

SWITCH /

Background of the Invention

Field of the Invention

The present invention relates to a switch that incorporates resilient clamps for directly connecting with the blade terminals of bus bars in the housing of a switch such as a push-button switch.

Description of the Prior Art

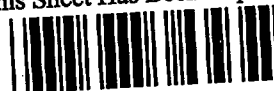
In the past, in order to connect a switch with a circuit on an insulated base, the switch and circuit were connected by inserting the female connector of a lead wire, of which one end was soldered to the circuit on the insulated base, onto a lead plate of a switch attached to an attached body such as a panel. In the switch connecting structure of the prior art as described above, the number of work processes was large due to having a process in which the switch is mounted to the attached body, and a process in which the female connector connected with the lead of said switch is soldered to an insulated base by means of a lead wire. This resulted in the problems of requiring additional time for assembly as well as contributing to increased labor costs.

Summary of the Invention

In order to solve the above-mentioned problems, the object of the present invention is to provide a switch connecting structure

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that is able to shorten work time and lower labor costs by enabling a switch to be directly attached to a bus bar formed on an insulated base.

In order for the switch connecting structure of the present invention to achieve the above-mentioned object, the means described in claim 1 consists of a switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.

In addition, the means described in claim 2 composes a switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming holes in the inside wall of said recesses of said housing and engaging tabs on the flat portions of said connection terminals within said holes. In addition, the means described in claim 3 composes a switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming projections on the inside wall of said recesses of said housing and engaging said projections in holes in the flat portions of said contact terminals.

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Brief Description of the Drawings

Fig. 1 is an exploded perspective view showing a first embodiment as claimed in the switch connecting structure of the present invention.

Fig. 2 is a perspective view of the assembled state of the above.

Fig. 3 is a cross-sectional view of the switch in the off state.

Fig. 4 is a perspective view of the switch in the on state.

Description of the Preferred Embodiment

The following provides an explanation of the form of one embodiment of the switch as claimed in the present invention with reference to Fig. 1 through Fig. 4.

In the drawings, reference numeral 1 indicates a switch such as a push-button switch, seesaw switch or slide switch, and as shown in Figs. 3 and 4, indicates a push-button switch in this embodiment. Furthermore, this push-button switch 1 is used, for example, as a switch for turning on and off the interior lamp unit installed on the roof of an automobile interior.

The following provides a detailed explanation of switch 1. Reference numeral 11 indicates a bottomed housing, projection 11b projects toward the inside from the center of bottom 11a, and together with mutually facing insertion holes 11c being formed, slots 11d are formed in each recess 11c.

Reference numeral 12 indicates a pair of terminal plates that are press fit into grooves 11e formed in the inside wall of

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housing 11 from the above-mentioned holes 11d, the ends of which extend into the above-mentioned recesses. Reference numeral 13 indicates a spring of which one end is inserted onto the above-mentioned projection 11b. Reference numeral 14 indicates a pushing lever in which the other end of spring 13 is inserted into hole 14a, and protrudes from through hole 15a of cover plate 15 fixed on the open end of said housing 11. Reference numeral 16 is a resilient contact plate bent roughly into the shape of the letter "U" that is attached to the above-mentioned pushing lever 14, both ends of which have contacts 16a formed into a curved shape.

Next, the following provides an explanation of the operation of the above-mentioned switch 1. In Fig. 3, pushing lever 14 is pushed up by the spring force of spring 13 and is stopped as a result of ledge 14b of said pushing lever 14 making contact with cover plate 15. Thus, since contacts 16a of resilient contact plate 16 are positioned away from terminal plates 12 in this state, the space between the pair of terminal plates 12 is electrically off.

In the above-mentioned state, when pushing lever 14 is pushed down in opposition to the spring force of spring 13, contact plate 16 lowers as shown in Fig. 4 causing contacts 16a to make contact with terminal plates 12. Consequently, the space between the pair of terminal plates 12 is electrically on. If this type of switch 1 was to be installed, for example, on the chassis of an automobile with the door closed, switch 1 would enter the on state when the door was opened.

