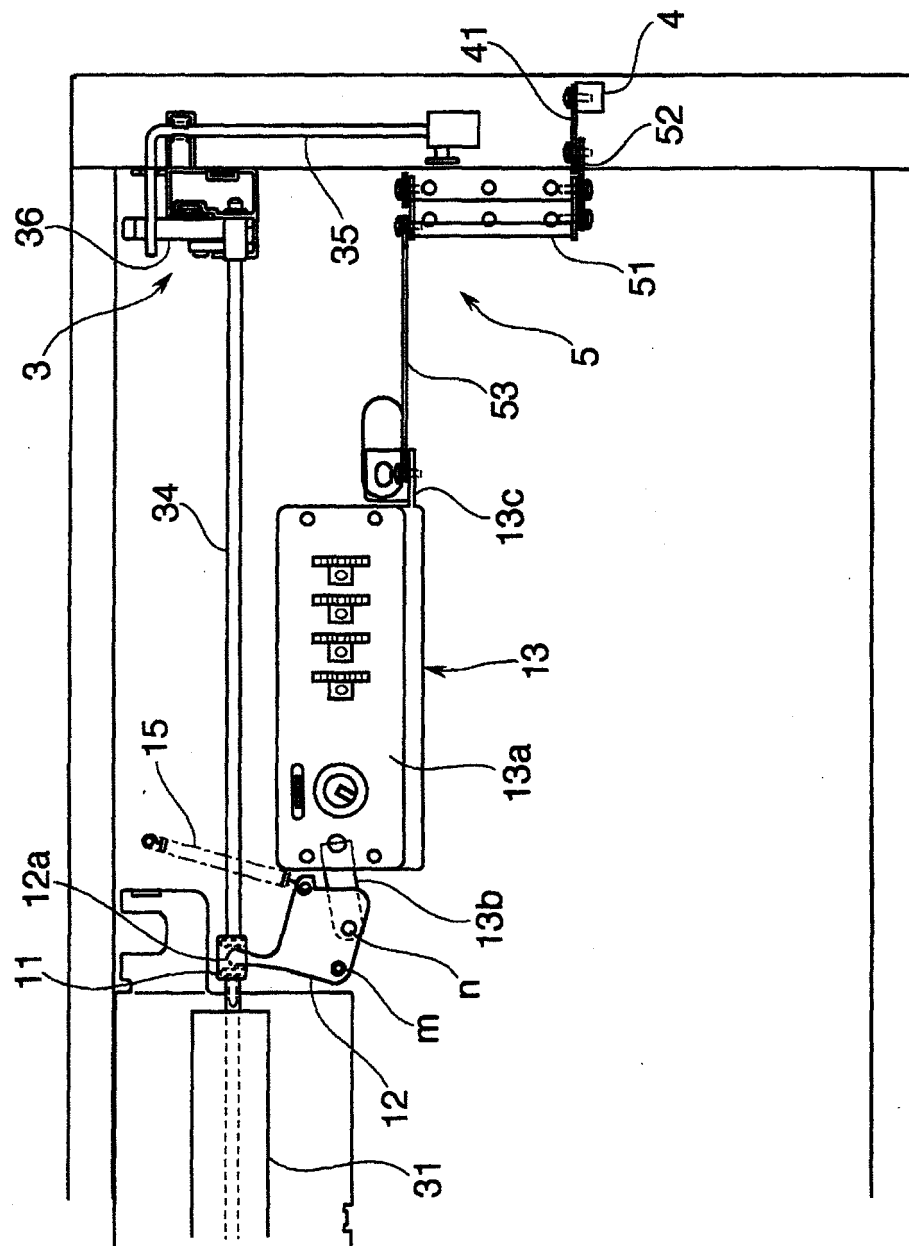
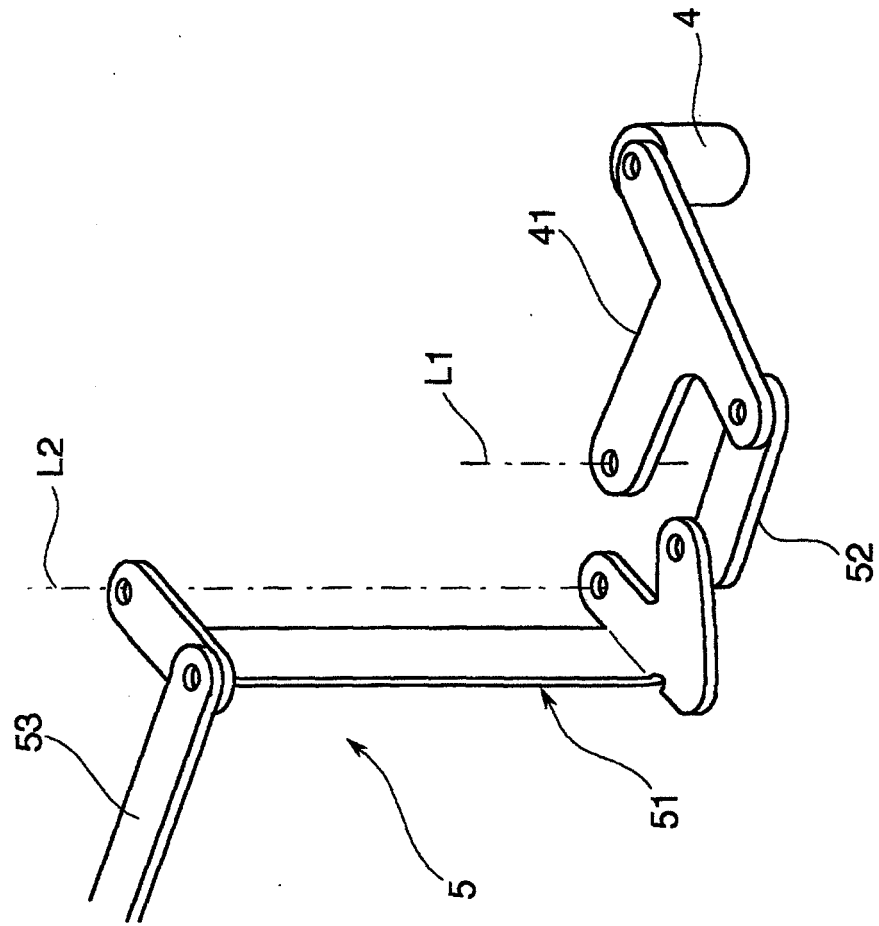


