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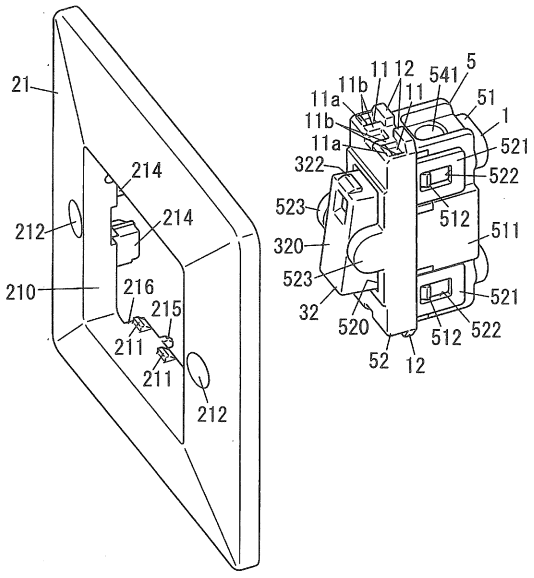
(54) **SWITCH**

(57) A switch includes a switch body configured to be embedded in an embedding hole provided in a wall member, and a plate configured to be fixed to the wall member while being detachably attached to the switch body. The plate has a through-hole through which the switch body is inserted. The plate is provided at portions thereof, facing each other across the switch body, with engagement projections, respectively. The switch body is provided with engagement recesses. The switch body and the plate are configured to be attached to each other by the engagement projections being respectively engaged with the engagement recesses. The engagement projections, which are relatively likely to be damaged when the attachment and detachment of the switch body with respect to the plate are repeated, are provided at the plate that is generally more inexpensive than the switch body. Therefore, it is possible to more reduce the maintenance cost, compared with a case where the engagement projections are provided on the switch body side.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The invention relates to a switch.

BACKGROUND ART

[0002] Conventionally, there has been a switch, which includes: a switch body to be embedded in an embedding hole provided in a wall member; and a plate to be fixed to the wall member while being detachably attached to the switch body (e.g., see paragraphs 0035 and 0036, and Fig. 9 in JP 2001-325846 A). The plate has a through-hole through which the switch body is inserted.

[0003] Also, conventionally, there has been a switch as shown in Figs. 7 and 8. In this case, a switch body 80 is detachably attached to a plate 82 by engagement projections 81, 81 provided at the switch body 80 being respectively engaged with engagement recesses 84, 84 provided in an inner peripheral surface of a through-hole 83 of the plate 82.

[0004] However, if attachment and detachment of the switch body 80 with respect to the plate 82 are repeated, the engagement projections 81 of the switch body 80 are likely to be damaged. Replacement of the switch body 80 is required when the engagement projections 81 are damaged, and cost (maintenance cost) for the replacement is relatively high.

DISCLOSURE OF THE INVENTION

[0005] It is an object of the present invention to provide a switch, which can reduce maintenance cost even when attachment and detachment of a switch body with respect to a plate are repeated.

[0006] A switch of the present invention includes a switch body and a plate. The switch body is configured to be embedded in an embedding hole provided in a wall member. The plate is configured to be fixed to the wall member while being detachably attached to the switch body. The plate has a through-hole through which the switch body is inserted. The plate is provided at portions thereof, facing each other across the switch body, with engagement projections, respectively. The switch body is provided with engagement recesses. The switch body and the plate are configured to be attached to each other by the engagement projections being respectively engaged with the engagement recesses.

[0007] According to the present invention, the engagement projections, which may be relatively likely to be damaged when attachment and detachment of the switch body with respect to the plate are repeated, are provided at the plate that is generally more inexpensive than the switch body. Therefore, it is possible to more reduce the maintenance cost, compared with a case where the engagement projections are provided on the switch body side.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Preferred embodiments of the present invention will now be described in further details. Other features and advantages of the present invention will become better understood with regard to the following detailed description and accompanying drawings where:

Fig. 1 is a perspective view of a plate and a switch body of a switch according to an embodiment of the present invention;
Fig. 2 is an exploded perspective view of the switch according to the embodiment of the present invention;
Fig. 3 is a perspective view of the switch, when viewed from the front side, according to the embodiment of the present invention;
Fig. 4 is a perspective view of the switch, when viewed from the back side, according to the embodiment of the present invention;
Fig. 5 is a cross-section view of a main part of the switch, in a state where terminal screws are loosened, according to the embodiment of the present invention;
Fig. 6 is a cross-section view of the switch according to the embodiment of the present invention;
Fig. 7 is a perspective view of a plate and a switch body of a conventional switch; and
Fig. 8 is a cross-section view of the plate and the switch body of the conventional switch.

BEST MODE FOR CARRYING OUT THE INVENTION

[0009] Hereinafter, best mode for carrying out the present invention will be described with reference to drawings.

[0010] Figs. 1 to 6 show a switch of the present embodiment. Hereinafter, A, B, C, D, E and F-directions shown in Fig. 2 are referred to as up, down, left, right, front and back directions, respectively. In the present embodiment, an up-down direction corresponds to an axis direction of a terminal screw 44 described later. An up direction (the A-direction) corresponds to a direction (a first direction) in which a first terminal nut 431 is moved when a first terminal screw 451 is tightened, described later. A down direction (the B-direction) is a direction opposite to the first direction, and corresponds to a direction (a second direction) in which a second terminal nut 432 is moved when a second terminal screw 452 is tightened, described later. A right-left direction is orthogonal to the first direction, and is parallel to a surface of a plate 21. A left direction (the C-direction) is a left direction (a third direction) when the switch is viewed from the front. A right direction (the D-direction) is a direction opposite to the third direction. That is, the right direction is a right direction (a fourth direction) when the switch is viewed from the front. A front-back direction is orthogonal to the first and third directions. A front direction (the E-direction)

corresponds to a direction (a fifth direction) in which electric wires are inserted into first and second wire insertion holes 531, 532 described later. A back direction (the F-direction) is a direction opposite to the fifth direction, and corresponds to a direction (a sixth direction) in which an operation handle 31 described later is pressed.

[0011] The switch includes a switch body 1, the plate 21, and two metal fittings 22. The plate 21 and two metal fittings 22 are used when the switch body 1 is embedded in an embedding hole (not shown) provided in a wall member.

[0012] The switch body 1 includes: a reversal handle 32 that is configured to be turned by receiving operation force via the operation handle 31; and a contactor 40 that includes a movable contact 401 and is configured to be turned together with the reversal handle 32. The switch body 1 further includes: a first terminal plate 41 that includes a fulcrum projection 411 as a fulcrum for the contactor 40; and a second terminal plate 42 that includes a fixed contact 421 which the movable contact 401 of the contactor 40 is separated from and comes into contact with. The reversal handle 32 is formed of synthetic resin for example. The contactor 40, and the first and second terminal plates 41, 42 are respectively formed of metal plates for example.