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Furthermore, although the switch shown in the drawings only enters the on state when pushing lever 14 is pushed, it can be made into a locking push-button switch by incorporating a known locking mechanism. If this type of locking push-button switch 1 was to be used as, for example, a switch for turning on and off the interior lamp unit installed on the roof of an automobile interior, it could be used to turn the interior lamp on and off. Next, the following provides an explanation of a means of installing the above-mentioned switch 1 on an automobile chassis. Reference numeral 2 indicates a pair of bus bars fixed in an insulated state in a chassis (not shown) such as the interior lamp unit, and electrically connected to a lamp, the ends of which are bent at right angles to form blade terminals 21. Reference numeral 3 indicates connection terminals that connect terminal plates 12 and the above-mentioned blade terminals 21 in the above-mentioned switch. Each connection terminal 3 is formed to compose a flat portion 31, eyeglass-shaped resilient clamp 32 that is bent towards the inside into a curved shape on the right and left sides, and tab 31a that is formed towards the outside from the above-mentioned flat portion 31. Furthermore, gaps d between the ends of resilient clamps 32 and flat portions 31 is made to be slightly wider than the thickness between the above-mentioned terminal plates 12 and blade terminals 21 so that clamps 32 are able to resiliently clamp said terminal plates 12 and blade terminals 21 when inserted. In addition, connection terminals 3 are made to of a size that

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enables them to fit inside the above-mentioned recesses 11c of housing 11.

Then connection terminals 3 composed in the manner described above are fit into the above-mentioned recesses 11c of housing 11, tabs 31a formed in flat portions 31 are fixed in place as a result of engaging with depressions 11f formed in recesses 11c. In addition, when connection terminals 3 are fit into recesses 11c, terminal plates 12 are inserted between flat portions 31 and resilient clamps 32.

Furthermore, fixing of connection terminals 3 in recesses 11c is not only performed by engaging the above-mentioned tabs 31a with depressions 11f, but may also be performed by forming holes in flat portions 31, forming projections in recesses 11c, and engaging these projections in the holes of flat portions 31. Moreover, this fixing may also be performed by press fitting.

Next, the following provides an explanation of the method by which switch 1 is attached to blade terminals 21 of bus bars 2. When depressions 11c are inserted onto blade terminals 21 rising from an interior lamp unit and so forth (and the interval between the pair of blade terminals 21 is roughly equal to the interval between recesses 11c of housing 11), blade terminals 21 resiliently fit between terminal plates 12 and resilient clamps 32. Thus, blade terminals 21 and terminal plates 12 are fixed in a contact state.

When pushing lever 14 in switch 1 is pressed down in this state, the pair of bus bars 2 are electrically connected. In addition, when the pushing force on pushing lever 14 is released,

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the space between the pair of bus bars 2 becomes electrically open.

Effects of the Invention

As has been described above, since the present invention extends the ends of terminal plates, over which a resilient contact plate slides by the operation of an operating lever such as a pushing lever protruding from a housing, into recesses formed in said housing, connection terminals are fit into said recesses so that the ends of the terminal plates are resiliently clamped by resilient clamps, and the blade terminals of bus bars are inserted into the resilient clamps of these connection terminals, since said blade terminals are resiliently clamped with said terminal plates, connection of the switch and the bus bars can be performed without the use of a connecting means such as welding, thus simplifying the work process since the work time required for connecting the two components is shortened and the two components can be disconnected easily.

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CLAIMS:

1. A switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.
2. A switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming holes in the inside wall of said recesses of said housing and engaging tabs on the flat portions of said connection terminals within said holes.
3. A switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming projections on the inside wall of said recesses of said housing and engaging said projections in holes in the flat portions of said contact terminals.

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ABSTRACT

SWITCH

A switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.