Fig. 7



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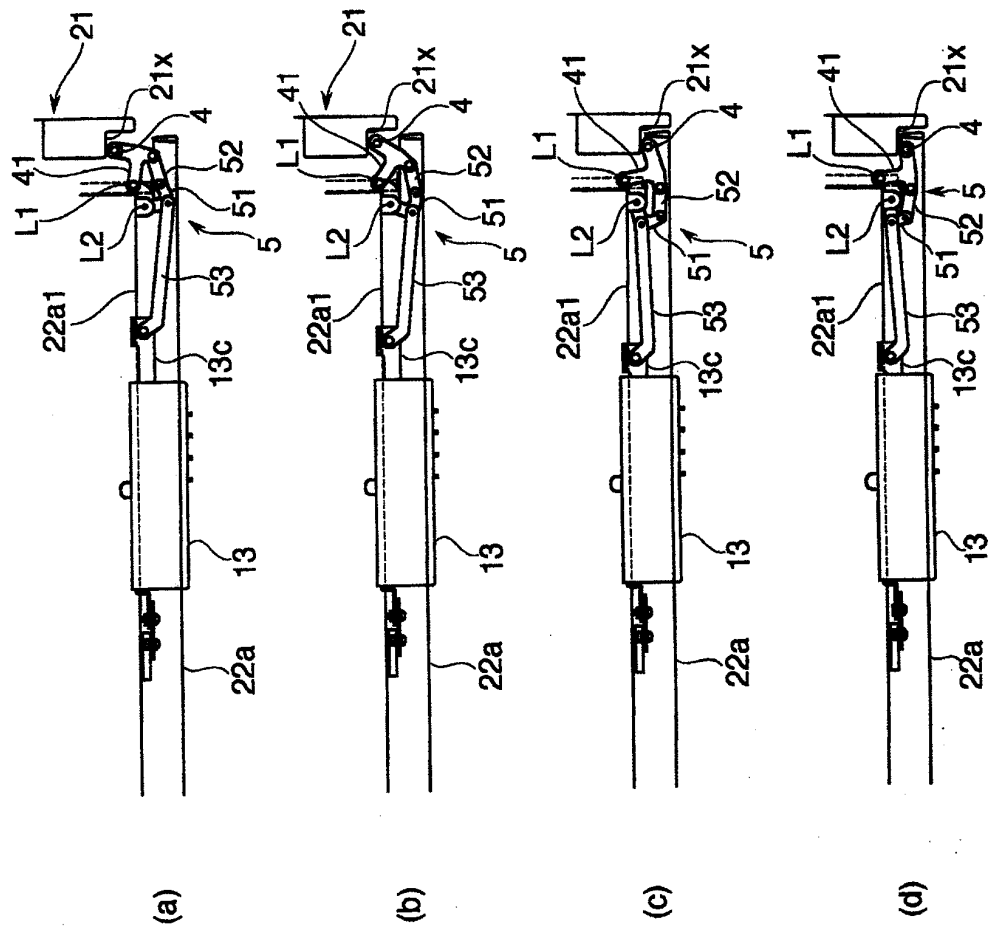