[0013] The switch body 1 further includes a housing 5 that is constituted by a casing 51 and a cover 52. The casing 51 has an opened front surface, and accordingly, is provided with a storage recess 50 into which the contactor 40, and the first and second terminal plates 41, 42 can be housed individually. The cover 52 is coupled on a front side of the casing 51, and functions as a fulcrum for the reversal handle 32. The casing 51 and cover 52 are formed of synthetic resin for example.

[0014] The casing 51 is provided with two central projections 511, 511 which are respectively projected from central parts, in the up-down direction (the first and second directions), of right and left surfaces of the casing 51. Further, two connection projections 512, 512 are respectively projected on upper and lower sides of the each central projection 511.

[0015] The cover 52 includes a main body 520 that is frame-shaped so as to surround the reversal handle 32, and four connection pieces 521 that are projected rearward. Two of the four connection pieces 521 are arranged in the up-down direction at a right end portion of the main body 520, and the remaining connection pieces 521 are arranged in the up-down direction at a left end portion of the main body 520. Each connection piece 521 is plate-shaped, and its thickness direction is directed toward the right-left direction (the third and fourth directions). Each connection piece 521 is provided with a connection hole 522 through the right-left direction, into which a corresponding connection projection 512 is engaged. In other words, regarding each of the right and left sides of the casing 51, two connection projections 512 are respectively engaged into two corresponding connection holes 522 while two connection pieces 521, 521 hold a corresponding central projection 511 therebetween, and accordingly, the casing 51 and the cover 52 are connected with each other. In addition, when end portions (rear end portions) of the connection pieces 521 are elastically deformed to be displaced outward in the right-left direction with respect to base portions (front end portions) thereof, the connection projections 512 can be engaged into or disengaged from the connection holes 522.

[0016] The reversal handle 32 includes a main body 320 that has a rectangular parallelepiped shape as the whole, and two fulcrum projections 321, 321 that are respectively projected outward in the right-left direction from right and left surfaces of the main body 320. The cover 52 further includes two fulcrum receiving portions 523, 523 that are projected forward from right and left end portions of the main body 520. The respective fulcrum receiving portions 523, 523 are provided in inner surfaces thereof in the right-left direction with recesses. The reversal handle 32 is capable of being turned with respect to the cover 52 so that upper and lower end portions of the reversal handle are displaced in the front-back direction (the fifth and sixth directions) with respect to a central portion of the reversal handle, by the respective fulcrum projections 321 abutting on front end portions of the fulcrum receiving portions 523 from the back side.

[0017] The operation handle 31 is provided in a rear surface thereof with a fitting recess 310 (see Fig. 6) into which a front end portion of the reversal handle 32 is fitted. The reversal handle 32 is provided with two engagement protruding portions 322, 322 that are protruded from upper and lower surfaces of the reversal handle 32, respectively. The operation handle 31 is integrated with the reversal handle 32, by the respective engagement protruding portions 322 being engaged into two engagement recessed portions 312, 312 provided on upper and lower sides of an inner peripheral surface of the fitting recess 310.

[0018] Further, the switch body 1 includes a reversal spring 33 as a coil spring. One end of the reversal spring 33 is in elastic contact with a rear end of the reversal handle 32, and the other end of the reversal spring 33 is in elastic contact with a front surface of the contactor 40. Note that, regarding the reversal spring 33, only both end portions thereof are shown in Fig. 5. Due to spring force of the reversal spring 33, the respective fulcrum projections 321 of the reversal handle 32 are pressed against the fulcrum receiving portions 523 of the cover 52 from the back side, and the contactor 40 is pressed against the fulcrum projection 411 of the first terminal plate 41 from the front side.

[0019] When the upper end portion of the reversal handle 32 is in a state of being projected forward with respect to the housing 5, that is, when the reversal handle 32 is in a state of being inclined counterclockwise as viewed from the right (hereinafter, referred to as an "OFF-state"), the reversal spring 33 is curved so that a central portion thereof is displaced above both end portions thereof in the up-down direction. In the OFF-state, the spring force

of the reversal spring 33 is applied to the reversal handle 32 so as to keep the above-mentioned posture of the reversal handle 32. The movable contact 401 of the contactor 40 is disposed to face downward, and the fixed contact 421 of the second terminal plate 42 is disposed to face upward. Accordingly, in the OFF-state, the spring force of the reversal spring 33 is applied to the contactor 40 so as to keep a state where the movable contact 401 is separated from the fixed contact 421. That is, in the OFF-state, the first terminal plate 41 is electrically disconnected with the second terminal plate 42.

[0020] In the OFF-state, when the upper end portion of the reversal handle 32 receives force pressed backward via the operation handle 31 and accordingly the reversal handle 32 is turned clockwise against the spring force of the reversal spring 33 as viewed from the right, a direction of the spring force of the reversal spring 33 is reversed at a time point when the lower end portion of the reversal handle 32 is displaced in front of the central portion thereof. Then, the lower end portion of the reversal handle 32 is instantaneously displaced in a state of being projected forward with respect to the housing 5 due to the spring force of the reversal spring 33 (hereinafter, referred to as an "ON-state"). In the ON-state, as shown in Fig. 5, the reversal spring 33 is curved so that the central portion thereof is displaced below both end portions thereof in the up-down direction. In this case, the spring force of the reversal spring 33 is applied to the contactor 40 so as to press the movable contact 401 to the fixed contact 421. That is, in the ON-state, the first terminal plate 41 is electrically connected with the second terminal plate 42 via the contactor 40. The operation handle 31 is provided with a mark 311 as a projection, which is disposed at an upper end portion of a front surface of the operation handle 31. The front surface is an operation surface for receiving the operation force. The upper end portion is displaced backward in the ON-state. Note that, the mark 311 is not limited to the projection, and may be a recess. Alternatively, the mark 311 may be formed by other method such as printing or two-color molding.

[0021] In the ON-state, when the lower end portion of the reversal handle 32 receives force pressed backward via the operation handle 31 and accordingly the reversal handle 32 is turned counterclockwise against the spring force of the reversal spring 33 as viewed from the right, a direction of the spring force of the reversal spring 33 is reversed at a time point when the upper end portion of the reversal handle 32 is displaced in front of the central portion thereof. Then, the reversal handle 32 is instantaneously displaced in the OFF-state.