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FIG. 1

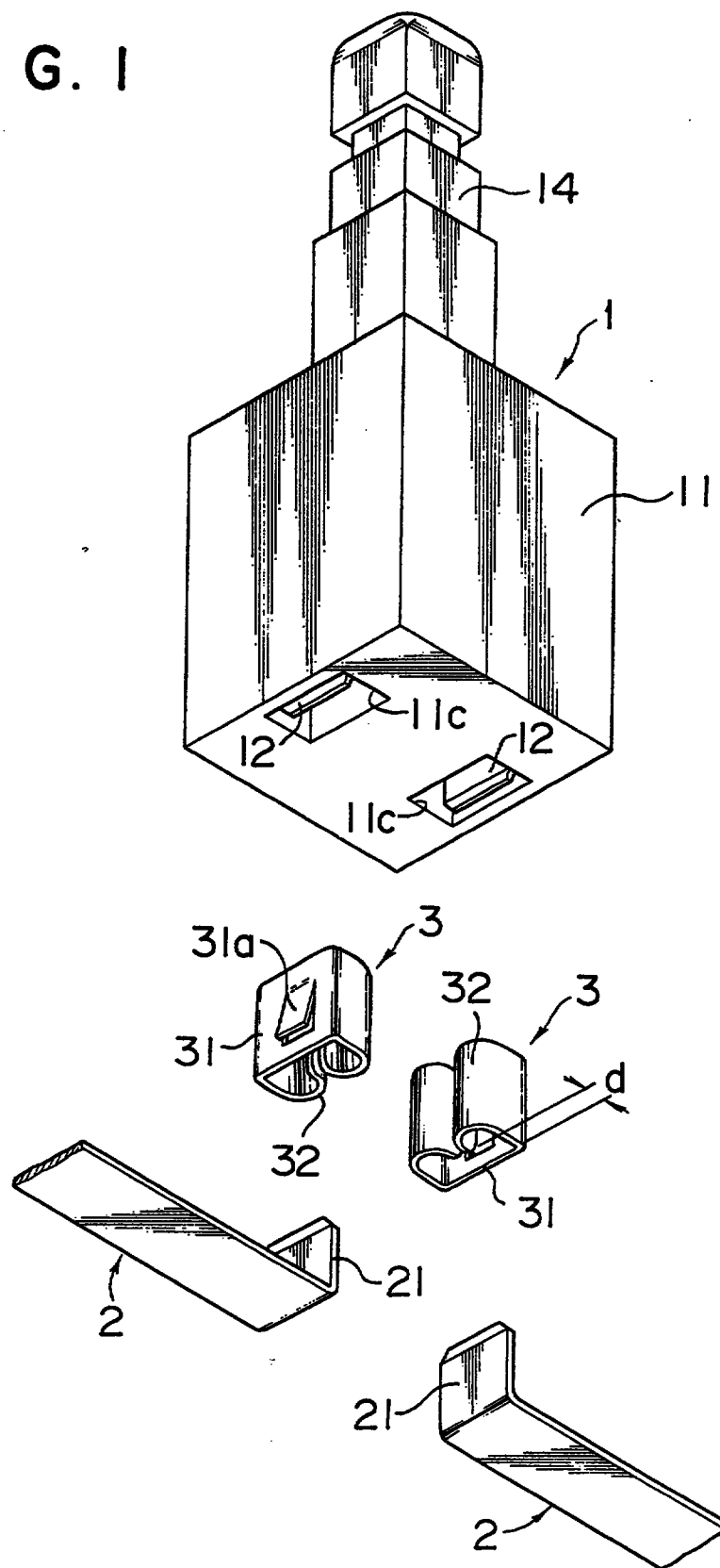