Fig. 9

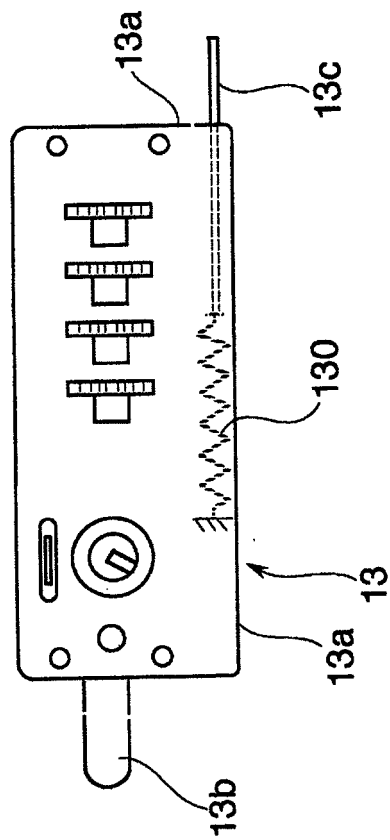


Fig. 10

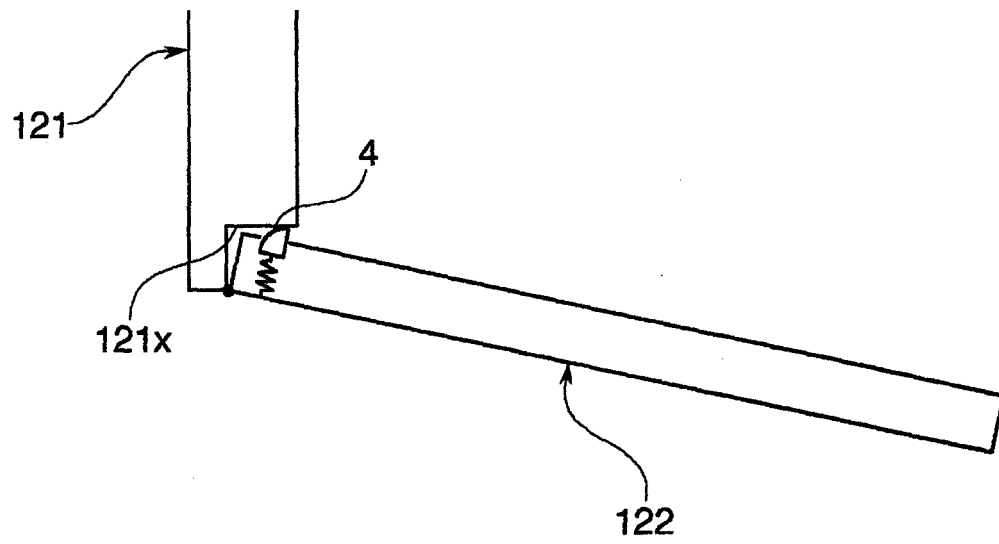
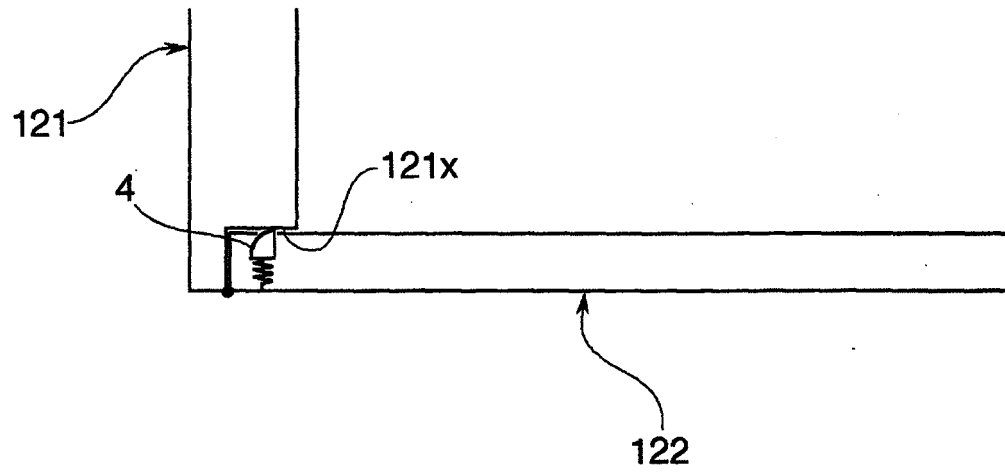