[0022] The storage recess 50 of the casing 51 further stores therein a set of a terminal nut 43 and a terminal screw 44 (hereinafter, referred to as a first terminal nut 431 and a first terminal screw 451) corresponding to the first terminal plate 41, and a set of a terminal nut 43 and a terminal screw 44 (hereinafter, referred to as a second terminal nut 432 and a second terminal screw 452) corresponding to the second terminal plate 42. The respective electric wires are connected with the first and second terminal plates 41, 42 via the first terminal nut 431 and first terminal screw 451, and the second terminal nut 432 and second terminal screw 452. The first terminal plate 41 is provided with a first contact portion 412 that is inserted between the first terminal nut 431 and a head 441 of the first terminal screw 451 so as to face the first terminal nut 431. Similarly, the second terminal plate 42 is provided with a second contact portion 422 that is inserted between the second terminal nut 432 and a head 441 of the second terminal screw 452 so as to face the second terminal nut 432. The first and second contact portions 412, 422 are U-shaped, and have cutout portions 413, 423 provided for avoiding shafts 442 of the first and second terminal screws 451, 452, respectively. Further, the storage recess 50 of the casing 51 is provided in an inner peripheral surface thereof with four positioning grooves 56. Two of the four positioning grooves 56 are provided so as to correspond to the first terminal plate 41 in right and left inner surfaces of the inner peripheral surface to face each other, respectively. The remaining positioning grooves 56 are provided so as to correspond to the second terminal plate 42 in the right and left inner surfaces of the inner peripheral surface to face each other, respectively. It is possible to prevent looseness of the first and second terminal plates 41, 42 to the housing 5, by the respective right and left end portions of the first and second contact portions 412, 422 being inserted into the corresponding positioning grooves 56.

[0023] The respective first and second terminal screws 451, 452 are housed at end portions in the storage recess 50 in the up-down direction, while the axis directions are parallel to the up-down direction and the heads 441 face outward in the up-down direction.

[0024] Further, as shown in Fig. 4, the storage recess 50 of the casing 51 is provided in a bottom surface thereof with a pair of first wire insertion holes 531, 531 and a pair of second wire insertion holes 532, 532, which are holes through the front-back direction. The first wire insertion holes 531, 531 are disposed near the upper side of the storage recess 50 so as to correspond to the first terminal plate 41. The second wire insertion holes 532, 532 are disposed near the lower side of the storage recess 50 so as to correspond to the second terminal plate 42. The first wire insertion holes 531, 531 are disposed slightly below the first contact portion 412 of the first terminal plate 41. The first wire insertion holes 531, 531 are further disposed so that the shaft 442 of the first terminal screw 451 is positioned between the first wire insertion holes 531, 531, when viewed from the front-back direction. Similarly, the second wire insertion holes 532, 532 are disposed slightly above the second contact portion 422 of the second terminal plate 42. The second wire insertion holes 532, 532 are further disposed so that the shaft 442 of the second terminal screw 452 is positioned between the second wire insertion holes 532, 532, when viewed from the front-back direction.

[0025] The casing 51 is provided in upper and lower

end portions thereof with first and second screw operation holes 541, 542 from which the heads 441 of the first and second terminal screws 451, 452 are exposed, respectively. Accordingly, it is possible to operate the first terminal screw 451, by a screwdriver (not shown) being inserted from the first screw operation hole 541, and similarly, it is possible to operate the second terminal screw 452, by the screwdriver being inserted from the second screw operation hole 542. Sizes and shapes of the first and second screw operation holes 541, 542 are sufficiently reduced to the extent that the heads 441 of the first and second terminal screws 451, 452 cannot pass through the first and second screw operation holes 541, 542.

[0026] The first and second terminal nuts 431, 432 are rectangle-shaped, and is prevented from being turned with respect to the housing 5 (i.e., co-rotation) by abutting on the inner surface of the storage recess 50.

[0027] When connecting electric wires (not shown) to the switch body 1, a user first sufficiently loosens the first and second terminal screws 451, 452 to move the first terminal nut 431 below the first wire insertion hole 531 and move the second terminal nut 432 above the second wire insertion hole 532. In other words, the first terminal nut 431 is disposed on the side apart from the first contact portion 412 of the first terminal plate 41 (movement toward the second direction), and the second terminal nut 432 is disposed on the side apart from the second contact portion 422 of the second terminal plate 42 (movement toward the first direction). Then, the user inserts the respective electric wires between the first terminal nut 431 and the first contact portion 412, and between the second terminal nut 432 and the second contact portion 422, through the first and second wire insertion holes 531, 532, and then tightens the first and second terminal screws 451, 452. Accordingly, one electric wire is held between the first contact portion 412 and the first terminal nut 431 displaced upward (in the first direction) according to tightening of the first terminal screw 451 (in other words, the one electric wire is pressed against the first contact portion 412 by the first terminal nut 431). Similarly, the other electric wire is held between the second contact portion 422 and the second terminal nut 432 displaced downward (in the second direction) according to tightening of the second terminal screw 452 (in other words, the other electric wire is pressed against the second contact portion 422 by the second terminal nut 432). In this way, connection of the electric wires is completed. Here, as shown in Fig. 4, the housing 5 is provided in the rear surface thereof with a reference groove 13 that has a length identical to a length by which cable coating of the electric wire should be peeled. When connecting the electric wire, the user can peel the cable coating of the electric wire depending on the length of the reference groove 13 by putting a tip of the electric wire in the reference groove 13.

[0028] Further, the housing 5 is provided with a restricting portion 55 that is configured to restrict movable ranges of the terminal nuts 43 such that the terminal nuts 43 are not separated from the terminal screws 44. Specifically, first and second restricting portions 551, 552, as the restricting portion 55, are disposed in the storage recess 50. A movable range of the first terminal nut 431 (a range of moving downward) with respect to the housing 5 is restricted by the first restricting portion 551 abutting on right and left ends on a lower surface of the first terminal nut 431. A movable range of the second terminal nut 432 (a range of moving upward) with respect to the housing 5 is restricted by the second restricting portion 552 abutting on right and left ends on an upper surface of the second terminal nut 432. Therefore, the restricting portion 55 (first and second restricting portions 551, 552) can prevent the terminal nuts 43 (first and second terminal nuts 431, 432) from falling off from the terminal screws 44 (first and second terminal screws 451, 452).

[0029] As already described, the switch body 1 is embedded and disposed in the embedding hole (not shown) provided in the wall member, using the plate 21 and two metal fittings 22, 22.