FIG. 2

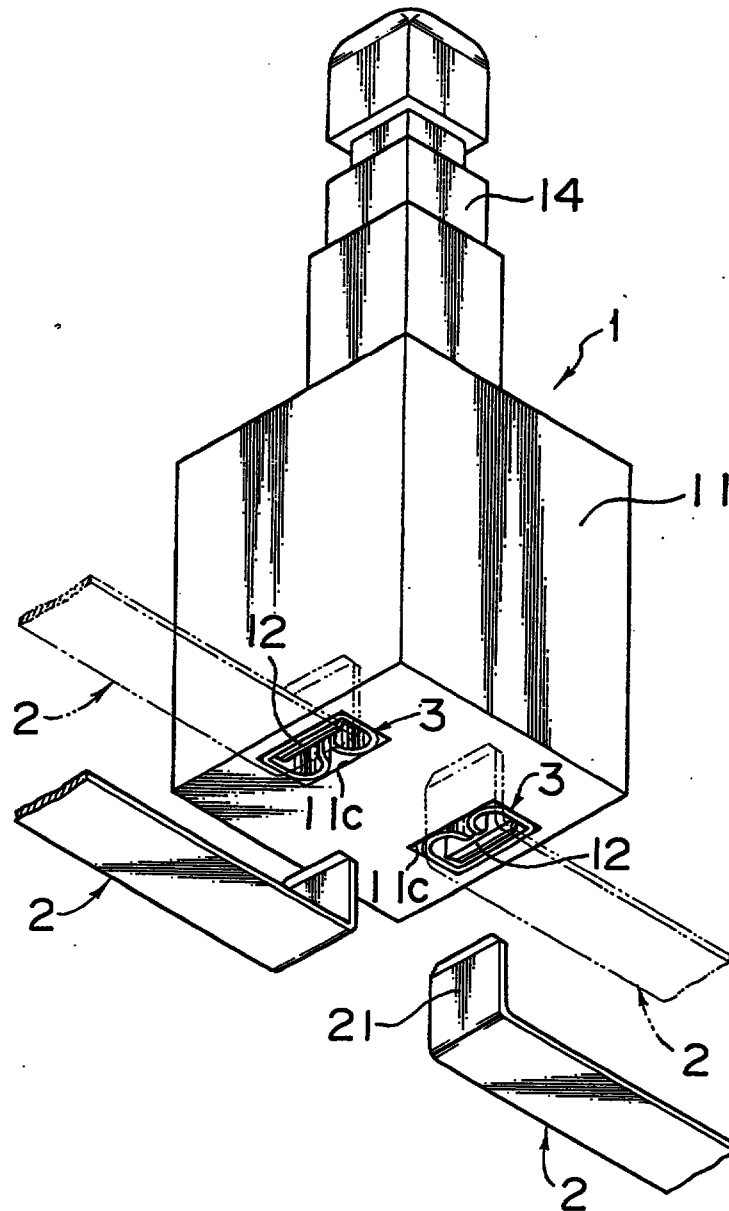