Fig. 11

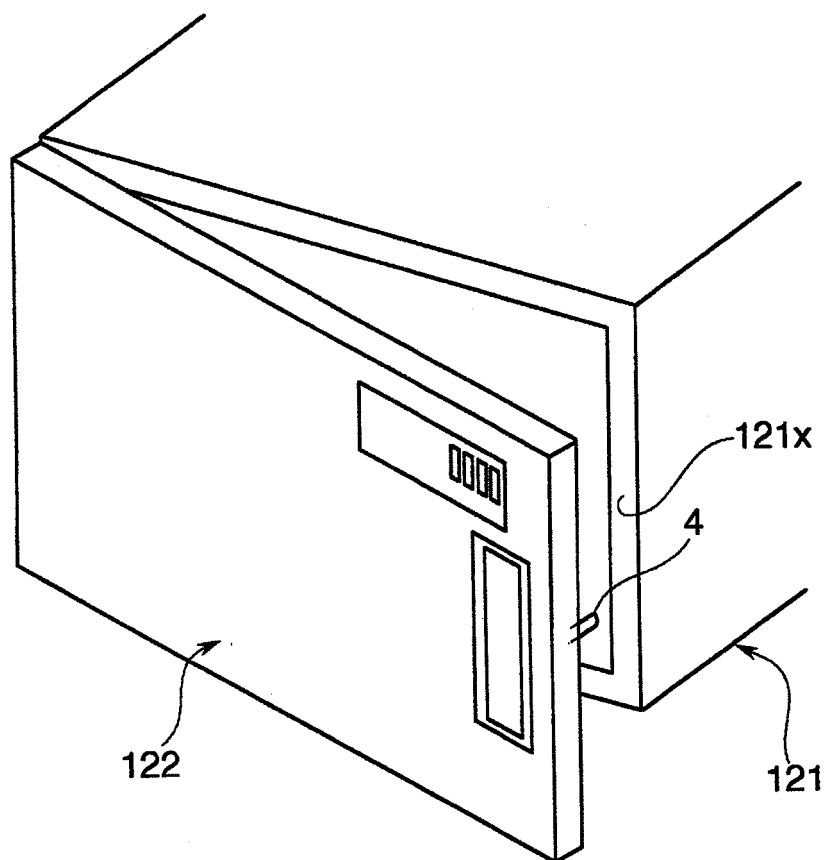


Fig. 12

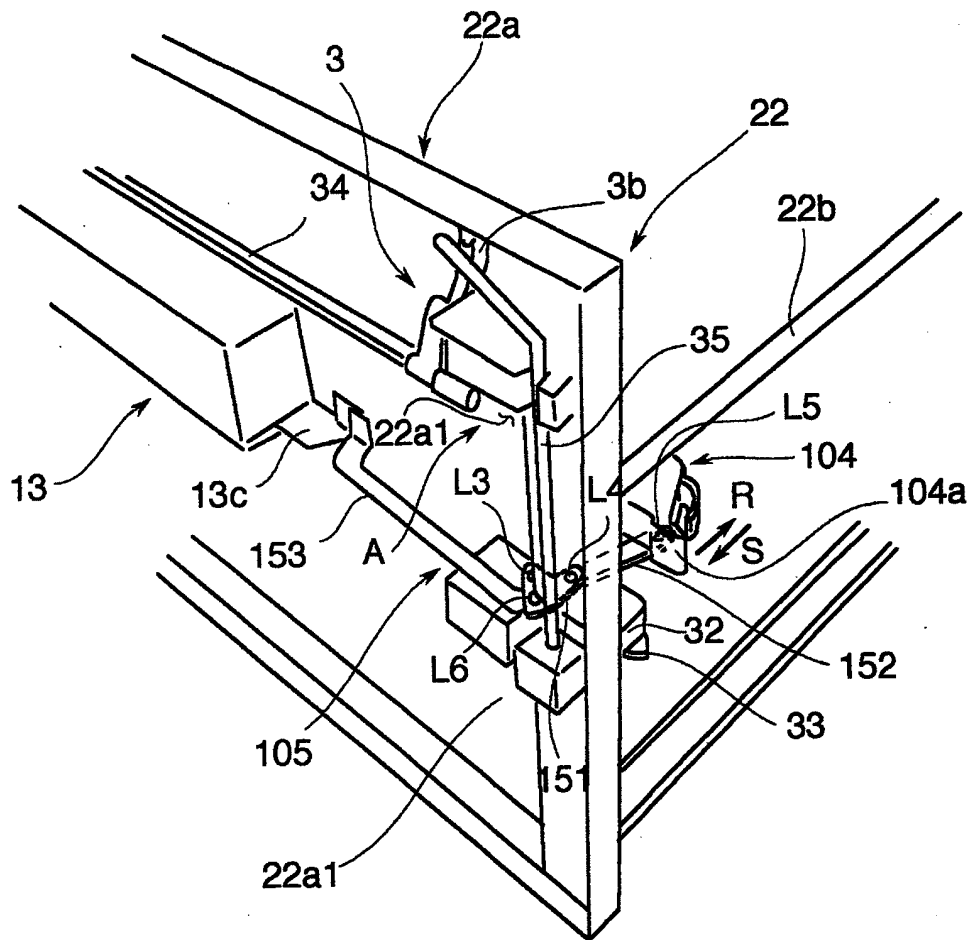


Fig. 13

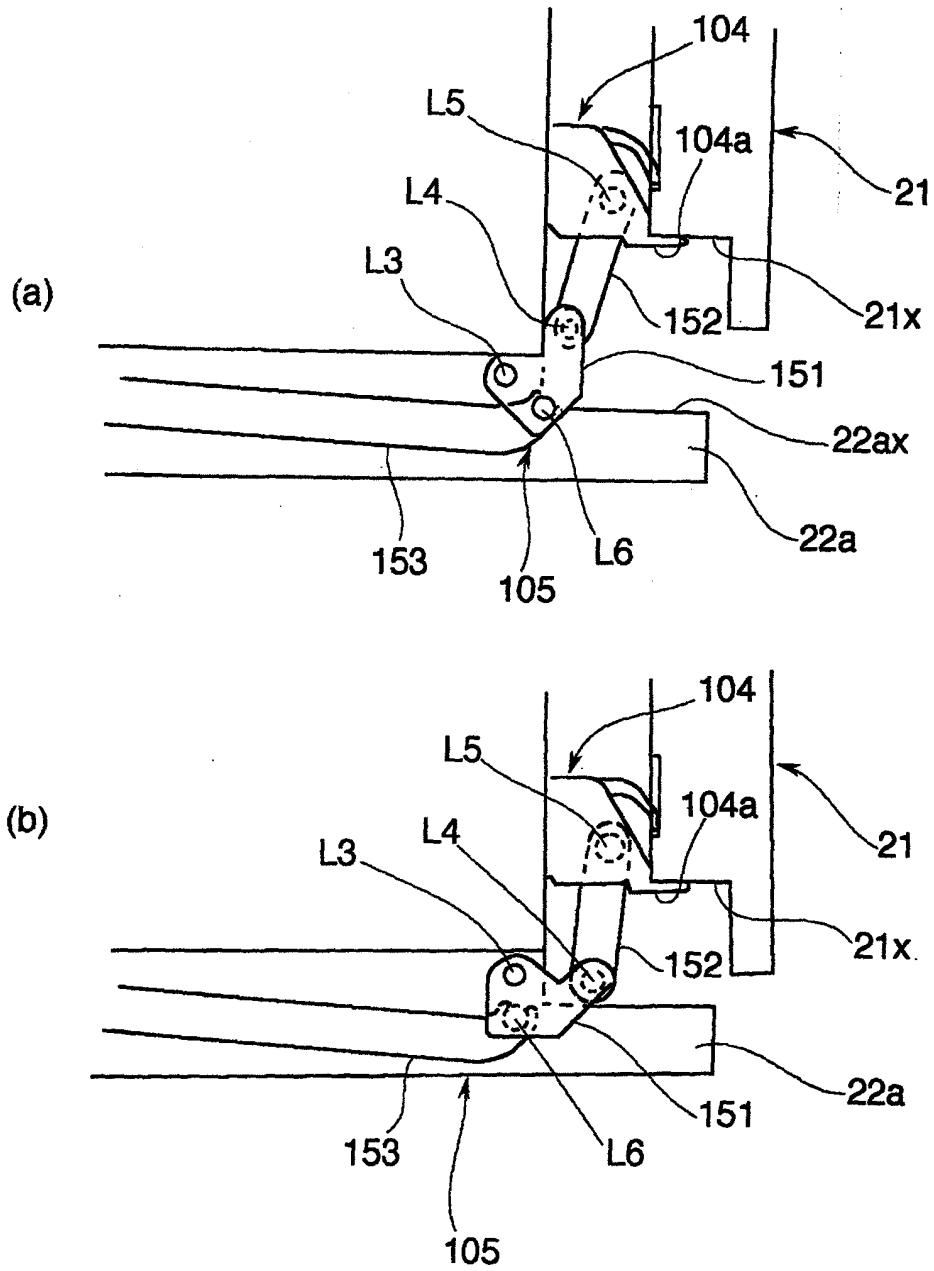


Fig. 14

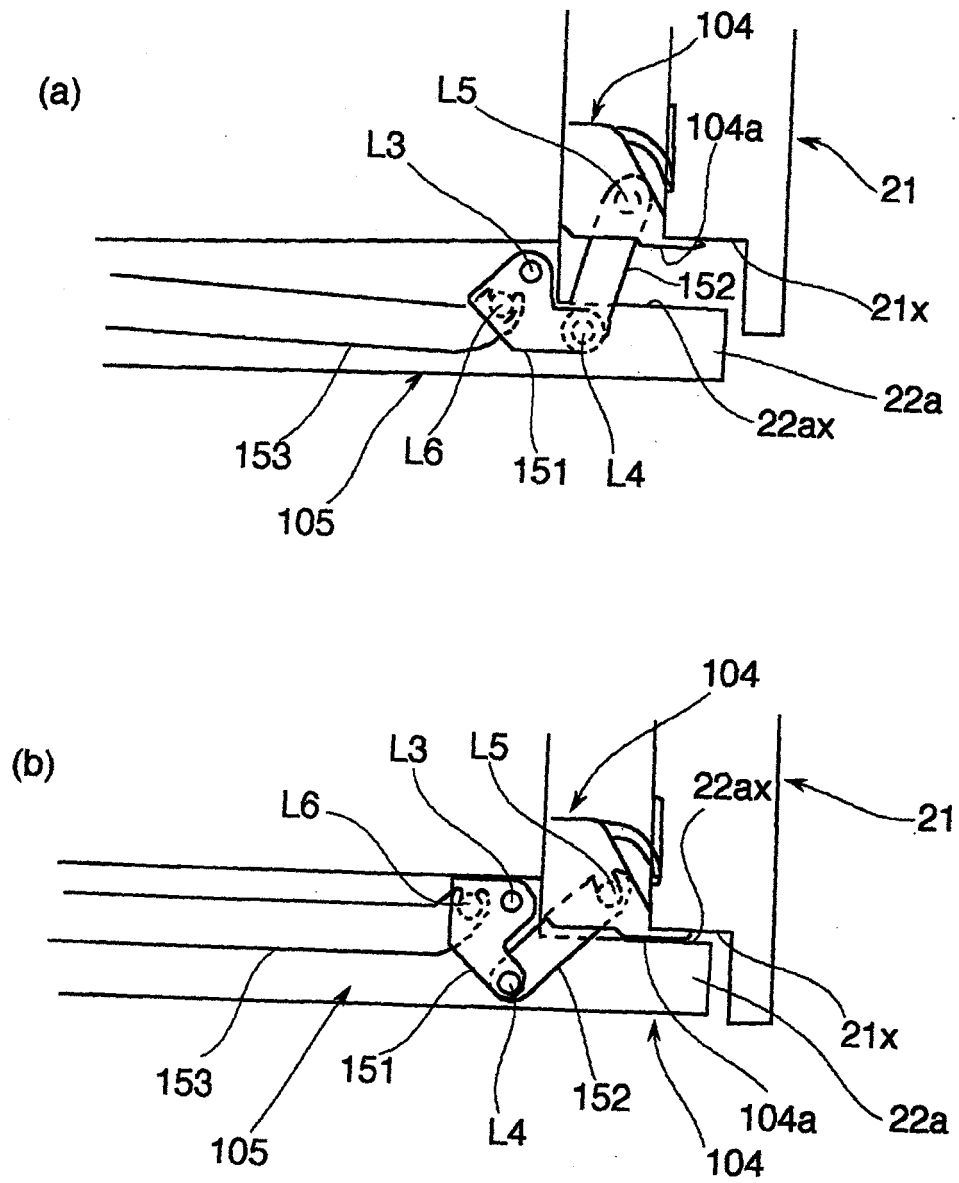


Fig. 15

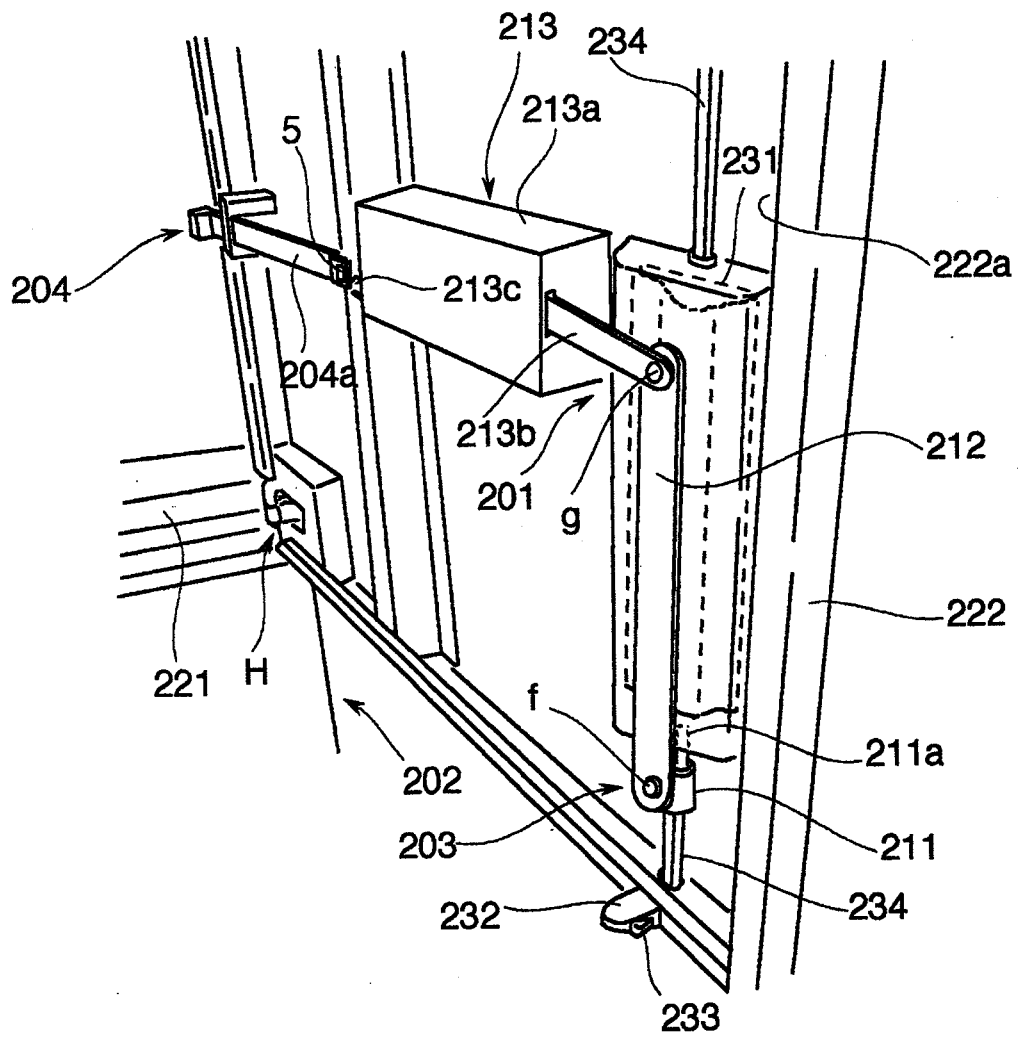


Fig. 16

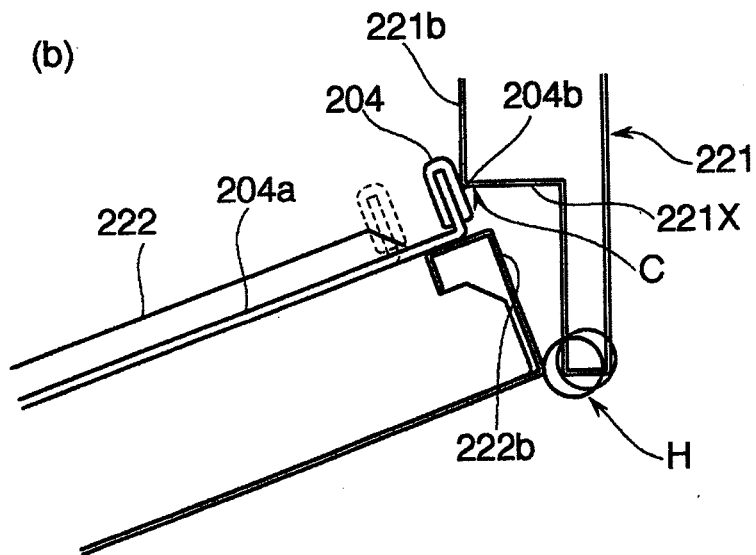