[0030] The plate 21 is formed of synthetic resin for example, and has a through-hole 210 through which the switch body 1 is inserted. The through-hole 210 has a square shape slightly larger than the size of the operation handle 31 when viewed from the front. Further, two connection portions 216, 216 are respectively projected backward from upper and lower sides of the through-hole 210 while thickness directions thereof are parallel to the up-down direction. Each connection portion 216 is provided on an inward surface (in the up-down direction) of an end portion thereof with four engagement projections 211 that are arranged in the right-left direction and projected inward (in the up-down direction). The main body 520 of the cover 52 is provided in each of upper and lower surfaces thereof with two engagement recesses 11, 11 that are arranged in the right-left direction. The switch body 1 is attached to the plate 21 by the respective engagement projections 211 being engaged into the engagement recesses 11. Engaging and disengaging of the engagement projections 211 with respect to the engagement recesses 11 can be repeated by the connection portions 216 of the plate 21 being elastically deformed, and accordingly, the switch body 1 can be attached and detached to/from the plate 21. In the present embodiment, regarding each of the upper and lower sides of the switch body 1, when two central engagement projections 211 of the four engagement projections 211 are used and engaged into the engagement recesses 11, 11, the switch body 1 is attached to the plate at the center of the through-hole 210. However, if the operation handle 31 is changed to an operation handle having a half of a length of the operation handle 31 in the right-left direction, it is possible to attach to a single plate 21 two switch bodies 1 to be arranged in the right-left direction, by using all engagement projections 211. The plate 21 is further provided on a rear surface side thereof with six positioning projections 215 that are projected backward.

Specifically, three positioning projections 215 are arranged in the right-left direction at each of the connection portions 216 on the upper and lower sides of the through-hole 210. Further, the cover 52 is provided with four holding projections 12 that are projected outward in the up-down direction, two of which are arranged in the right-left direction and the remaining are also arranged in the right-left direction. Specifically, on each of the upper and lower surfaces of the cover 52, two holding projections 12 are respectively disposed behind two engagement recesses 11, 11. In other words, on each of the upper and lower sides of the cover 52, positioning of the switch body 1 with respect to the plate 21 is achieved by one positioning projection 215 of the plate 21 being held between two holding projections 12, 12 of the cover 52. When the number of switch body 1 to be attached to the plate 21 is one, the switch body 1 is positioned with a central positioning projection 215 of the three positioning projections 215 arranged in the right-left direction on each of the upper and lower sides of the through-hole 210. When the number of switch body 1 to be attached to the plate 21 is two, switch bodies 1 are positioned with two right and left positioning projections 215 of the three positioning projections 215 arranged in the right-left direction.

[0031] Each metal fitting 22 is attached to the plate 21 with a fitting screw 23 that passes through the each metal fitting 22, and a fitting nut 24 into which the fitting screw 23 is screwed. Specifically, each metal fitting 22 is formed of a metal plate for example, and includes a body portion 221 and two fitting pawls 222, 222. The body portion 221 is provided with a screw insertion hole 220 into which the fitting screw 23 is inserted. The fitting pawls 222, 222 are projected outward in the right-left direction while extending diagonally backward from upper and lower end portions of the body portion 221, respectively. The fitting nut 24 is rectangle-shaped, and is prevented from being turned with respect to the metal fitting 22 by being held between the two fitting pawls 222, 222 behind the body portion 221 of the metal fitting 22. The plate 21 is provided, in right and left portions of the front surface thereof on the right and left sides of the through-hole 210, with two screw storage recesses 212, 212 in which heads of the fitting screws 23 are stored, respectively. Each screw storage recess 212 is provided in a bottom surface thereof with a screw insertion hole 213 as a through-hole, into which a shaft of the fitting screw 23 is inserted. Each metal fitting 22 is attached to the plate 21 with the fitting screw 23, namely, by the fitting screw 23 being inserted into the screw insertion hole 213 of the plate 21 and the screw insertion hole 220 of the each metal fitting 22 and screwed in the fitting nut 24. Here, the plate 21 is provided on a rear surface thereof with four turn stopping projections 214 that are projected backward. Specifically, on each of the right and left sides of the through-hole 210, two turn stopping projections 214, 214 are provided so as to hold the metal fitting 22 in the up-down direction. By being held by the turn stopping projections 214, the metal fitting 22 is prevented from being turned with respect to the plate 21 in the process in which the metal fitting 22 is secured to the plate 21 (i.e., co-rotation).

[0032] For fixing of the plate 21 to the wall member, the metal fittings 22 are secured to the plate 21 in a state where tips of the fitting pawls 222, 222 are introduced into the back side of the wall member via the embedding hole. Thus, the wall member is held between a tip of each fitting pawl 222 and the rear surface of the plate 21 in the front-back direction, and accordingly, the plate 21 is fixed to the wall member.

[0033] Here, regarding a switch body 80 of a conventional switch, portions in which a load is applied upon attachment and detachment with respect to a plate 82 are engagement projections 81. On the other hand, regarding the switch body 1 of the switch of the present embodiment, portions in which a load is applied upon attachment and detachment with respect to the plate 21 are portions (first wall portions 11a, 11a) on front sides of the engagement recesses 11, 11. In other words, the first wall portions 11a are portions to be continuously pressed by the engagement projections 211 of the plate 21 until the engagement projections 211 are engaged with the engagement recesses 11. Each first wall portion 11a in the present embodiment is provided on right and left sides thereof with portions (second wall portions 11b) that are integrally formed so as to be projected backward. Accordingly, pressing force received from each engagement projection 211 of the plate 21 is distributed through a pair of second wall portions 11b, 11b. Therefore, those are unlikely to be damaged, compared with the engagement projections 81 of the conventional switch.

[0034] Further, regarding the plate 82 of the conventional switch, portions in which a load is applied upon attachment and detachment of the switch body 80 are portions on rear sides (lower sides in Fig. 7 and Fig. 8) of engagement recesses 84. On the other hand, regarding the plate 21 of the switch of the present embodiment, portions in which a load is applied upon attachment and detachment of the switch body 1 are the engagement projections 211. Accordingly, the engagement projections 211 of the plate 21 are relatively likely to be damaged. However, cost (price per unit) for replacement of the plate 21 is generally more inexpensive than that of the switch body 1.

[0035] According to the above-mentioned configuration, the engagement projections 211 (relatively likely to be damaged, when the attachment and detachment of the switch body 1 with respect to the plate 21 are repeated) are provided at the plate 21 that is generally more inexpensive than the switch body 1. Therefore, it is possible to more reduce the maintenance cost, compared with the conventional switch in which the engagement projections are provided on the switch body that is more expensive than the plate.

