

SWITCH ASSEMBLY WITH ROTATABLE OPERATIONAL PART

INCORPORATION BY REFERENCE

[0001] The following publications are referred to in the present application:

PCT/AU12014/000545 entitled “Electrical Connector, System and Method”

PCT/AU12014/000544 entitled “Batten Holder, Connector, System and Method”

PCT/AU12011/001675 entitled “Touch Switch”

PCT/AU2013/001274 entitled “General Power Outlet and Remote Switch Module”

Co-pending Australian Provisional Patent Application entitled “Inductive Power Transfer In an Electrical Outlet”

Co-pending Australian Provisional Patent Application entitled “Connection System and Method for Electrical Outlets”

Co-pending Australian Provisional Patent Application entitled “Electrical System, Apparatus and Method”

Co-pending Australian Provisional Patent Application entitled “Switch Assembly, System and Method”

Co-pending Australian Provisional Patent Application entitled “Push Button Switch Assembly and Operational Part”

[0002] The entire content of each of these documents is hereby incorporated by reference.

PRIORITY

The present application claims priority from the following applications:

Australian Provisional Patent Application No 2014905210 entitled “Electrical System, Apparatus and Method”

Australian Provisional Patent Application No 2014905212 entitled “Inductive Power Transfer In an Electrical Outlet”

Australian Provisional Patent Application No 2014905211 entitled “Connection System and Method for Electrical Outlets”

Australian Provisional Patent Application No 2014905209 entitled “Switch Assembly, System and Method”

Australian Provisional Patent Application No 2014905213 entitled “Push Button Switch Assembly”

Australian Provisional Patent Application No 2014905203 entitled “Switch Assembly with Rotatable Operational Part”

Chinese Patent Application No 201410795485.8 entitled “Hybrid Switch Mechanism”

Chinese Patent Application No 201410795482.4 entitled “Switch Assembly With Rotatable Operational Part”

Chinese Patent Application No 201410795430.7 entitled “Push-Button Switch Assembly and Operational Part”.

The entire content of each of these documents is hereby incorporated by reference.

TECHNICAL FIELD

[0003] The present application relates to the field of switch assemblies.

BACKGROUND

[0004] In the field of plate switch assemblies (including sockets having switch assemblies), there are different installation styles and practices in different regions and for different applications. For example, in some regions, and for some applications, switch plates are installed horizontally and in other regions and applications, switch plates are installed vertically.. For example, vertical installation is preferred in eastern regions of China, while horizontal installation is preferred in western regions. There are also

different installation styles and practices in Australia and New Zealand.

[0005] In current switch products, a user has to select parts corresponding to horizontal switches or parts corresponding vertical switches at the time of purchasing switch products. The freedom of selection is limited.

[0006] Fig. 1 is a diagram showing a switch assembly according to the prior art. In the current switch products, as shown in Fig. 1, an actuator portion and a driver portion of the switch assembly are fixed together. After a period of usage of the switch assembly, if the user desires to change a plate or an operational portion thereof, the user has to purchase a plate or an operational portion which fits into the original switch assembly. For example, if the original one is a horizontal switch assembly, a newly purchased plate should also be horizontal. It is even necessary to change the entire switch assembly. Thus, changing costs are high for the user.

[0007] Generally speaking, in the field of conventional switch assemblies, it is difficult to install the switch assemblies according to a desired angle or orientation. Also, it is not easy to change the installation angle of a plate randomly.

SUMMARY

[0008] The present application relates to a switch assembly, a carrier for a driver in the switch assembly, an operational part, a cover unit, and a method for rotating an operational part of the switch assembly, in which an installation angle or orientation of the switch assembly can be easily changed. In one aspect, the switch assembly is provided by a functional part and an operational part with an interface for interfacing between the operational part and the functional part. In another aspect, the operational part is designed to be operable to change its installing angle with respect to the cover unit or plate in a plane parallel to the cover unit or plate. Thus, the installation angle can be easily changed to meet demands of the market.

[0009] According to one aspect then there is provided a switch arrangement comprising; a cover unit; and an operational part of a switch assembly for controlling a functional part via an interface; wherein the operational part comprises a user interface, one or more driving components and a carrier, the carrier supporting the user interface and the one or more driving components; wherein the operational art is connected to the cover unit via the carrier which is rotatable with respect to the cover unit.

[0010] According to a second aspect, there is provided an operational part of a switch assembly for controlling a functional part via an interface; wherein the operational part comprises a user interface, one or more driving components and a carrier, the carrier supporting the user interface and the one or more driving components; and wherein the operational art is connectable to a cover unit via the carrier.

[0011] According to a third aspect, there is provided a cover unit for connection to an operational part of a switch assembly, the cover unit comprising; at least one aperture for receiving the operational part; and a retaining portion for removably connecting the operational part to the cover unit.

