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H1N NQK N637 N649 N664 N712 N714 N854

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GB 1285455 A GB 0717919 A

(58) Field of Search
UK CL (Edition O) H1N NQK , H2E EEKE EEKH
INT CL^6 H01H 9/00 , H01R 11/09

(54) A switch for connection to a bus bar

(57) A switch structure comprising a switch (1) provided with a resilient contact plate that slides by operating an operating lever (13) such as a pushing lever protruding from a housing (11); bus bars (2) having blade terminals (21) rising from an insulated base; and, connection terminals (3) in which are formed resilient terminal plates (31) that are inserted into insertion holes (11c) of said housing (11) within the range over which the resilient contact plate of said switch (1) slides, and resilient clamps (32) integral with said terminal plates (31) that make contact with the blade terminals of said bus bars whereby the resilient contact plate, on engagement with the terminal plates (31), effects electrical continuity between the bus bars (2).

FIG. 1

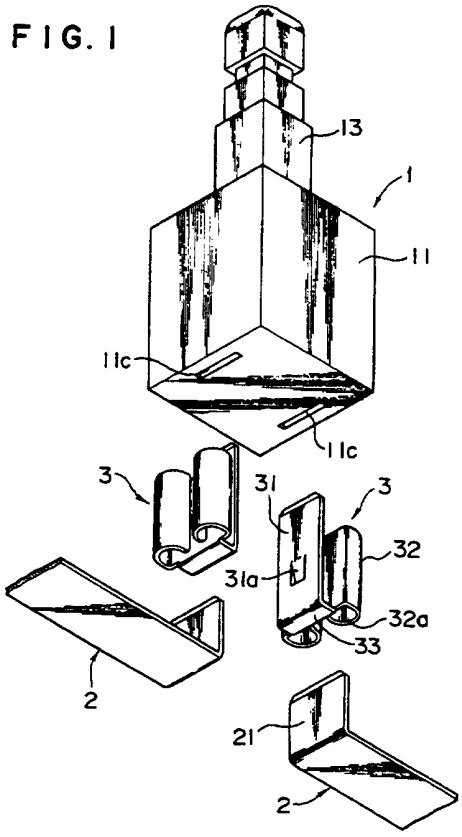

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FIG. 1