[0036] As above, the switch of the present embodiment includes the switch body 1 and the plate 21. The switch body 1 is configured to be embedded in the embedding

hole provided in the wall member. The plate 21 is configured to be fixed to the wall member while being detachably attached to the switch body 1. The plate 21 has the through-hole 210 through which the switch body 1 is inserted. The plate 21 is provided at portions thereof, facing each other across the switch body 1, with the engagement projections 211, respectively. The switch body 1 is provided with the engagement recesses 11. The switch body 1 and the plate 21 are configured to be attached to each other by the engagement projections 211 being respectively engaged with the engagement recesses 11.

[0037] Although the present invention has been described with reference to certain preferred embodiments, numerous modifications and variations can be made by those skilled in the art without departing from the true spirit and scope of this invention, namely claims.

Claims

1. A switch, comprising:

a switch body configured to be embedded in an embedding hole provided in a wall member; and
a plate configured to be fixed to the wall member while being detachably attached to the switch body,
the plate having a through-hole through which the switch body is inserted,
wherein the plate is provided at portions thereof, facing each other across the switch body, with engagement projections, respectively,
wherein the switch body is provided with engagement recesses, and
wherein the switch body and the plate are configured to be attached to each other by the engagement projections being respectively engaged with the engagement recesses.

FIG. 1

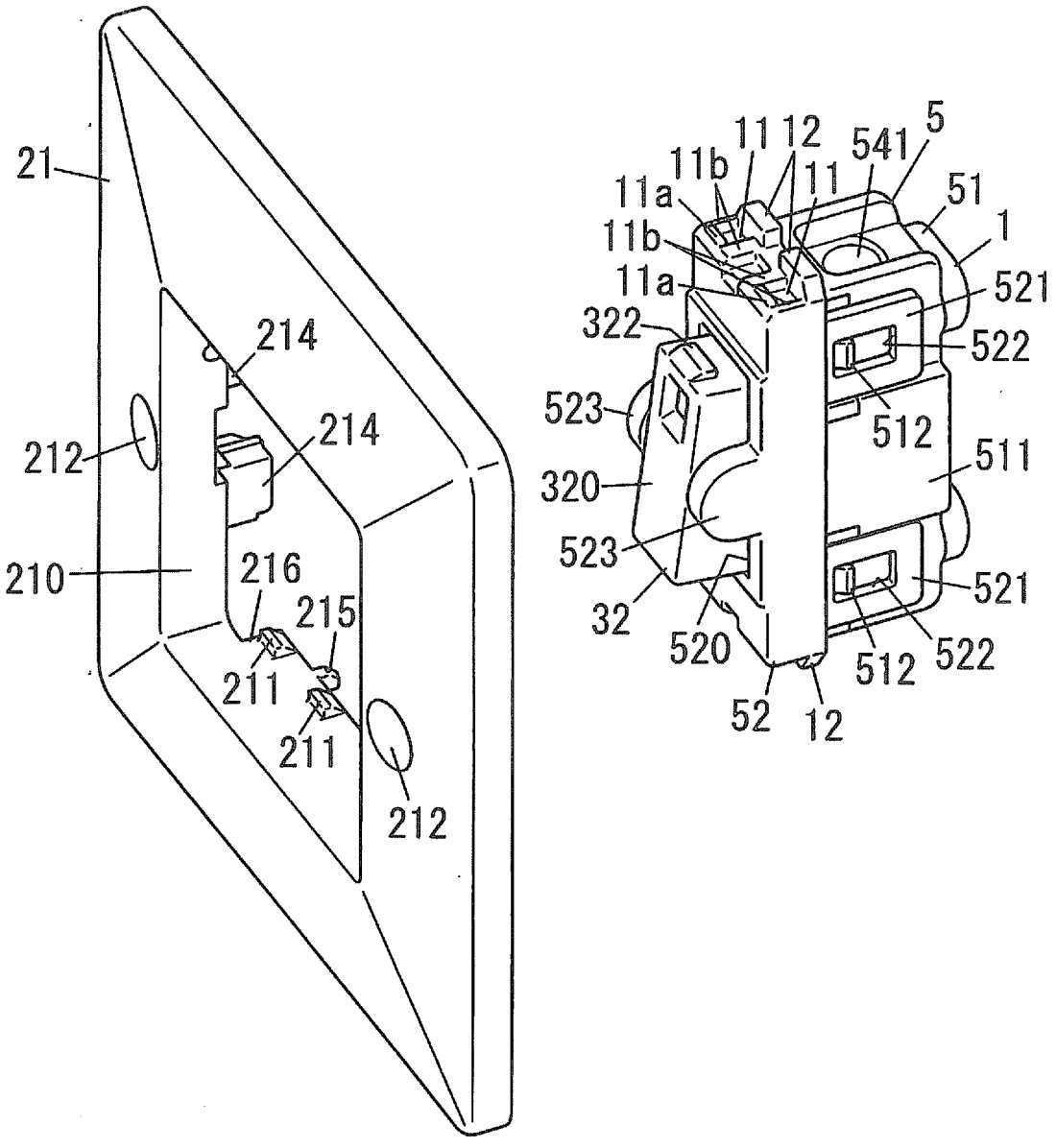
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FIG. 2