[0012] A method for rotating an operational part of a switch assembly with respect to a cover unit connected to the operational part, the method comprising; disconnecting the operational part from the cover unit; rotating the operational part with respect to the cover unit; and reconnecting the operational part to the cover unit.

[0013] A method for rotating an operational part of a switch assembly with respect to a cover unit connected to the operational part, the operational part comprising a carrier containing components of the operational part, method comprising; rotating the carrier with respect to the cover unit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a perspective view of a switch assembly in the prior art;

[0015] FIG. 2A - shows a generalised exploded view of the two sub-assembly parts of a switch assembly according to one aspect;

[0016] FIG. 2B – shows a generalised exploded view of the main components of the two sub-assemblies of the switch assembly of Figure 2A;

[0017] FIG. 3A is a perspective front view of one embodiment of a switch system with assembly (push-button switch assembly) according to a first aspect;

[0018] FIG. 3B is a perspective rear view of the embodiment of Figure 3A;

[0019] FIG. 4A is a perspective front view of another embodiment of a switch system with switch assembly (rocker switch assembly);

[0020] FIG. 4B is a perspective rear view of the embodiment of Figure 4A;

[0021] FIG. 5 is a perspective top view of an interface included in the switch assembly;

[0022] FIG. 6 is a cross-sectional view, along line A-A' in FIG 3A, of a combination of a functional part, the interface and an operational part within the embodiment of Figure 3A, with the perspective top view of the interface for reference;

[0023] FIG. 7 is a cross sectional view of the switch system along the line A-A' of FIG 3A including the base unit and cover unit;

[0024] FIG. 8 is a cross-sectional view, along line B-B' in FIG. 4B, of a combination of a functional part, the interface and an operational part in the embodiment of Figure 4, with the perspective top view of the interface for reference;

[0025] FIG. 9 is a cross sectional view of the switch system along the line B-B' of FIG 4B including the base unit and cover unit;

[0026] FIG. 10A is an exploded perspective front view of a switch assembly (a push-button switch assembly) according to another aspect;

[0027] FIG. 10B is an exploded perspective rear view of the switch assembly according to the embodiment of FIG 10A;

[0028] FIG. 11A is an exploded perspective front view of a switch assembly (a rocker switch assembly) according to another aspect;

[0029] FIG. 11B is an exploded perspective rear view of the switch assembly according to the embodiment of FIG 11A;

[0030] FIG. 12A is a front view of an operational part included in the push-button switch assembly according to the one embodiment;

[0031] FIG. 12B is a rear view of the arrangement of FIG. 12A;

[0032] FIG. 13A is a front view of an operational part included in the rocker switch assembly according to the other embodiment;

[0033] FIG. 13B is a rear view of the arrangement of FIG. 13A;

[0034] FIG. 14A is a front view of the cover unit according to a further embodiment;

[0035] FIG. 14B is a rear view of the arrangement of FIG. 14A;

[0036] FIG. 15 is a perspective view of a combination of a cover unit and a plurality of operational parts forming a switch arrangement according to a further embodiment;

[0037] FIG. 16 is an exploded perspective view of the cover unit and the plurality of operational parts as shown in FIG. 13;

[0038] FIG. 17 is a perspective view of a combination of a cover unit and an operational part forming a switch arrangement according to a second aspect; and

[0039] FIG. 18 is a diagram showing a rotation of the operation part in the switch assembly according to the second aspect.

DESCRIPTION OF THE EMBODIMENTS

[0040] Various embodiments will now be described in detail in accordance with the accompanying drawings. It will be appreciated that the relative arrangement of components and shapes of devices in the embodiments are described merely as examples, and are not intended to limit the scope of the invention to these examples. Further, similar reference numerals and letters refer to similar items in the figures, and thus once an item is defined in one figure, it need not be discussed for following figures.

[0041] Figures 2A and 2B show a general representation of the components of an embodiment of a switch assembly 500 according to one aspect. Broadly, in this aspect, switch assembly 500 comprises two sub-assemblies, being base unit switch part 510 and operational part 200. As shown in Figure 2A, base unit switch part 510 comprises a functional part 100 and an interface 300. Operational part 200 is for actuation by a user and for controlling the functional part 100, via the interface 300, for interfacing the functional part 100 and the operational part 200.

[0042] It will be noted that the operational part 200 is not fixed to the interface 300 or the functional part and is able to move freely with respect thereto, for reasons as will be described further below.

[0043] Figure 2B shows a further exploded general view of an embodiment of the switch assembly 500 of Figure 2A, in which it can be seen that in this embodiment, operational part 200 itself comprises two parts, namely user interface 201 and carrier 202. In some embodiments, the user interface 201 and the carrier 202 are fixed together and in other embodiments, the user interface 201 and the carrier 202 are separable as will be described in more detail below.