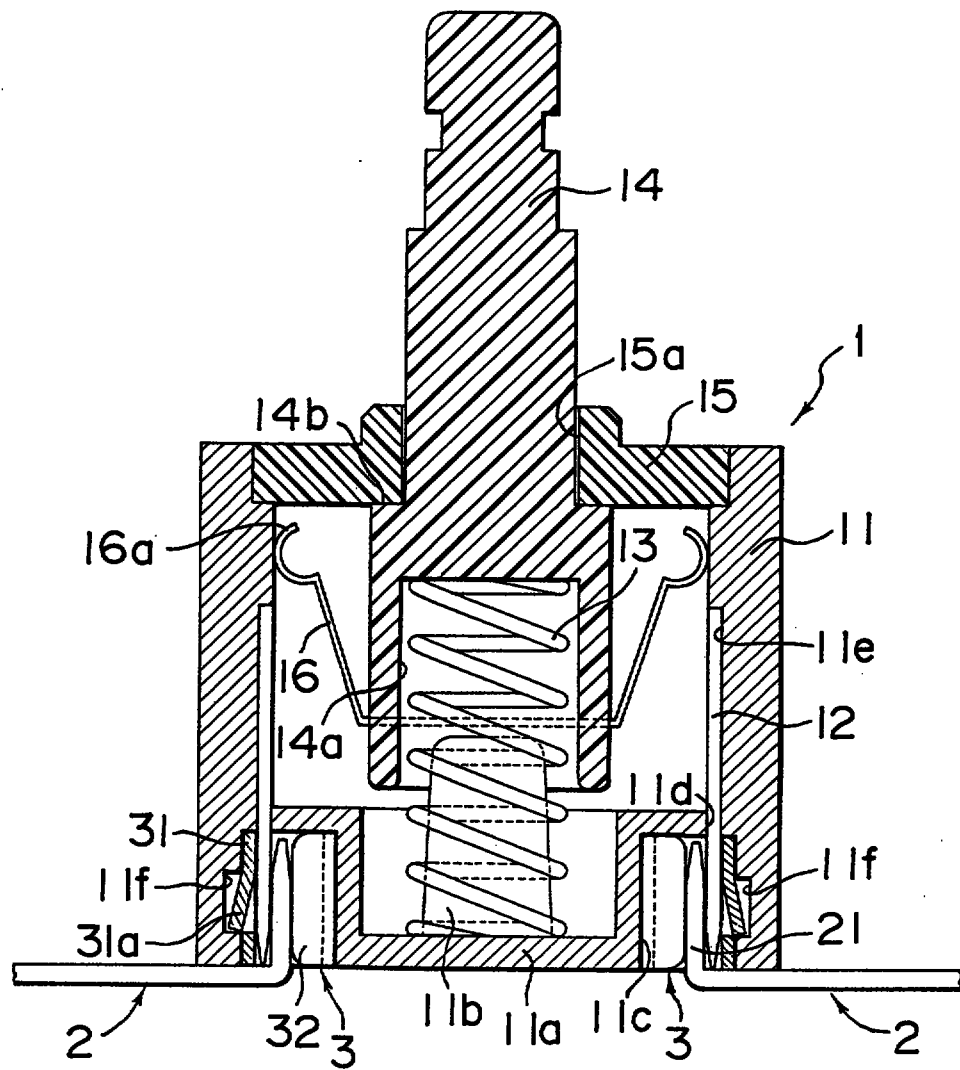
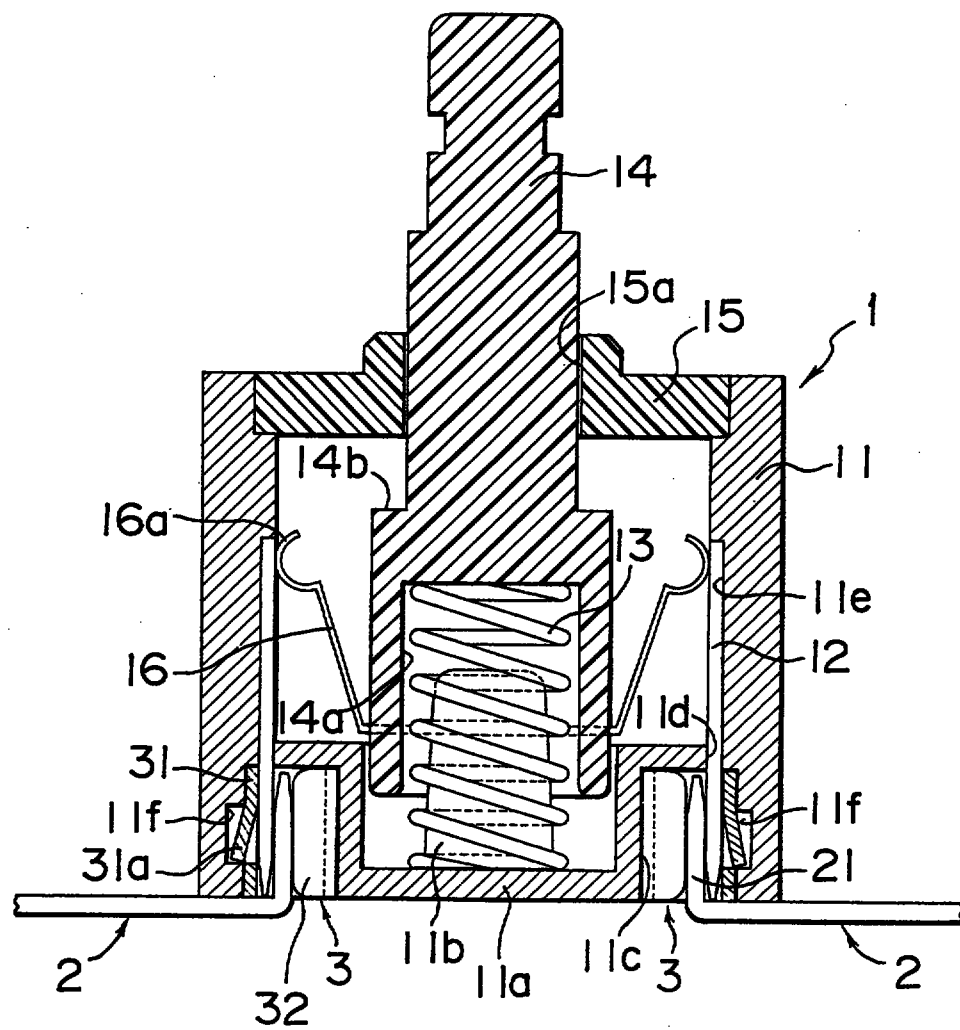
FIG. 3