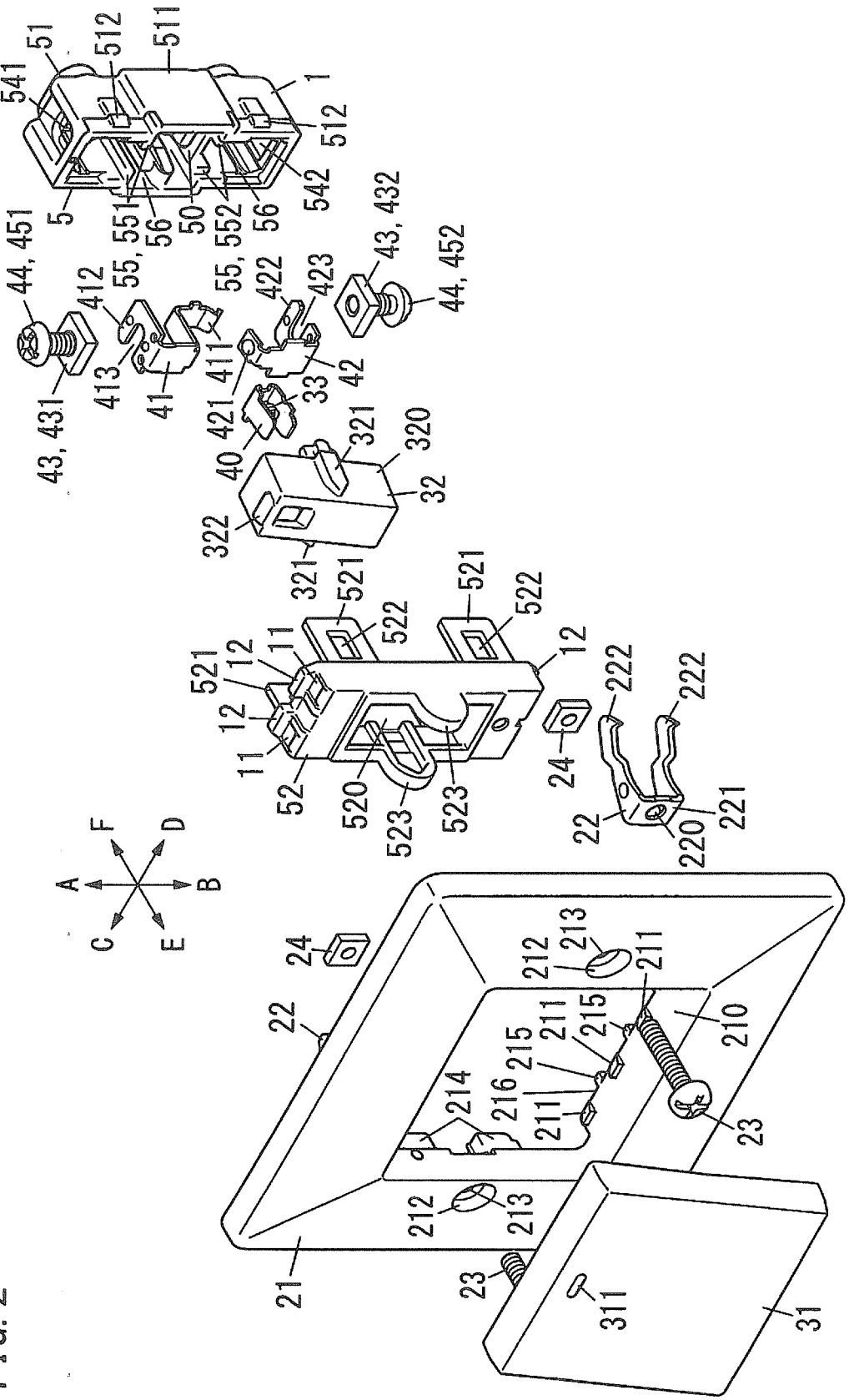
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FIG. 3