[0044] FIG. 3A is an exploded perspective front view of a switch system 1000, comprising a base unit 1100 and a cover unit or switch plate 1200. The switch assembly 500 (push-button switch assembly in

this embodiment) is shown distributed between the base unit 1100 and cover unit or switch plate 1200, with the base unit switch part 510 being provided in the base unit 1100 and the functional part 200 (of which only the user interface 201 is visible in this view) being provided in the cover unit or switch plate 1200. FIG. 2B is an exploded perspective rear view of the switch system 1000. As shown in FIG. 3A, the switch assembly 500 includes the functional part 100, which in an embodiment is a switch mechanism, the operational part 200 which in this embodiment is a push button, and the interface 300.

[0045] As can be seen in Figures 3A and 3B, the operational part 200 can be freely removed from the base unit switch part (specifically the interface 300) and/or the functional part 100 as there is no connection between the operational part 200 and the interface 300/functional part 100.

[0046] In this embodiment, the operational part 200 comprises a user interface 201 (in this embodiment, a push-button 201A) and a push-button carrier 202A, as shown in FIG. 3A and 3B. The operational part 200 is engaged in the cover unit 1200 (forming a switch arrangement) through the push-button carrier 202A which can be fitted into the cover unit 1200, as shown in FIG. 3B. The push-button 201A is operated by a user to effect a switch on/off operation. FIG. 3B shows one embodiment of the engagement of the push-button carrier 202A to the cover unit 1200. However, a person skilled in the art will understand that the engagement of the operational part 200 and the cover unit 1200 can be provided in any way which can connect the operational part 200 and the cover unit 1200 together. The details of the connection between the cover unit 1200 and the operational part 200 will be described in more detail later with reference to FIGs. 10A, 10B and FIG. 11A, 11B.

[0047] It will be appreciated that the user interface 201 can be any suitable type including push button, dolly or rocker, toggle, or rotary knob.

[0048] When the cover unit or plate 1200 is connected to the base unit 1100, the functional part 100 and interface 300 are located behind the operational part 200 when viewed from the side of the cover unit 1200. The functional part 100 is controlled by the actuation of the operational part 200 to implement switch on/off operation through the interface 300. The functional part 100 is connected to the base unit 1100. This connection is by any suitable means including bonding, clipping, friction fit, gluing or by a means employing a sliding connector as described in co-pending patent application entitled "Connection System and Method for Electrical Outlets" previously incorporated by reference.

[0049] The interface 300 is disposed between the operational part 200 and the functional part 100, and is connected with the functional part 100 as described further below. Interface 300 is for interfacing the

functional part 100 and the operational part 200 so as to transfer the user's actuation operation (such as pushing the button or actuating the dolly) on the operational part 200 to the functional part 100. An enlarged view of the interface 400 is shown in FIG. 5.

[0050] In a conventional switch assembly, the operational part 200, and in particular, the push button 201A is fixed to the functional part 100 and cannot be removed or detached from the functional part 100.

[0051] However, according to an aspect described herein, as shown in FIG. 3A and 3B, the operational part 200 is not fixed or connected to base unit switch part 510, including the interface 300 or to the functional part 100, but can be removed from the base unit switch part 510 being the functional part 100 or the interface 300. For example, the operational part 200 can be caused to contact or engage with the functional part 100 or the interface 300 by only connecting the cover unit 1200 to the base unit 1100. Similarly, the operational part 200 can be removed or disengaged from the base unit switch part 510 being the functional part 100 and the interface 300 by simply separating the cover unit 1200 from the base unit 1100. The details of the relationship of the three parts and principles of how the switch assembly 500 works will be explained later with reference to FIGs. 6 and 8.

[0052] FIG. 4A and 4B illustrate another embodiment of the switch system 1000 with switch assembly 500, with the operational part 200 being provided by a rocker switch or dolly 201B. FIG. 4A is an exploded perspective front view of this embodiment of the switch system 1000 with switch assembly (rocker switch assembly). FIG. 4B is an exploded perspective rear view of the switch system 1000 with switch assembly 500 according to this embodiment.

[0053] The switch assembly 500 in FIG. 4A and 4B includes the functional part 100, the operational part 200, and the interface 300. The difference between the rocker switch assembly in FIG. 4 and the push-button switch assembly in FIG. 3 lies only in the operational part 200 in this embodiment.

[0054] The operational part 200 includes a dolly 201B and a rocker carrier 202B, as shown in FIG. 4A and 4B. The operational part 200 is engaged in the cover unit or switch plate 1200 through the rocker carrier 202B which can be fitted into the cover unit 1200, as shown in FIG. 4B. The dolly 201B is operated by a user to effect switch on/off operation. FIG. 4B shows the engagement implemented by the carrier 202. However, it will be appreciated by the person skilled in the art that the engagement of the operational part 200 and the cover unit 1200 can be in any way which can connect the operational part 200 and the cover unit 1200 together.