FIG. 4



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Background of the Invention

Field of the Invention

The present invention relates to a switch that incorporates resilient clamps for directly connecting with the blade terminals of bus bars in the housing of a switch such as a push-button switch.

Description of the Prior Art

In the past, in order to connect a switch with a circuit on an insulated base, the switch and circuit were connected by inserting the female connector of a lead wire, of which one end was soldered to the circuit on the insulated base, onto a lead plate of a switch attached to an attached body such as a panel. In the switch connecting structure of the prior art as described above, the number of work processes was large due to having a process in which the switch is mounted to the attached body, and a process in which the female connector connected with the lead of said switch is soldered to an insulated base by means of a lead wire. This resulted in the problems of requiring additional time for assembly as well as contributing to increased labor costs.

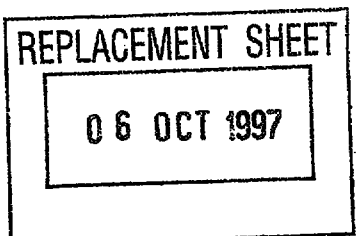
Summary of the Invention

In order to solve the above-mentioned problems, the object of the present invention is to provide a switch connecting structure

that is able to shorten work time and lower labor costs by enabling a switch to be directly attached to a bus bar formed on an insulated base.

In order for the switch connecting structure of the present invention to achieve the above-mentioned object, the means described in claim 1 consists of a switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.

In addition, the means described in claim 2 composes a switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming holes in the inside wall of said recesses of said housing and engaging tabs on the flat portions of said connection terminals within said holes. In addition, the means described in claim 3 composes a switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming projections on the inside wall of said recesses of said housing and engaging said projections in holes in the flat portions of said contact terminals.



Brief Description of the Drawings

Fig. 1 is an exploded perspective view showing a first embodiment as claimed in the switch connecting structure of the present invention.

Fig. 2 is a perspective view of the assembled state of the above.

Fig. 3 is a cross-sectional view of the switch in the off state.

Fig. 4 is a perspective view of the switch in the on state.