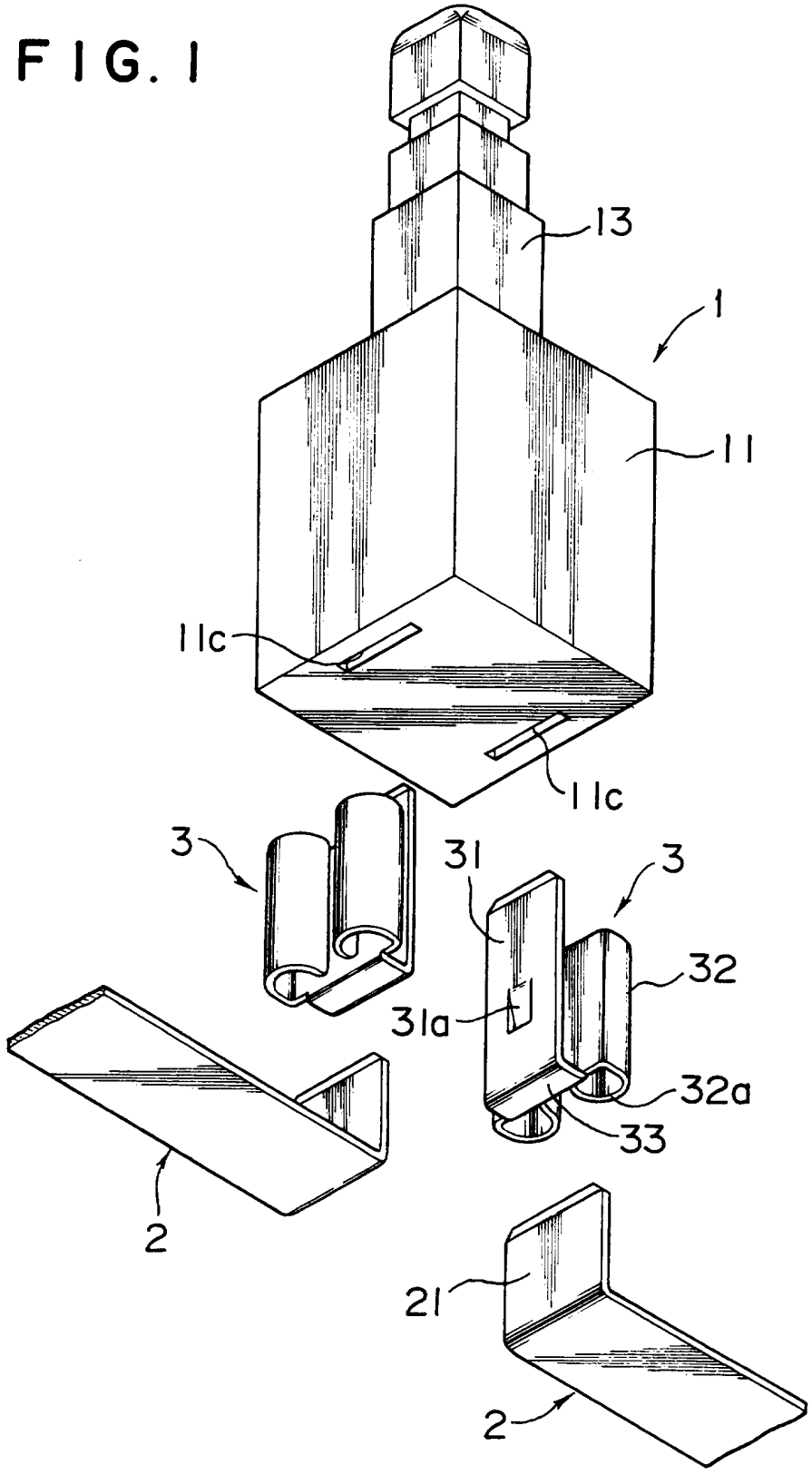


FIG. 2

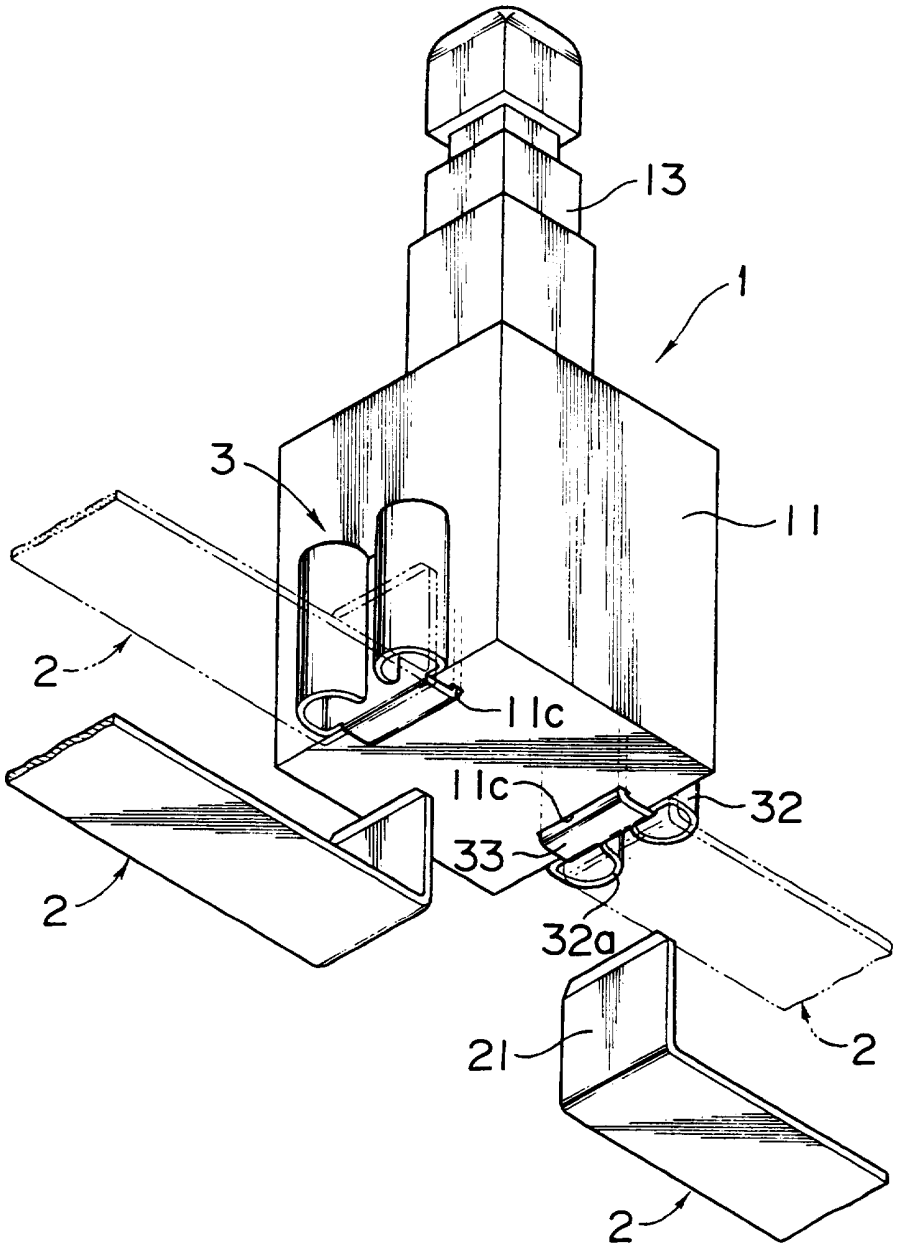


FIG. 3

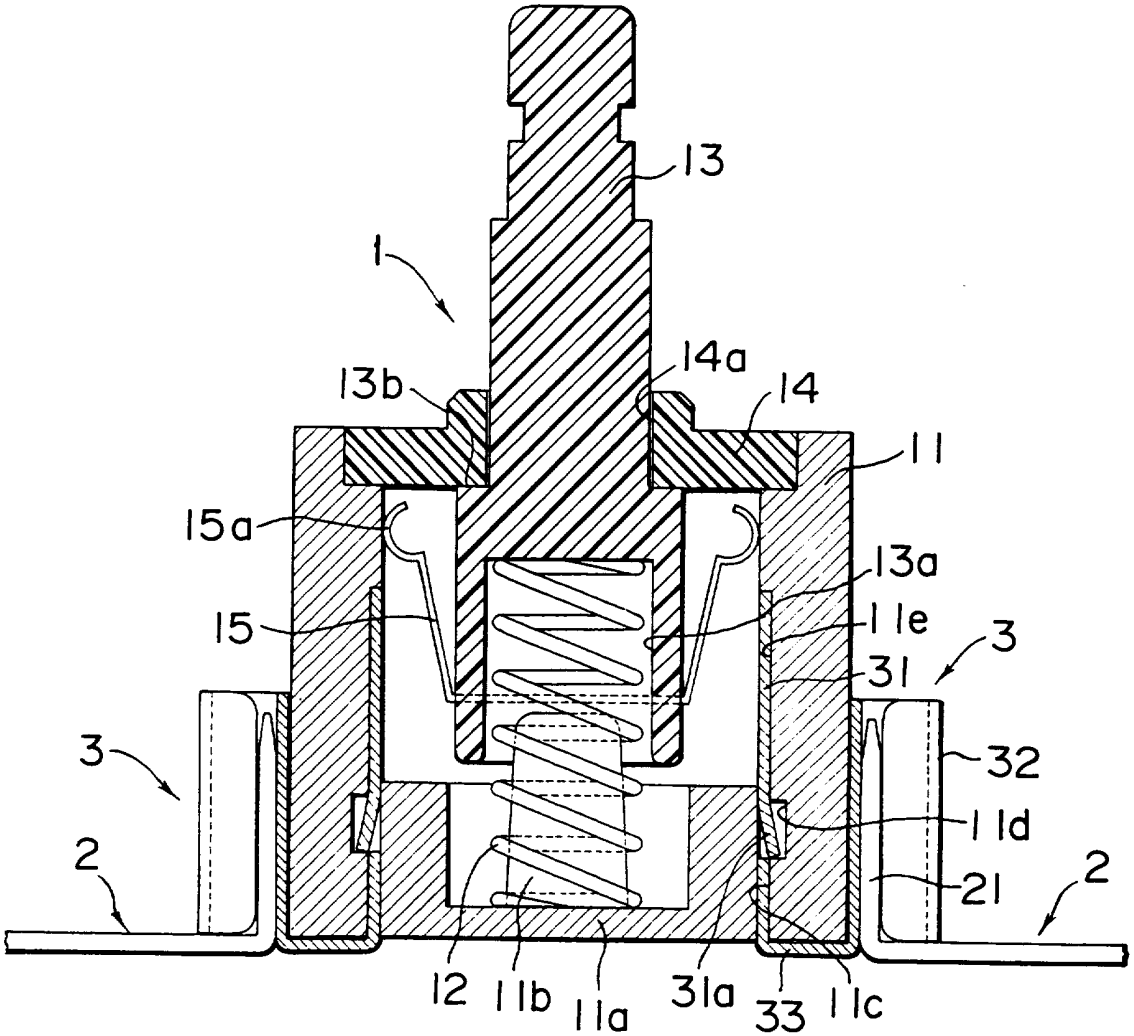

13
1
14a
13b
14
11
15a
13a
15
11e
3
31
3
32
11d
2
21
2
12
11b
11a
31a
33
11c

FIG. 4

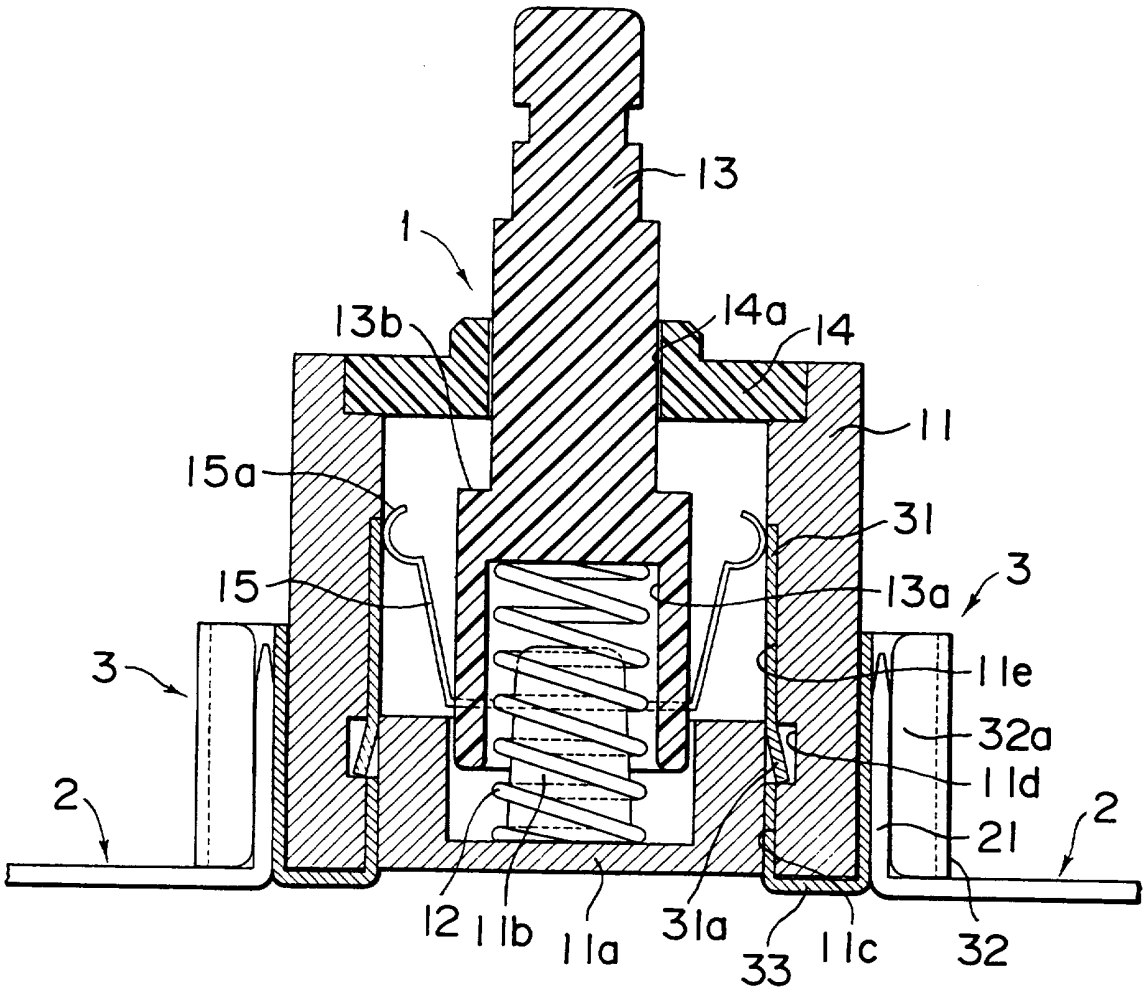

13
1
13b
14a
14
11
15a
31
15