[0055] As with the embodiment shown in FIG. 3A and 3B, the operational part 200 is not fixed to the base unit switch part 510 and in particular, to interface 300 or to the functional part 100, but can be removed or separated from the base unit switch part 510 being the functional part 100 or the interface 300. For example, the operational part 200 can be engaged with the functional part 100 through the interface 300 by only connecting the cover unit 1200 on the base 1100. Similarly, the operational part 200 can be disengaged or removed from the functional part 100 or the interface 300 by simply separating the cover unit 1200 from the base 1100. The details of the relationship of the three parts and principles of how the switch assembly works in this embodiment will be explained later with reference to FIG. 8.

[0056] Since the functional part 100 in FIG. 3 is the same as that in FIG. 4 and the operational part 200 can be removed from the same functional part 100, the push-button switch assembly as shown in FIG. 3 can be converted to the rocker switch assembly as shown in FIG. 4 simply by replacing the functional part 200 with push-button switch 201A with the functional part with the rocker switch 201B. Such replacement can be done by a user himself/herself without assistance of a professional or qualified tradesperson.

[0057] The details of the interface and how the switch assembly according to the first embodiment works will now be described in detail with reference to FIG. 5 to FIG. 7.

[0058] FIG. 5 is a perspective top view of an embodiment of interface 300 included in the switch assembly 500 according to the first embodiment described previously.

[0059] As shown in FIG. 5, the interface 300 comprises first protrusion 301A and second protrusion 301B, first surface 302A, second surface 302B, and first top surface 303A and second top surface 303B. The protrusions 301A and 301B are located at each side of a centre 306 of the interface 300, respectively. In this embodiment, interface 300 also comprises first surface 302A and second surface 302B. In this embodiment, first surface 302A is outside the first protrusion 301A with respect to the centre 306 and second surface 302B is outside the second protrusion 301B with respect to the centre 306. First top surface 303A is disposed at the top of the first protrusion 301A. Second top surface 303B is at the top of the second protrusion 301B. As can be seen, the first surface 302A and second surface 302B are planar surfaces each disposed a first distance from the centre 306 of the interface 300 and the first top surface 303A and second top surface 303B are disposed above the first surface 302A and the second surface 302B, each at a second distance from the centre 306 of the interface. In one embodiment,

the first distance is greater than the second distance. In another embodiment, (not shown), the first distance is less than the second distance.

[0060] FIG. 6 shows how a push-button switch assembly of the first embodiment works. FIG. 6 is a cross-sectional view, along line A-A' in FIG 3A, of the switch assembly 500, being a combination of the functional part 100, the interface 300 and the operational part 200, with the perspective top view of the interface 300 also shown for ease of reference.

[0061] As shown in FIG. 6, the push button 201A included in the operational part 200 is above the interface 300. In one embodiment, the interface 300 is connected to an actuating member 305. In some other embodiments, actuating member 305 is a part of, or integrated with, interface 300. The switching element 102 within the functional part 100 is under the actuating member 305 and is for making and breaking contact between terminals 103, 104 and 105 which in use, are connected to respective electrical conductors (not shown) carrying electrical current such as mains or supply current or current from another source. The effect of switching element 102 being rocked from one side to another is to create an electrical path between terminals 103 and 104 and breaking the electrical path between terminals 104 and 105, thereby effecting an on/off switching function under actuation of the actuating member 305 as will be understood by the person skilled in the art.

[0062] In the view of FIG 6, at the initial state, the push button 201A contacts with the first top surface 303A located at the top of the first protrusion 301A. When the user pushes the push button 201A downwards, the first protrusion 301A of the interface 300 is pressed down, causing the actuating member 305 to swing towards the right side, since interface 300 is connected to functional part 100 via a pivot point 307 at centre 306. The switching element 102 is actuated correspondingly to change switching on/off status of the switch assembly 100 as previously described. At the same time, the second protrusion 301B moves up so that the second top surface 303B makes contact with the push button 201A. When the push button 201A is pressed again in the position of contact with the second top surface 303B of second protrusion 301B, the second protrusion 301B is pressed down, causing the actuating member 305 to swing toward the left side. The switching element 102 is actuated correspondingly to change the switching on/off status of the switch assembly 100. At the same time, the first protrusion 301A moves up so that the first top surface 303A makes contact with the push button 201A. The same process is repeated when the user presses the push button 201A again.