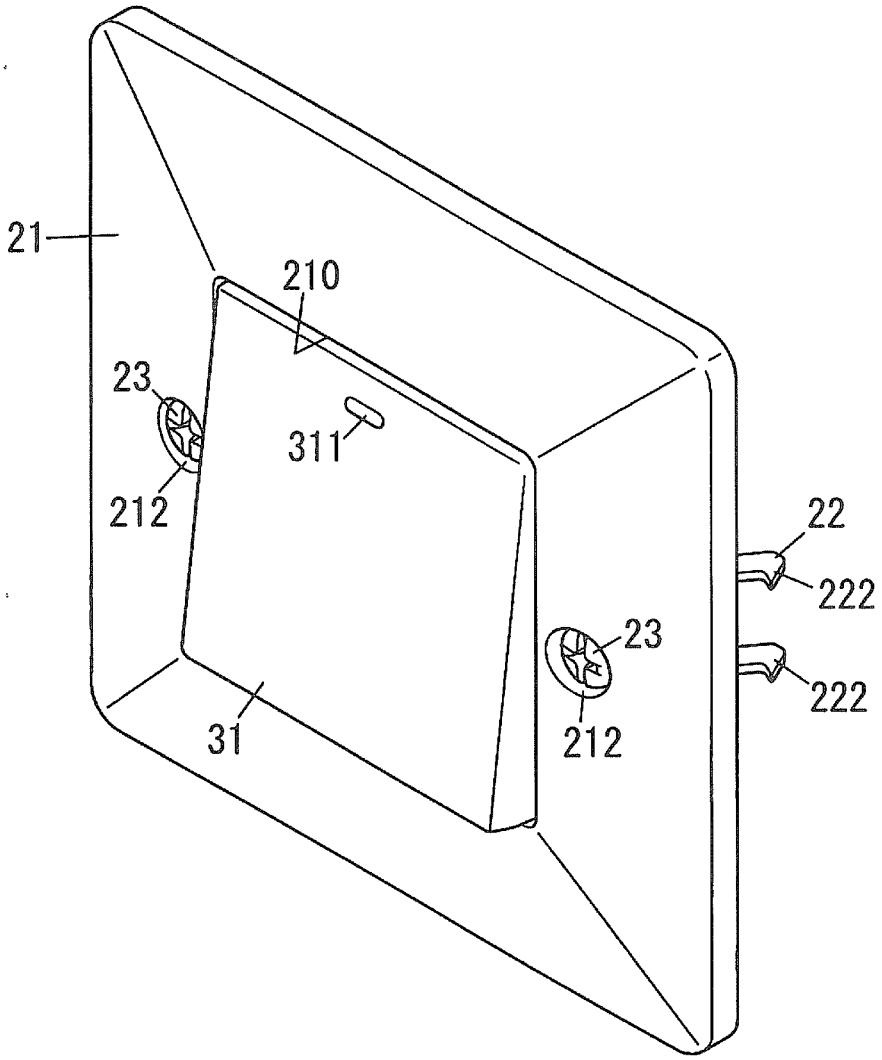

FIG. 4

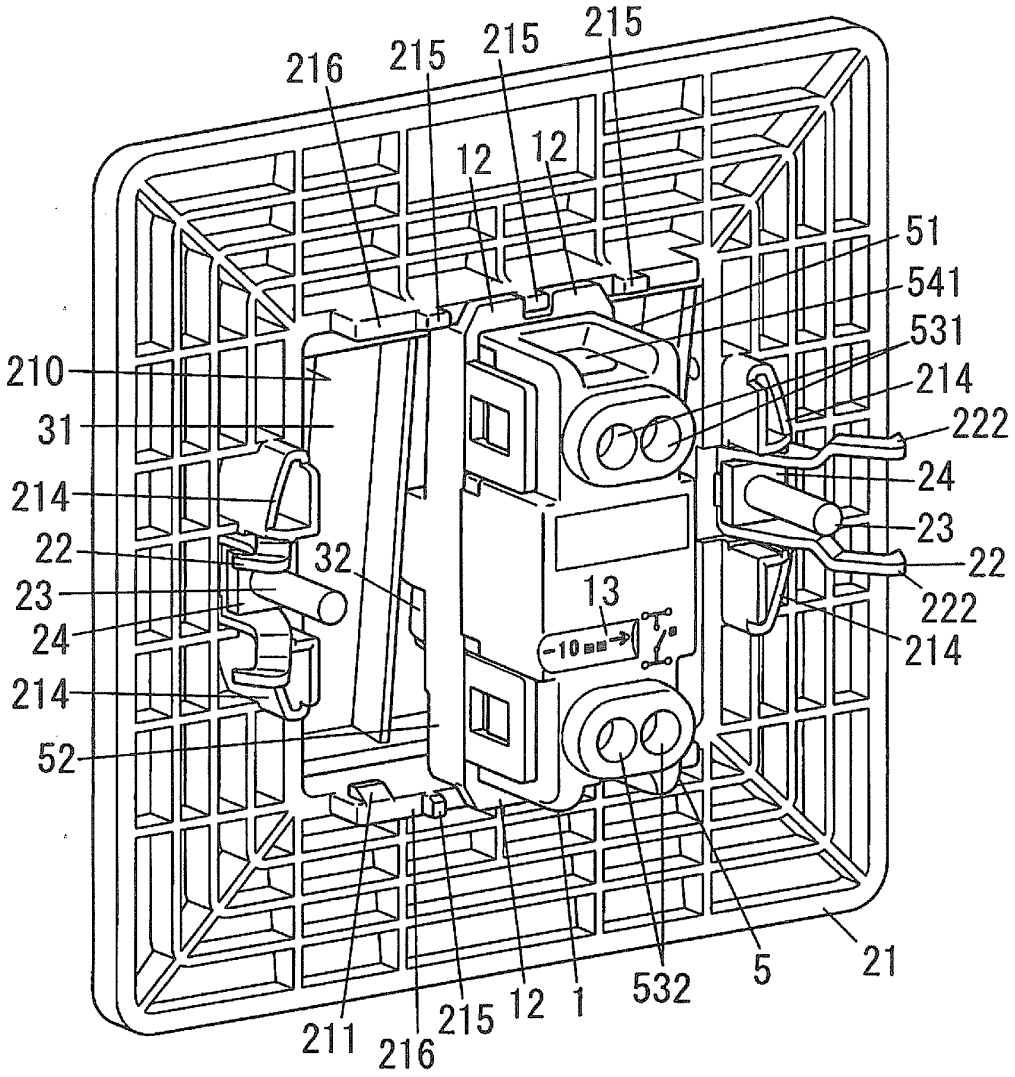
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FIG. 5

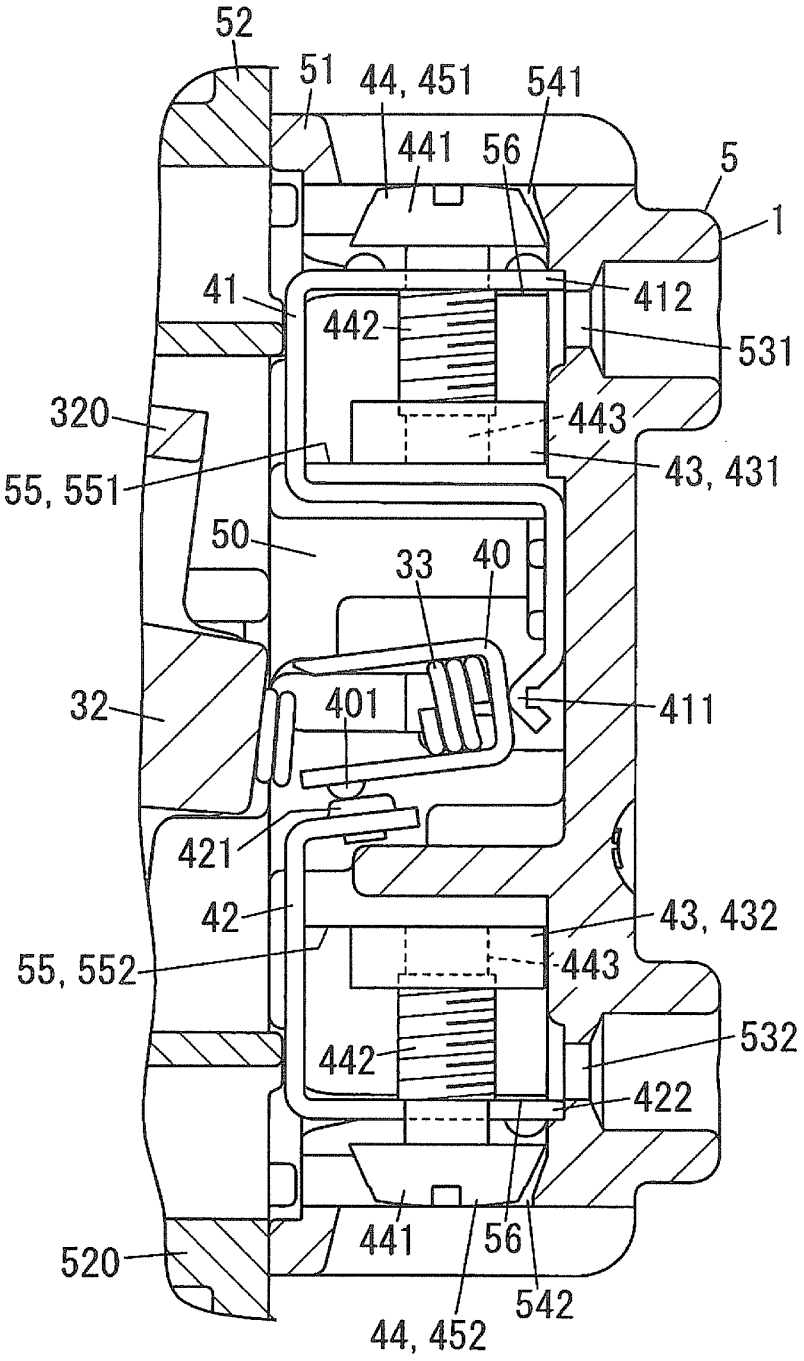
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FIG. 6