13a
3
3
11e
32a
11d
2
21
2
12
11b
11a
31a
33
11c
32

FIG. 5

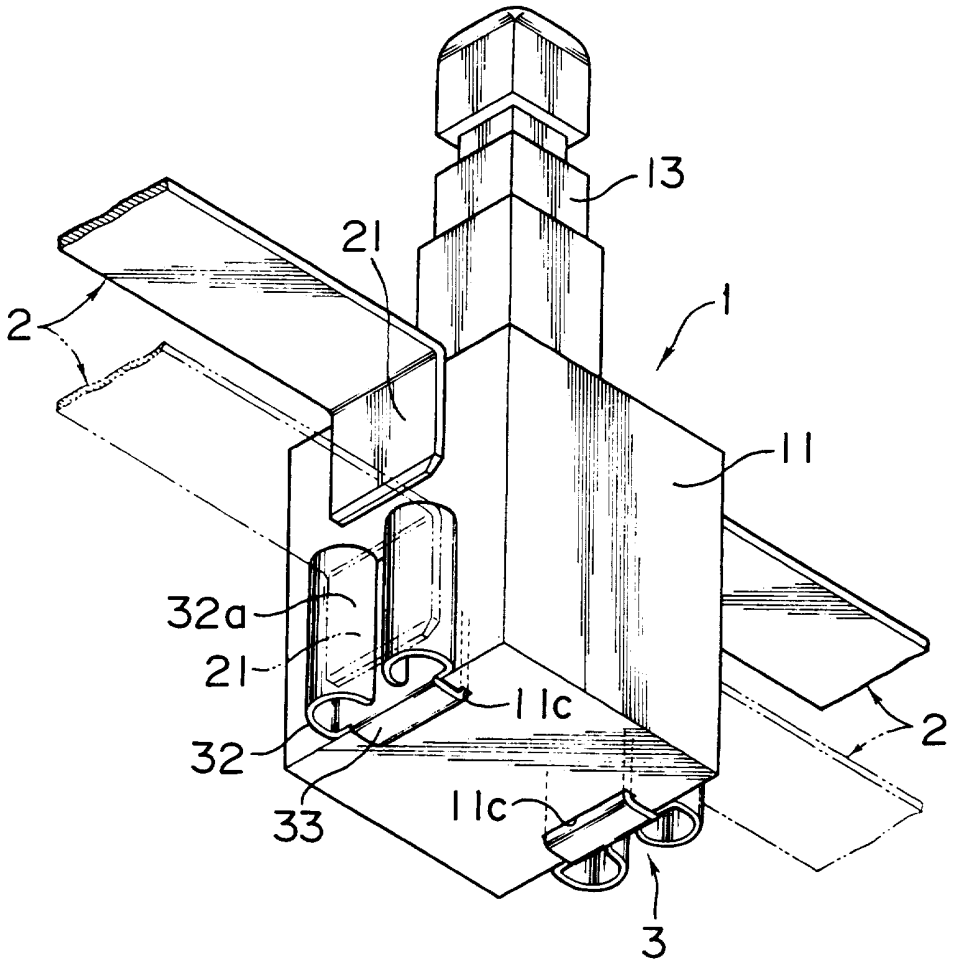


FIG. 6

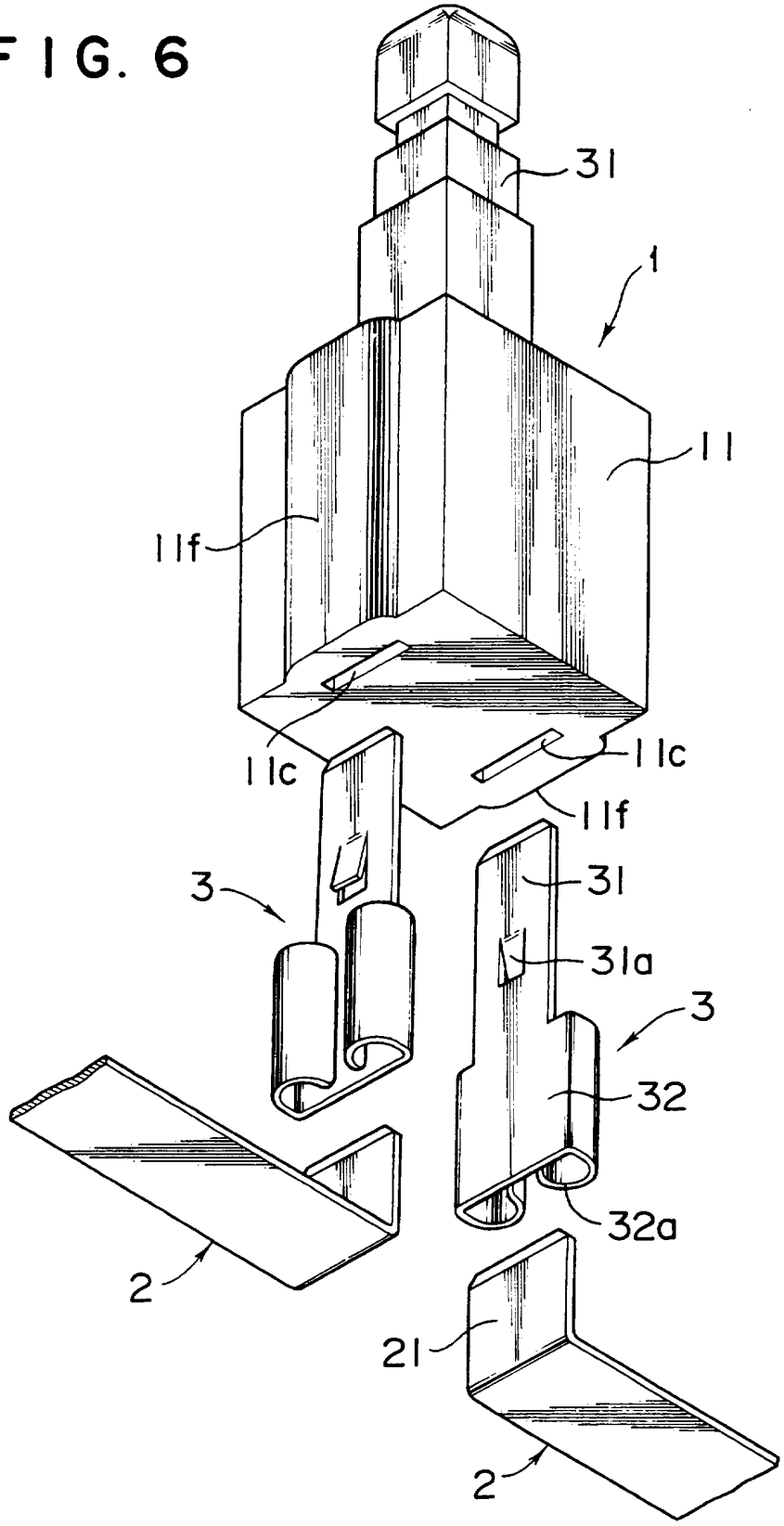


FIG. 7

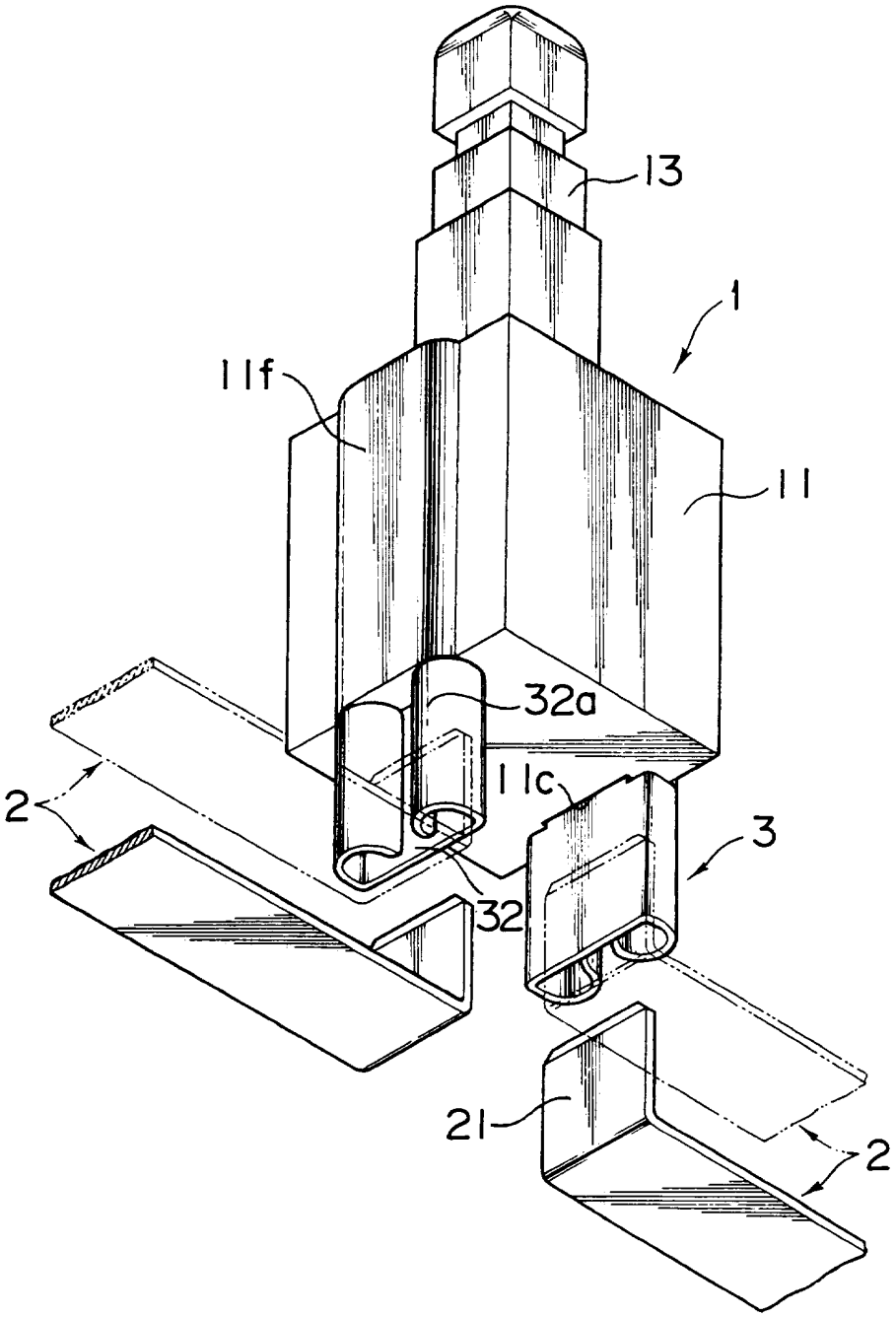


FIG. 8

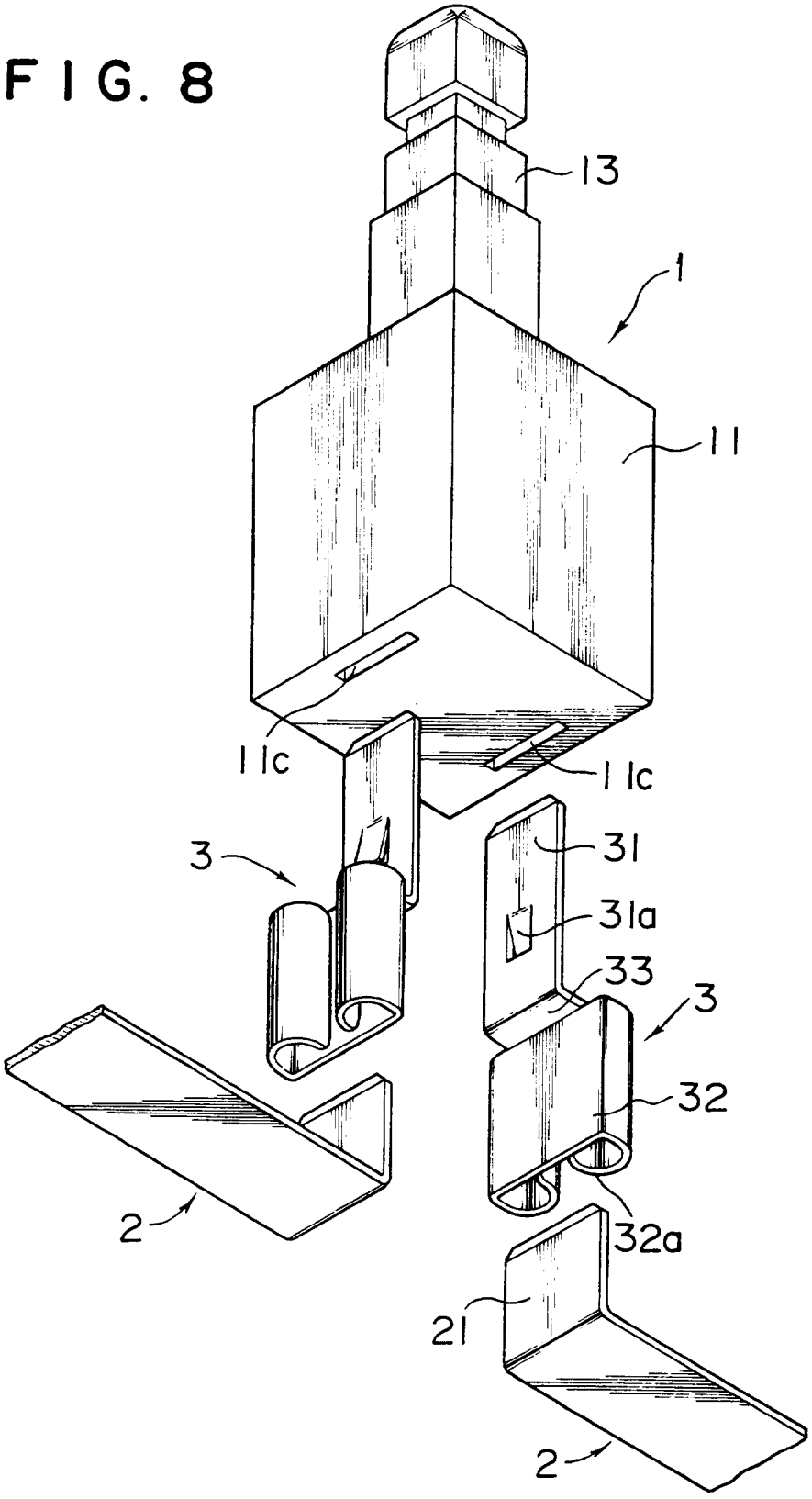
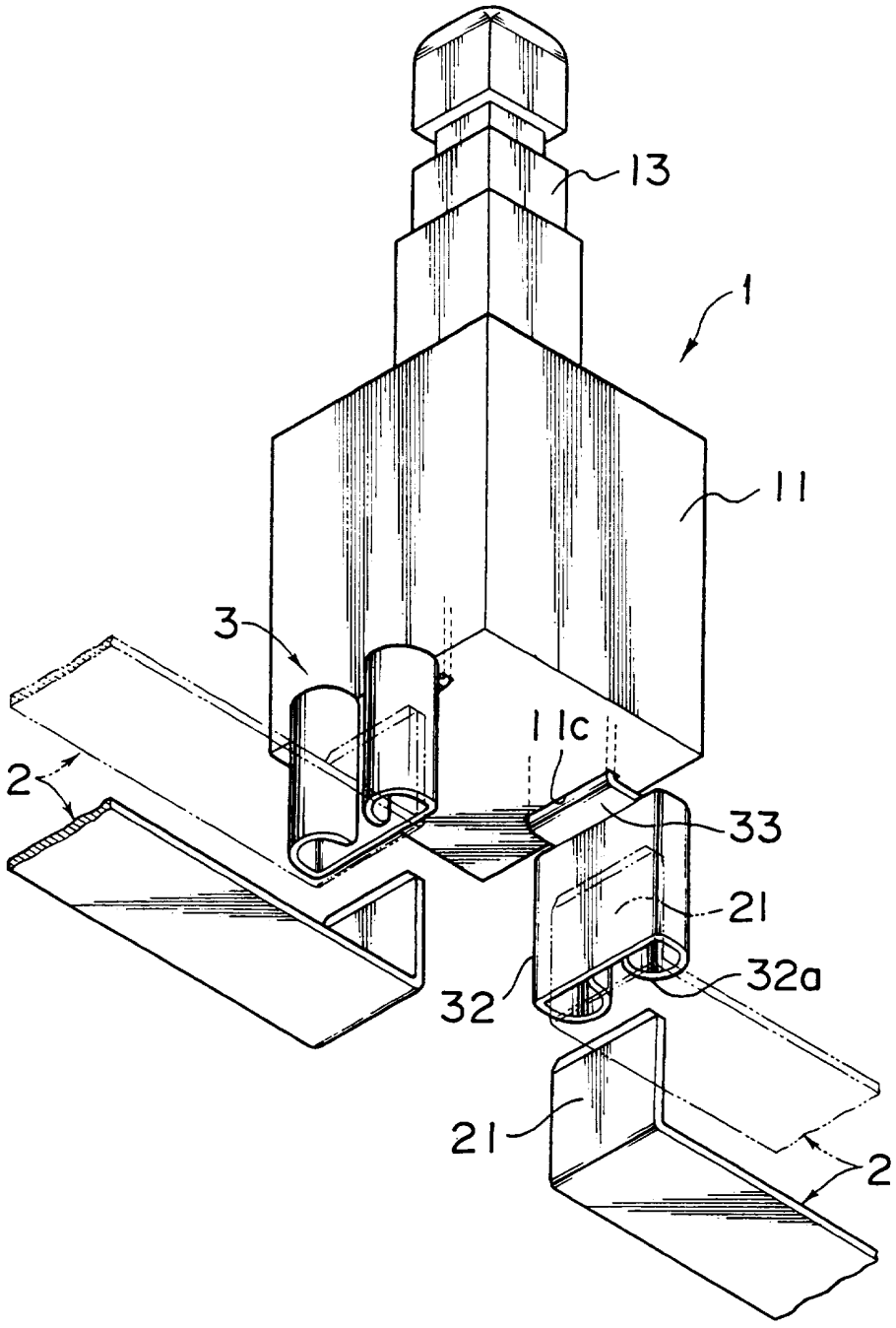