[0063] As can be seen from FIG. 6, the push button 201A moves linearly in an up and down motion, while through the transfer of the interface 300, the switching element 102 makes a rocker motion. That

is, the interface 300 is configured to, in use, convert linear motion from the first operational part 200 into rocking motion to the functional part 100 when the operational part 200 is or includes a push button 201A.

[0064] FIG. 7 shows the cross-sectional view of switch system 1000 along the line A-A' of FIG. 3A, including the base unit 1100 and the cover unit or plate 1200. It can be seen in this view how operational part 200 is brought into non-fixed but touching engagement with base unit switch part 510 (and in particular in this embodiment, interface 300), when cover unit or plate 1200 is connected to base unit 1100. The operational part 200 and the base unit switch part 510 are separated (and in particular separated from interface 300 in this embodiment) simply by removing cover unit or plate 1200 from base unit 1100.

[0065] FIG. 8 shows how a switch assembly 500 of the second embodiment of FIG. 4 functions. FIG. 8 is a cross-sectional view, along line B-B' in FIG. 4A, of a combination of the functional part 100, the interface 300 and the operational part 200, with the perspective top view of the interface 300 also shown for ease of reference.

[0066] As shown in FIG. 8, the dolly 201 included in the operational part 200 is above the interface 300. As in the arrangement shown in FIG. 8, in one embodiment, the interface 300 is connected to an actuating member 305. In some other embodiments, actuating member 305 is a part of, or integrated with, interface 300. The switching element 102 within the functional part 100 is under the actuating member 305 and is for making and breaking contact between terminals 103, 104 and 105 which in use, are connected to respective electrical conductors carrying electrical current such as mains or supply current or current from another source.. The effect of switching element 102 being rocked from one side to another is to create an electrical path between terminals 103 and 104 and breaking the electrical path between terminals 104 and 105, thereby effecting an on/off switching function under actuation of the actuating member 305as will be understood by the person skilled in the art.

[0067] In the view of FIG. 8, at the initial state, the dolly 201B makes contact with the first surface 302A and the second surface 302B, via legs 201B-1 and 201B-2 associated with dolly 201B. In this embodiment the first surface 302A and the second surface 302B are located farther from the centre 306 as compared with the first top surface 303A and second top surface 303B. When a user actuates the dolly 201B, the dolly 201B causes the first surface 302A of the interface 300 to be pressed down, which makes the actuating member 305 swing toward right side in the view shown. The switching element 102 is actuated to change switching on/off status of the switch assembly. At the same time, the second

surface 302B moves up. When the dolly 201B is actuated again, the dolly 201B causes the second surface 302B of the interface 300 to be pressed down, which makes the actuating member 305 swing toward the left side in this view. The switching element 102 is actuated to change the switching on/off status of the switch assembly. At the same time, the first surface 302A moves up. The same process is repeated when the user actuates the dolly 201B again.

[0068] In the above embodiment, the dolly 201B makes contact with the first surface 302A and the second surface 302B of the interface 300 which are planar. In another embodiment, the rocker or dolly switch 201B may make contact with the first slanted surface 304A and second slanted surface 304B of the protrusions 301A and 301B. In other embodiments, the first surface 302A, the second surface 302B, the first slanted surface 304A and/or the second slanted surface 304B can be curved or non-planar.

[0069] As can be seen from FIG. 8, the interface 300 transfers rocking motion from the operational part 200 to the functional part 100, when the operational part 200 is a dolly 201B.

[0070] Although in the above embodiment, two protrusions 301A and 301B are shown as an example, a person skilled in the art will appreciate that three or more protrusions can be applied to effect the switching. Furthermore, any other surface configurations can be used to effect the same translational functions as the exemplary embodiments described above.

[0071] From FIG.6 and FIG.8, it will be appreciated that the push-button switch assembly 500 can be converted to a rocker switch assembly simply by replacing the operational part 200 being a push button 201A, with an operational part 200 being a dolly 201B.

[0072] Such replacement can be done by a user himself/herself without assistance of a professional or qualified tradesperson. Therefore, costs to an end-user are reduced. Furthermore, production costs of the switch assembly 500 are reduced because when a part of the switch assembly is updated or modified, only that part is needed to be produced, without affecting other parts.

[0073] FIG. 9 shows the switch assembly of FIG. 8 with operational part 200 in cover unit or switch plate 1200, connected to base unit 1100, to form switch system 1000.

The engagement between the operational part and the cover unit will now be described.

.FIG.10A is an exploded perspective front view of a switch system 1000 (with a push-button switch assembly 500 in this embodiment) according to another aspect described herein. FIG. 10B is an exploded perspective rear view of the switch system 1000 according to this aspect.

[0074] In this aspect, as shown in Figure 10B, a retaining portion 1203 is provided to retain the push-button carrier 202A to the cover unit 1200. In the embodiment shown in Figure 10B, the retaining portion 1203 is a clip structure 1203A.