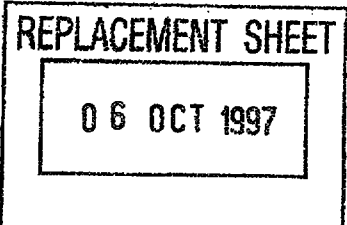
Description of the Preferred Embodiment

The following provides an explanation of the form of one embodiment of the switch as claimed in the present invention with reference to Fig. 1 through Fig. 4.

In the drawings, reference numeral 1 indicates a switch such as a push-button switch, seesaw switch or slide switch, and as shown in Figs. 3 and 4, indicates a push-button switch in this embodiment. Furthermore, this push-button switch 1 is used, for example, as a switch for turning on and off the interior lamp unit installed on the roof of an automobile interior.

The following provides a detailed explanation of switch 1. Reference numeral 11 indicates a bottomed housing, projection 11b projects toward the inside from the center of bottom 11a, and together with mutually facing insertion holes 11c being formed, slots 11d are formed in each recess 11c.

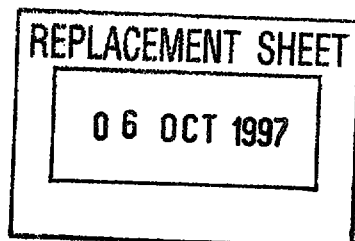
Reference numeral 12 indicates a pair of terminal plates that are press fit into grooves 11e formed in the inside wall of



housing 11 from the above-mentioned holes 11d, the ends of which extend into the above-mentioned recesses. Reference numeral 13 indicates a spring of which one end is inserted onto the above-mentioned projection 11b. Reference numeral 14 indicates a pushing lever in which the other end of spring 13 is inserted into hole 14a, and protrudes from through hole 15a of cover plate 15 fixed on the open end of said housing 11. Reference numeral 16 is an resilient contact plate bent roughly into the shape of the letter "U" that is attached to the above-mentioned pushing lever 14, both ends of which have contacts 16a formed into a curved shape.

Next, the following provides an explanation of the operation of the above-mentioned switch 1. In Fig. 3, pushing lever 14 is pushed up by the spring force of spring 13 and is stopped as a result of ledge 14b of said pushing lever 14 making contact with cover plate 15. Thus, since contacts 16a of resilient contact plate 16 are positioned away from terminal plates 12 in this state, the space between the pair of terminal plates 12 is electrically off.

In the above-mentioned state, when pushing lever 14 is pushed down in opposition to the spring force of spring 13, contact plate 16 lowers as shown in Fig. 4 causing contacts 16a to make contact with terminal plates 12. Consequently, the space between the pair of terminal plates 12 is electrically on. If this type of switch 1 was to be installed, for example, on the chassis of an automobile with the door closed, switch 1 would enter the on state when the door was opened.



Furthermore, although the switch shown in the drawings only enters the on state when pushing lever 14 is pushed, it can be made into a locking push-button switch by incorporating a known locking mechanism. If this type of locking push-button switch 1 was to be used as, for example, a switch for turning on and off the interior lamp unit installed on the roof of an automobile interior, it could be used to turn the interior lamp on and off. Next, the following provides an explanation of a means of installing the above-mentioned switch 1 on an automobile chassis. Reference numeral 2 indicates a pair of bus bars fixed in an insulated state in a chassis (not shown) such as the interior lamp unit, and electrically connected to a lamp, the ends of which are bent at right angles to form blade terminals 21. Reference numeral 3 indicates connection terminals that connect terminal plates 12 and the above-mentioned blade terminals 21 in the above-mentioned switch. Each connection terminal 3 is formed to compose a flat portion 31, eyeglass-shaped resilient clamp 32 that is bent towards the inside into a curved shape on the right and left sides, and tab 31a that is formed towards the outside from the above-mentioned flat portion 31.