FIG. 9



A SWITCH STRUCTURE

The present invention relates to a switch structure and more particularly to such a structure enabling a switch, such as a push-button switch, to spaced contact blades, for example bus bars formed on an insulated base.

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 labour costs.

In order to solve the above-mentioned problems, it would be desirable to be able to provide a switch connecting structure that is able to shorten work time and lower labour costs by enabling a switch to be directly attached to a bus bar formed on an insulated base.

According to the present invention there is provided a switch structure for connection to a pair of spaced contact blades, the structure comprising an electrical switch including a housing from which extends an operating member, and a

resilient, electrically conductive contact plate slidable in the housing between a rest position and a displaced position on movement of the operating member, and a pair of insertion holes formed within the housing, the structure further comprising a pair of connection terminals each including a terminal plate resiliently retained in an associated insertion hole in the housing to extend into the path of movement of the contact plate between its rest position and its displaced position, and a resilient clamp to fit resiliently onto an associated one of the contact blades, whereby, on movement of the contact plate to its displaced position, said contact plate engages the terminal plates and effects electrical continuity between the contact blades.

In one embodiment of the invention, the resilient clamps are arranged in said connection terminals to be juxtaposed about the housing wall by means of a coupling between said terminal plates, while further recesses for containing said resilient clamps may be formed in said housing.

The terminal plates and the resilient clamps may be formed linearly in said connection terminals.

Alternatively, the terminal plates and the resilient clamps may be bent into an offset shape by means of a coupling in said connection terminals.

By way of examples only, embodiments of the invention will now be described in greater detail with reference to the accompanying drawings of which:

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.

Fig. 5 is an exploded perspective view in which the attachment direction of the bus bars has been changed.

Fig. 6 is an exploded perspective view showing a second embodiment of the present invention.

Fig. 7 is an exploded perspective view showing the assembled state of the above.

Fig. 8 is an exploded perspective view showing a third embodiment of the present invention.

Fig. 9 is an exploded perspective view showing the assembled state of the above.

The following provides an explanation of the form of one

embodiment of the switch connecting structure 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.

The following provides a detailed explanation of switch 1. Reference numeral 11 indicates a bottomed housing, projection 11b projects toward the inside from the centre of bottom 11a, and together with mutually facing insertion holes 11c being formed, recesses 11d are formed in a portion of the wall surface that composes each insertion hole 11c. Moreover, grooves 11e, which are continuous with said insertion holes 11c and into which terminals 31 of connection terminals 3 to be described later are engaged, are formed in the inside wall of housing 11.

Reference numeral 12 indicates a spring of which one end is inserted onto the above-mentioned projection 11b. Reference numeral 13 is a pushing lever in which the other end of spring 12 is inserted into hole 13a, and protrudes from through hole 14a of cover plate 14 fixed on the open end of said housing 11. Reference numeral 15 is an resilient contact plate bent roughly into the shape of the letter "U" that is attached to the above-mentioned pushing lever 13, both ends of which have contacts 15a formed into a curved shape.

Reference numeral 2 indicates a pair of bus bars attached to an insulated base and so forth in a chassis (not shown) and fixed in an insulated state, the ends of which are bent at

right angles to form blade terminals 21. Reference numeral 3 indicates connection terminals that are inserted into insertion holes 11c of the above-mentioned switch 1, and are composed of terminals 31 that fit into grooves 11e, resilient clamps 32 that fit into and are connected to blade terminals 21 of the above-mentioned bus bars 2, and couplings 33 that connect said terminals 31 and resilient clamps 32.

Tabs 31a are formed in the above-mentioned terminal plates 31 that engage with recesses 11d formed in the above-mentioned housing 11. In addition, the above-mentioned resilient clamps 32 are in the form of eyeglass-shaped terminals 32a bent towards the inside into a curved shape on the right and left sides. Blade terminals 21 enter inside terminals 32a are clamped in position. When terminals 31 of connection terminals 3 composed in the above-mentioned manner are inserted into insertion holes 11c of housing 11 in switch 1 in advance, and the ends of said terminal plates 31 make contact with the ends of grooves 11e, said connection terminals are locked in position due to tabs 31a of terminals 31 entering recesses 11d. In this state, resilient clamps 32 are fixed along the outer surface of housing 11 with couplings 33 bend into the shape of the letter "U" in between.

As a result of connection terminals 3 being attached in this manner, switch 1 is fixed to bus bars 2 by inserting terminals 32a of resilient clamps 32 onto plate terminals 21 of bus bars 2 fixed on an insulated base and so forth. At the time of this insertion, the interval between blade terminals 21 is naturally arranged to be equal to the interval between

resilient clamps 32.