[0075] In this embodiment, the plate or cover unit 1200 in FIG. 10A and 10B includes a square clip 1203A around the aperture 1201 for receiving the, or part of the operational part 200. The size of the clip 1203A can be made to match the size of the push-button carrier 202A to retain the push-button carrier 202A in a friction fit or other clipping means. The operational part 200 can be removed from plate or cover unit 1200 by pressing the clip 1203 so as to release or otherwise disengage from, the carrier 202.

[0076] FIG. 11A is an exploded perspective front view of a switch system 1000 with an operational part 200 being provided by a rocker or dolly 201B as the user interface 201 according to another embodiment. FIG. 11B is an exploded perspective back view of the switch system according to this embodiment.

[0077] In this embodiment, operational part 200 in FIG. 11 includes a dolly, instead of the push-button in FIG. 10. Although the dolly replaces the push button, the clip structure 1203A can be the same.

[0078] Thus, it can be seen that in this aspect, the operational part 200 of a push button 201A can be replaced with an operational part 200 being a rocker or dolly 201B, so as to convert the push-button switch assembly to the rocker switch assembly without changing the plate or cover unit 1200.

[0079] Therefore, when a user desires to change the operational part 200, he does not need to change the plate or cover unit 1200. This provides even greater flexibility for the user and even greater efficiencies in manufacture, storage and installation in that the user is able to simply change the specific parts required while maintaining the majority of the system 1000.

[0080] Although in FIGs. 10 and 11, the shape of the clip 1203A and the carrier 202 are square shaped, it will be appreciated that the clip 1203A and the carrier 202 can be different shapes, such as round, rectangular, hexagonal etc.

[0081] Furthermore, it will be appreciated that the retaining portion 1203 can be of any suitable form including but not limited to a screw structure, a tight fitting or friction fit structure or a magnet.

[0082] Although FIG. 10 shows an embodiment of this aspect as a button switch assembly, and FIG. 11 shows an embodiment as rocker switch assembly, it will be appreciated that other forms of operational part 200 such as the rotary switch assembly and toggle switch assembly can be used, as can other switch types not explicitly described herein.

[0083] Furthermore, as shown in FIGs. 10 and 11, the plate or cover unit 1200 can be of any desired shape or appearance. The connection between the operational part 200 and the cover unit 1200 (forming a switch arrangement) according to the first embodiment will now be described in detail with reference to FIG. 12 to FIG. 14.

[0084] FIG. 12A is a front view and FIG. 12B is a back view of an operational part 200 included in the push-button switch assembly 500 according to the one embodiment. FIG. 14A is a front view and FIG. 14B is a back view of the cover unit according to the embodiment.

[0085] As shown in FIG. 12A and 12B, in one embodiment, the push-button carrier 202A includes clip structures 202A-1, 202A-2, 202A-3 and 202A-4. Correspondingly, there are a first cover clip 1203A-1, a second cover clip 1203A-2, a third cover clip 1203A-3, and a

fourth cover clip 1203A-4 at the periphery of the aperture 1201 within the cover unit 1200, as shown in FIG. 14A and FIG. 14B. The size of each clip in the carrier 202 and the distance between each two neighboring clips are arranged to correspond to the size of each clip at the periphery of the aperture within the cover unit 1200 and the distance between each two neighboring clips within the cover unit, respectively. The clips are arranged about the aperture 1201. When the push-button carrier 202A and the cover unit 1200 are engaged, clip structures of the carrier and clip structures of the cover unit are fitted into each other so as to fix the push-button carrier 202A and the cover unit 1200 together. When the clip structures of the carriers and the clip structures of the cover unit are separated, the push-button carrier 202A and the cover unit 1200 are separated from each other.

[0086] In the embodiment described, the carrier 202A is square shaped, and the clip structures are correspondingly arranged symmetrically about the square shape. Correspondingly, the clip structures at the periphery of the aperture 1201 within the cover unit 1200 are also symmetrically arranged about the aperture 1201. Accordingly, when the carrier 202A rotates at 90° with respect to the cover unit 1200 in a plane parallel to the cover unit, the carrier 202A is still able to be connected to the cover unit 1200. For example, in the case that there is an indicator on the top surface of the push-button switch 201A, when the cover unit 1200 is changed from a horizontal installation to a vertical installation, the push-button carrier 202A and push button 201A of the operational part 200 can rotate at 90° with respect to the cover unit 1200 in a plane parallel to the cover unit, so that the indicator is still at the top of the push-button switch.