Furthermore, gaps d between the ends of resilient clamps 32 and flat portions 31 is made to be slightly wider than the thickness between the above-mentioned terminal plates 12 and blade terminals 21 so that clamps 32 are able to resiliently clamp said terminal plates 12 and blade terminals 21 when inserted. In addition, connection terminals 3 are made to of a size that

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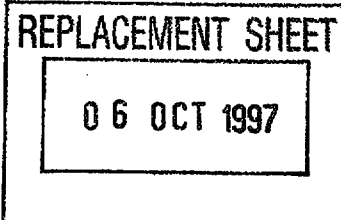
enables them to fit inside the above-mentioned recesses 11c of housing 11.

Then connection terminals 3 composed in the manner described above are fit into the above-mentioned recesses 11c of housing 11, tabs 31a formed in flat portions 31 are fixed in place as a result of engaging with depressions 11f formed in recesses 11c. In addition, when connection terminals 3 are fit into recesses 11c, terminal plates 12 are inserted between flat portions 31 and resilient clamps 32.

Furthermore, fixing of connection terminals 3 in recesses 11c is not only performed by engaging the above-mentioned tabs 31a with depressions 11f, but may also be performed by forming holes in flat portions 31, forming projections in recesses 11c, and engaging these projections in the holes of flat portions 31. Moreover, this fixing may also be performed by press fitting.

Next, the following provides an explanation of the method by which switch 1 is attached to blade terminals 21 of bus bars 2. When depressions 11c are inserted onto blade terminals 21 rising from an interior lamp unit and so forth (and the interval between the pair of blade terminals 21 is roughly equal to the interval between recesses 11c of housing 11), blade terminals 21 resiliently fit between terminal plates 12 and resilient clamps 32. Thus, blade terminals 21 and terminal plates 12 are fixed in a contact state.

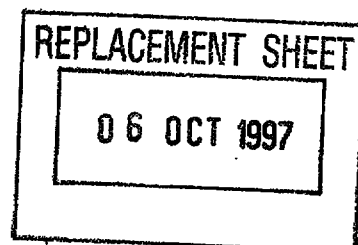
When pushing lever 14 in switch 1 is pressed down in this state, the pair of bus bars 2 are electrically connected. In addition, when the pushing force on pushing lever 14 is released,



the space between the pair of bus bars 2 becomes electrically open.

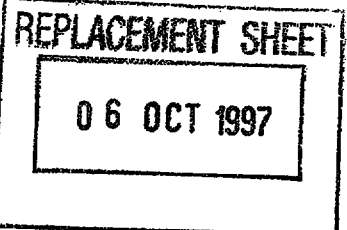
Effects of the Invention

As has been described above, since the present invention extends the ends of terminal plates, over which a resilient contact plate slides by the operation of an operating lever such as a pushing lever protruding from a housing, into recesses formed in said housing, connection terminals are fit into said recesses so that the ends of the terminal plates are resiliently clamped by resilient clamps, and the blade terminals of bus bars are inserted into the resilient clamps of these connection terminals, since said blade terminals are resiliently clamped with said terminal plates, connection of the switch and the bus bars can be performed without the use of a connecting means such as welding, thus simplifying the work process since the work time required for connecting the two components is shortened and the two components can be disconnected easily.



**CLAIMS:**

1. A switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.
2. A switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming holes in the inside wall of said recesses of said housing and engaging tabs on the flat portions of said connection terminals within said holes.
3. A switch as set forth in claim 1 wherein said connection terminals are fixed within said recesses of said housing by forming projections on the inside wall of said recesses of said housing and engaging said projections in holes in the flat portions of said contact terminals.



ABSTRACT

SWITCH

A switch comprising: a resilient contact plate that slides by operating an operating lever such as a pushing lever protruding from a housing; terminal plates over which said resilient contact plate slides that are attached so that the ends protrude into recesses formed in the bottom of said housing; and, contact terminals that fit into the recesses of said housing having resilient clamps that resiliently clamp the ends of said terminal plates extending into said recesses and blade terminals of bus bars rising from an insulated base.

(Figure 1)