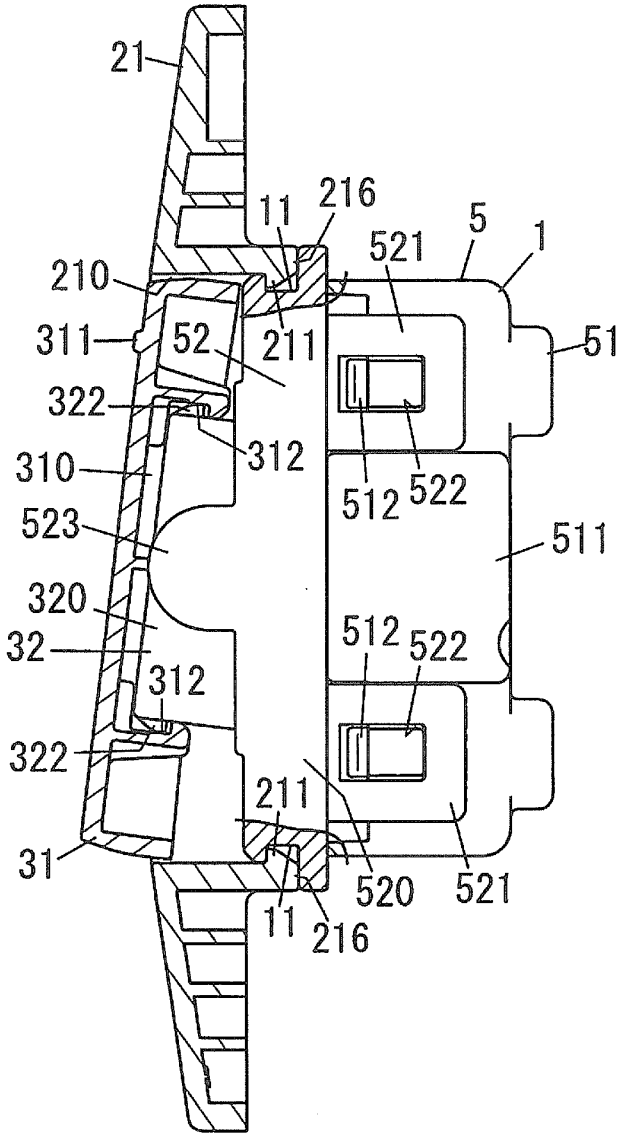
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FIG. 7

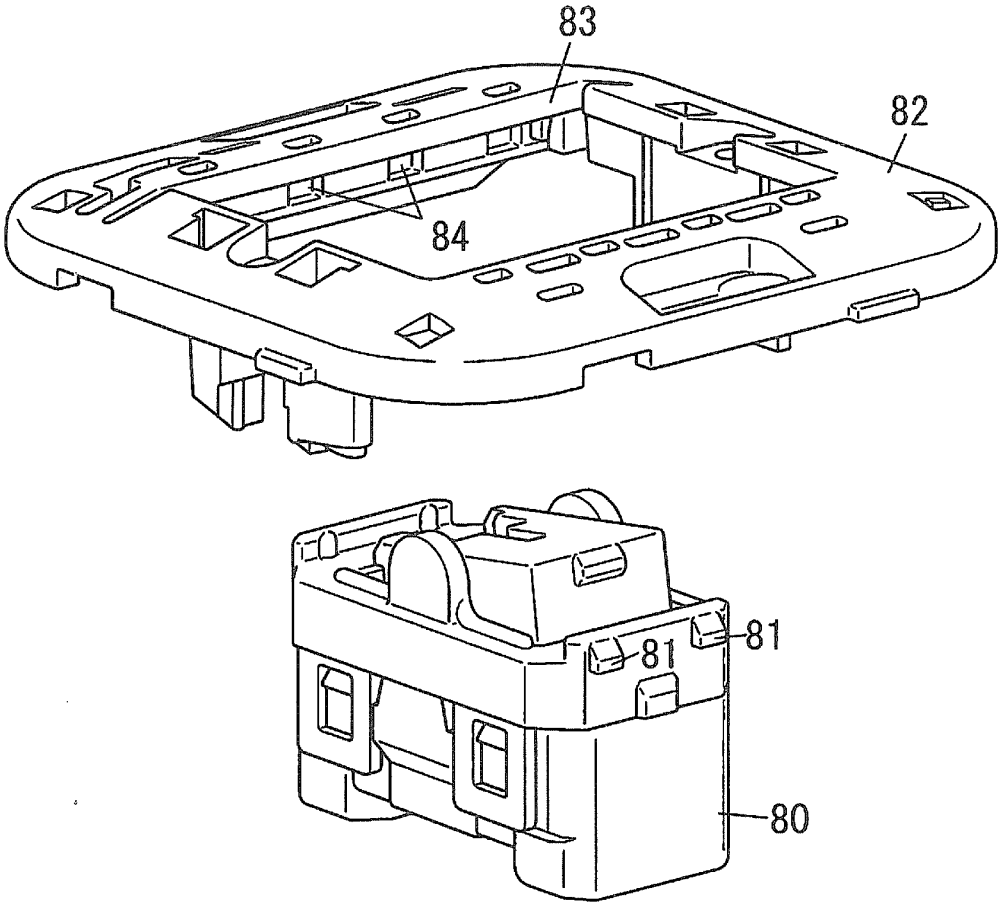
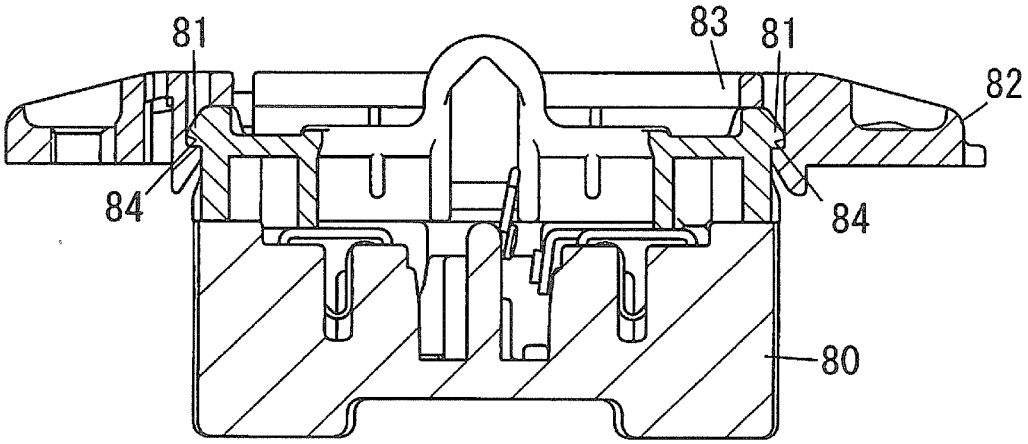


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/004921

A. CLASSIFICATION OF SUBJECT MATTER
H01H9/02(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)
H01H9/02

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 1996-2013
Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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	JP 10-188736 A (Matsushita Electric Works, Ltd.), 21 July 1998 (21.07.1998), paragraphs [0013] to [0031]; all drawings (Family: none)	1
X	JP 4-147531 A (Toshiba Lighting & Technology Corp.), 21 May 1992 (21.05.1992), page 2, lower right column, line 9 to page 4, upper right column, line 4; fig. 1 to 2 (Family: none)	1

☐ 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	Date of mailing of the international search report
29 October, 2013 (29.10.13)	12 November, 2013 (12.11.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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Patent documents cited in the description

- JP 2001325846 A **[0002]**