Next, the following provides an explanation of the operation of the above-mentioned switch 1. In Fig. 3, pushing lever 13 is pushed up by the spring force of spring 12 and is stopped as a result of ledge 13b of said pushing lever 13 making contact with cover plate 14. Thus, since contacts 15a of resilient contact plate 15 are positioned away from terminals 31 of connection terminals 3 in this state, the space between the pair of bus bars 2 is electrically off.

In the above-mentioned state, when pushing lever 13 is pushed down in opposition to the spring force of spring 12, contact plate 15 lowers as shown in Fig. 4 causing contacts 15a to make contact with terminals 31. Consequently, the space between the pair of bus bars 2 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 13 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. Furthermore, although blade terminals 21 of bus bars 2 are shown to be inserted and from the bottom of housing 11 in switch in the above-mentioned embodiment, switch 1 and bus bars 2 may also be connected by inserting from the side of

pushing lever 13 as shown in Fig. 5.

Although resilient clamps 32 are positioned along the outside of housing 11 in the above-mentioned embodiment, the ends of the switch can be prevented from being exposed by increasing the width in the horizontal direction of housing 11 (to the left and right in Figs. 3 and 4), forming holes to contain resilient clamps 32 in the widened portion, and containing resilient clamps 32 in these holes.

In addition, Figs. 6 and 7 indicate another embodiment of the present invention. In contrast to the above-mentioned two embodiments having terminals 31 and resilient clamps 32 bent in the same direction with coupling 33 in between, in the present embodiment, terminals 31 and resilient clamps 32 are arranged linearly with coupling 33 in between. In addition, in this embodiment, ribs 11f are formed on a portion of the outside of housing 11, and a portion of resilient clamps 32 are able to be placed on these ribs 11f.

When resilient clamps 32 are placed on the above-mentioned ribs 11f in this manner, resilient clamps 32, which protrude from housing 11, are fixed in a stable state. Moreover, this enables the switch to be used even in locations in which the interval between blade terminals 21 of bus bars 2 and housing 11 is long, or housing 11 and bus bars 2 are in such close proximity that they cannot be attached.

Figs. 8 and 9 further indicate another embodiment of the present invention. In contrast to the above-mentioned embodiment shown in Figs. 6 and 7 having terminals 31 and resilient clamps 32 formed linearly, in the present embodiment,

couplings 33 are bent at a right angle causing terminals 31 and resilient clamps 32 to be offset from each other. In this case, since couplings 33 are placed on the upper surface of housing 11 and second resilient clamps 32 are placed on extensions, switch 1 can be fixed to bus bars 2 in a stable state even without ribs 11f as in the previous embodiment.

Furthermore, regardless of the shape of connection terminals 3 in each of the above-mentioned embodiments, what is important is that terminal 31 and resilient clamp 32 be formed on one connection terminal 3, so that terminals 31a are inserted into housing 11 and serve as switch contacts, and terminals 32a of resilient clamps 32 engage and are clamped in blade terminals 21 of bus bars 2.

As has been described above, since the present invention forms insertion holes in a switch provided with a resilient contact plate that slides by operating an operating lever such as a pushing lever that protrudes from a housing, fits terminal plates through said insertion holes within the range over which said resilient contact plate slides, and resiliently engages and clamps resilient clamps formed into a single unit with these terminals plates in blade terminals of bus blades, 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.

In addition, by forming terminal plates and resilient clamps linearly, the interval between the bus bars and switch

can be increased thus enabling variation to be obtained in the manner in which the state is attached. Moreover, by bending the couplings to offset the terminal plates and resilient clamps, said couplings are placed on the housing, thus enabling the connection terminals to be fixed to the switch in a stable manner, and offering the advantage of preventing the switch from being deformed with respect to the bus bars.

CLAIMS

1. A switch structure for connection to a pair of spaced contact blades, the structure comprising an electrical switch including a housing from which extends an operating member, and a resilient, electrically conductive contact plate slidable in the housing between a rest position and a displaced position on movement of the operating member, and a pair of insertion holes formed within the housing, the structure further comprising a pair of connection terminals each including a terminal plate resiliently retained in an associated insertion hole in the housing to extend into the path of movement of the contact plate between its rest position and its displaced position, and a resilient clamp to fit resiliently onto an associated one of the contact blades, whereby, on movement of the contact plate to its displaced position, said contact plate engages the terminal plates and effects electrical continuity between the contact blades.

2. A switch structure as claimed in claim 1 in which, each resilient clamp is interconnected with the associated terminal plate by means of a coupling and whereby the resilient clamps are positioned relative to the housing.

3. A switch structure as claimed in claim 1 or claim 2 in which further recess for containing the resilient clamps are formed in the housing.

4. A switch structure as claimed in claim 1 in which, for each connection terminal, the terminal plate and the resilient clamp extend linearly relative to one another.

5. A switch structure as claimed in claim 1 in which, the terminal plate and the resilient clamp of each connection terminal are interconnected by a coupling to be linearly offset relative to one another.

6. A switch structure as claimed in any one of claims 1 to 5 in which each terminal plate includes a resilient tab projecting outwardly therefrom and received within a corresponding indent in the housing to locate and retain the associated connection terminal on the housing.

7. A switch structure substantially as described with reference to and as illustrated by the accompanying drawings.

The Patent Office

12

Application No: GB 9718115.0 **Examiner:** Paul Nicholls
Claims searched: 1 - 7 **Date of search:** 10 November 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H1N (NQK); H2E (EEKE, EEKH)

Int Cl (Ed.6): H01H 9/00; H01R 11/09

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1,285,455 A (DIAMOND) - See figure 4	1
A	GB 717,919 A (GREGG) - See figure 6	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.