[0087] FIG. 12A is a front view and FIG. 12B a back view of an operational part 202B included in the rocker switch assembly according to the other embodiment. The operational part in the rocker switch assembly as shown in FIG. 13 is different from the operational part in the push-button switch assembly in that the operational part in the rocker switch assembly includes a rocker switch 201B. Rocker carrier 202B has a structure fitting into the structure of rocker/dolly 201B. However, the clip structures thereof 202B-1, 202B-2, 202B-3, and

202B-4 are the same as the clip structures 202A-1, 202A-2, 202A-3, and 202A-4 as shown in FIG. 12.

[0088] Although FIG.s. 3-14 show that the operational part includes four clip structures so that the operational part can rotate at 90° with respect to the cover unit, the number of the clip structures is not limited to four, but can be any required number. The number of the clip structures at the periphery for the aperture of the cover unit can also be any required number correspondingly. For example, when the number is 12, that is, when there is one clip structure every 30° , the operational part can rotate with respect to the cover unit at every 30° . As a matter of course, in some cases, at the same time, the functional part 100 within the base 1100 and the interface 300 can to be rotated correspondingly so as to fit the rotation of the operational part. Accordingly, there can be provided 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 or more than 20 retaining portions 1203 on the cover unit 1200 and similarly with the carrier clips on the carrier 202. Furthermore, it is not necessary that the number of carrier clips on the carrier match the number of retaining portions on the cover unit. Furthermore, the structure of the retaining portions can be any suitable structure including pins, recesses and/or magnets. Similarly, the structure of the corresponding portions on the carrier can be of any suitable structure including the clip structure shown, pins, recesses and/or magnets.

[0089] Furthermore, although the clip structures in FIGs. 3, 4, 12 to 14 are shown as being distributed at sides of the square, respectively, the clip structures can also be evenly distributed along a circle. The clip structures can also be arranged in any shape. Furthermore, although clip structures are shown in the previous description, the connection between the cover unit and the operational part can be achieved through a tight fitting structure or a screw structure. When the connection between the cover unit and the operational part is a round tight-fitting structure, the operational part is able to rotate, with respect to the cover unit, in a plane parallel to the cover unit.

[0090] Furthermore, although the operational part 200 is not connected directly to the base unit 1100 in which the functional part 100 lies, in some embodiments, the operational part 200 does make contact with the base unit 1100. In order to make the operational part 200 contact the functional part 100 or more specifically, the interface 300 in a cavity of the base unit 1100, it is required that the external size of the carrier 202 of the operational part 200 matches or fits within, the size of the cavity in the base unit 1100, so as to allow the cover unit 1200 to contact with the base unit tightly. Furthermore, in order to make the operational part 200 match with the cover unit 1100, in this embodiment the external size of the carrier 202 of the operational part 200 can match with the size of the aperture in the cover unit 1100. Therefore, different operational parts, that match the size of the cavity in the base unit 1100 and the aperture in the cover unit 1200, can be exchanged with each other freely.

[0091] A combination of a cover unit 1200 and a plurality of operational parts 200 according to the third embodiment will now be described with reference to FIG. 15 and FIG. 16. FIG. 15 is a diagram of a combination of a cover unit 1200 and a plurality of operational parts 200 according to the third embodiment. FIG. 16 is an exploded view of a cover unit 1200 and a plurality of operational parts 200, 200', 200'', 200''', 200'''' and 200''''' with respective carriers 202, 202', 202'', 202''', 202'''', 202''''' according to the third embodiment.

[0092] As shown in FIG. 15 and FIG. 16, six operational parts 200 to 200''''' connect with a cover unit 1200 through respective carriers 202 to 202'''''. As can be seen, in this embodiment, an external size of each carrier is the same, and can be matched in size with the aperture in the cover unit 1200.

[0093] A switch assembly according to a fourth embodiment will now be described with reference to FIG. 17 and FIG. 18.

[0094] FIG. 17 is a diagram of a combination of a cover unit 1200' and an operational part 200 in the switch assembly forming a switch arrangement according to the fourth

embodiment. FIG. 18 is a diagram showing a rotation operation of an operational part in the switch assembly according to the fourth embodiment.

[0095] As shown in FIG. 17, the cover unit 1200' and the operational part 200 are fixed together, forming a switch arrangement. The operational part is connected to the cover unit 1200' through a press-rotation part 202C. A switch part 201C is accommodated in the press-rotation part 202C. When the press-rotation part 202C is pressed, the press-rotation part 202C and the switch part 201C together can rotate, with respect to the cover unit 1200', in a plane parallel to the cover unit 1200'. As shown in FIG. 18, the press-rotate part 202C can change the switch part 201C from a vertical direction to a horizontal direction. Although rotating at 90° is shown in FIG. 18, a person skilled in the art can easily understand that, the press-rotate part 501 can rotate at any angle as required.