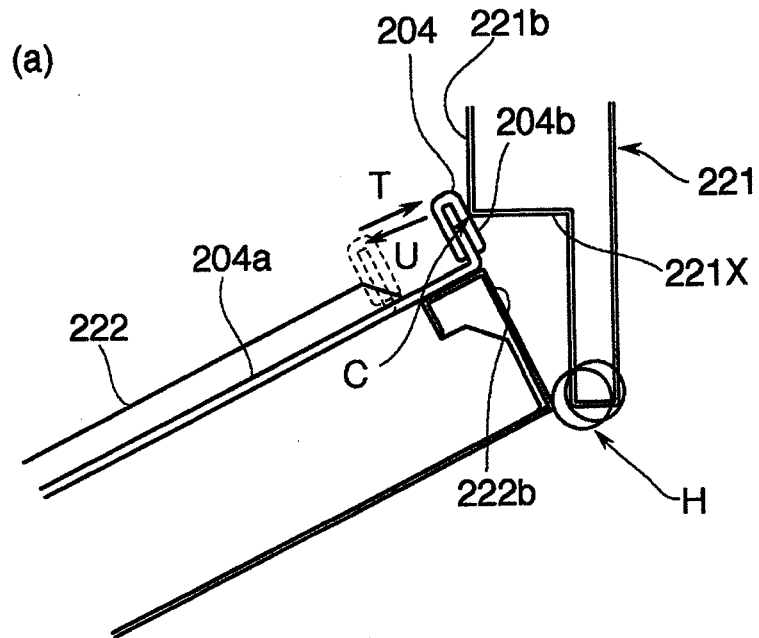
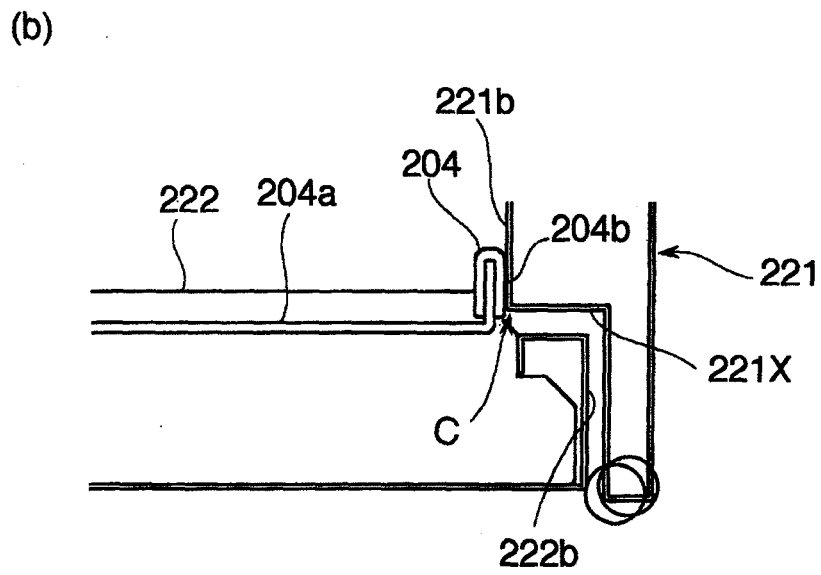
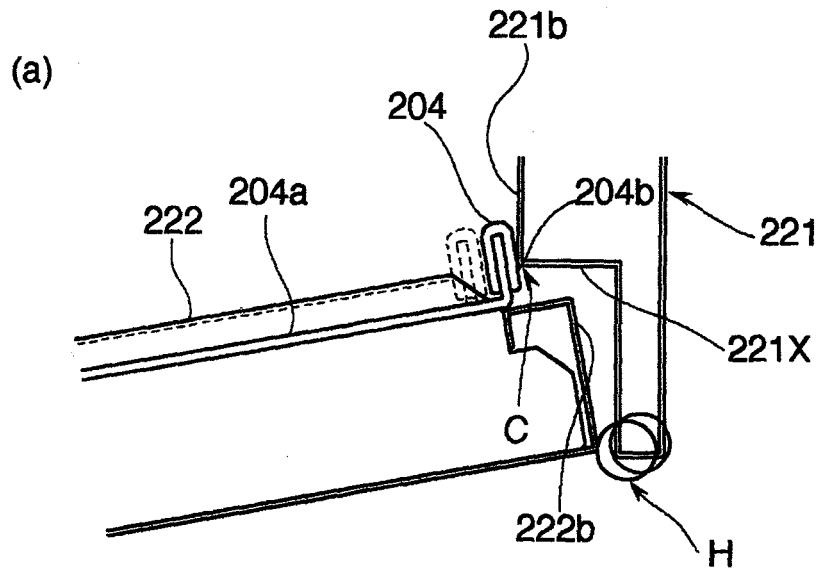


Fig. 17



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/050429

A. CLASSIFICATION OF SUBJECT MATTER

E05B37/02 (2006.01) i, E05B65/44 (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)

E05B37/02, E05B65/44

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	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

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 2006-183270 A (Hiroaki NOMURA), 13 July, 2006 (13.07.06), Par. No. [0054]; Fig. 5 (Family: none)	1-6, 11, 12 7-10
A	JP 2007-247296 A (Clover Co., Ltd.), 27 September, 2007 (27.09.07), Full text; all drawings (Family: none)	1-12
A	JP 2002-227484 A (Alpha Corp.), 14 August, 2002 (14.08.02), Full text; all drawings (Family: none)	1-12

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
10 March, 2009 (10.03.09)Date of mailing of the international search report
24 March, 2009 (24.03.09)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/050429

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	JP 2008-208661 A (Kokuyo Co., Ltd.), 11 September, 2008 (11.09.08), Full text; all drawings (Family: none)	1-12

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6060544 A [0003]