[0096] The switch assembly according to an aspect as described herein is separated into a base unit switch part 510 (comprising a functional part 100 and an interface 300) and an operational part 200. The operational part 200 can rotate, with respect to the cover unit 1200, in a plane parallel to the cover unit 1200. Thus, the installation angle can be customized according to the requirements of the user. Accordingly, at the time of purchasing a switch assembly, it is not necessary for a user to consider choosing a horizontal one or a vertical one. Because the switch assembly according to the various aspects described herein is standardized and generalized, the user can choose a particular style, functionality and/or appearance if the cover unit 1200 and/or operational part 200as and when required.

[0097] Although some specific embodiments of the present invention have been demonstrated in detail with examples, it should be understood by a person skilled in the art that the above examples are only intended to be illustrative but not to limit the scope of the present invention. It should be understood by a person skilled in the art that the above embodiments can be modified without departing from the scope and spirit of the present invention. The scope of the present invention is defined by the attached claims.

[0098] Throughout the specification and the claims that follow, unless the context requires otherwise, the words “comprise” and “include” and variations such as “comprising” and “including” will be understood to imply the inclusion of a stated integer or group of integers, but not the exclusion of any other integer or group of integers.

[0099] The reference to any prior art in this specification is not, and should not be taken as, an acknowledgement of any form of suggestion that such prior art forms part of the common general knowledge.

CLAIMS

1. A switch arrangement comprising;
 - a cover unit; and
 - an operational part of a switch assembly for controlling a functional part via an interface; wherein
 - the operational part comprises a user interface, one or more driving components and a carrier, the carrier supporting the user interface and the one or more driving components; and wherein the operational art is connected to the cover unit via the carrier which is rotatable with respect to the cover unit.
2. A switch arrangement as claimed in claim 1 wherein the carrier is removable from the cover unit and replaceable in a different orientation.
3. A switch arrangement as claimed in claim 2 wherein the carrier is connected to the cover unit via a clip structure.
4. A switch arrangement as claimed in claim 2 wherein the carrier is connected to the cover unit via a screw arrangement.
5. A switch arrangement as claimed in claim 2 wherein the carrier is connected to the cover unit via a friction fit arrangement.
6. A switch arrangement as claimed in any one of claims 1 to 5 wherein the user interface is a push button.
7. A switch arrangement as claimed in any one of claims 1 to 5 wherein the user interface is a rocker.

8. A switch arrangement as claimed in any one of claims 1 to 5 wherein the user interface is a toggle switch.
9. A switch arrangement as claimed in any one of claims 1 to 5 wherein the user interface is a rotary knob.
10. An operational part of a switch assembly for controlling a functional part via an interface; wherein
the operational part comprises a user interface, one or more driving components and a carrier, the carrier supporting the user interface and the one or more driving components; and wherein the operational art is connectable to a cover unit via the carrier.
11. An operational part as claimed in claim 10 wherein the carrier is removable from the cover unit and replaceable in a different orientation.
12. An operational part as claimed in claim 11 wherein the carrier is connectable to the cover unit via a clip structure.
13. An operational part as claimed in claim 11 wherein the carrier is connectable to the cover unit via a screw arrangement.
14. An operational part as claimed in claim 11 wherein the carrier is connectable to the cover unit via a friction fit arrangement.
15. An operational part as claimed in any one of claims 10 to 14 wherein the user interface is a push button.

16. An operational part as claimed in any one of claims 10 to 14 wherein the user interface is a rocker.
17. An operational part as claimed in any one of claims 10 to 14 wherein the user interface is a toggle switch.
18. An operational part as claimed in any one of claims 10 to 14 wherein the user interface is a rotary knob.
19. A cover unit for connection to an operational part of a switch assembly, the cover unit comprising;
 - at least one aperture for receiving the operational part; and
 - a retaining portion for removably connecting the operational part to the cover unit.
20. A cover unit as claimed in claim 19 wherein the cover unit comprises a plurality of retaining portions to allow the operational part to be disconnected from a first retaining portion and reconnected at a second retaining portion, thereby causing the operational part to be rotated with respect to the cover unit.
21. A cover unit as claimed in claim 20 wherein the retaining portion is a clip structure.
22. A cover unit as claimed in claim 20 wherein the retaining portion is a screw arrangement.
23. A cover unit as claimed in claim 20 wherein the retaining portion is a friction fit arrangement.
24. A cover unit as claimed in any one of claims 19 to 23 comprising a plurality of apertures.

25. A method for rotating an operational part of a switch assembly with respect to a cover unit connected to the operational part, the method comprising;
- disconnecting the operational part from the cover unit;
 - rotating the operational part with respect to the cover unit; and
 - reconnecting the operational part to the cover unit.
26. A method for rotating an operational part of a switch assembly with respect to a cover unit connected to the operational part, the operational part comprising a carrier containing components of the operational part, method comprising;
- rotating the carrier with respect to the cover unit.