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(54) **ELECTRICAL CONNECTOR**

(57) An electrical connector comprises two bases (1), a soldering terminal (2) fixed in each base (1), an elastic plate (3) including a free end (311) and a fixing end (321), and a button (4) the bottom of which is arranged against the free end (311), the soldering terminal (2) includes a current-carrying main plate (21), a supporting plate (22) and a resisting flange (23) which is arranged against the top of the free end (311) of the elastic plate

(3); and two welding feet (24) formed on the bottom of the soldering terminal (2) which respectively locate at two sides of the supporting plate (22) and stagger fore and aft. In this invention, the current-carrying area of the soldering terminal is large, it can increase the electrical conductivity. Moreover, the welding feet can enlarge the creep distance, the value of permissible voltage of the electrical connector can be increased, and the electric strength of the manufacture can be improved further.

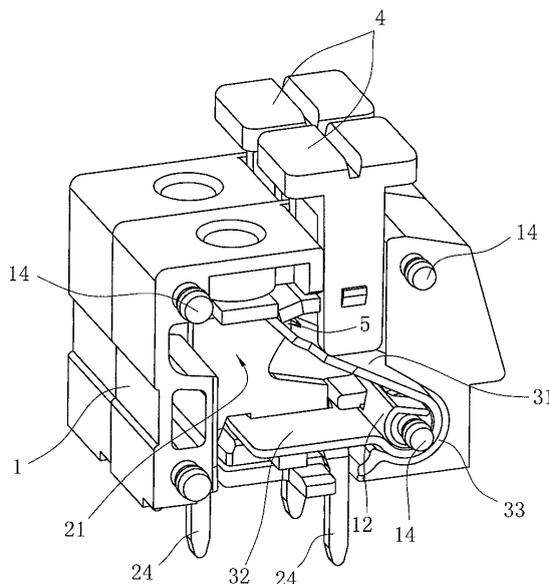


Fig. 4

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**Description****Field of the invention**

**[0001]** The present invention relates to a kind of electrical connector, in particular, to a kind of electrical connector used on lamp ballasts.

**Description of the Prior Art**

**[0002]** An electrical connector (a connector for a terminal block) usually is used in different electrical equipment as a node for electrical connection of a circuit. A common electrical connector is often equipped with a USB interface, when using, a wire is directly inserted into the interface so as to realize the electrical connection of a circuit.

**[0003]** According to various sites in actual applications, the structures and the wiring methods of various electrical connectors (connectors for terminal blocks) are also different. For example, the prior Chinese patent ZL200820088329.8 (Publication No. CN201207440Y) titled 'a connector for a terminal block with rapid wiring', disclosed such kind of connector, which comprises an insulated housing and at least a conducting interface disposed in the insulated housing and used for connecting a bare end of a wire. The patent is characterized in the conducting interface includes a soldering terminal and an elastic plate. The soldering terminal is equipped with a rectangular closed frame and a welding foot fixed at the lower portion of the closed frame. The elastic plate is U-shaped and equipped with a fixing end and a free end. The fixing end has a groove matching with the frame rim of the closed frame and enclosed the whole elastic plate in the closed frame. The free end of the elastic plate has a crimping foot bended downward. In the patent, the connector has an elastic plate with a fixing end and a free end, the elastic plate locates within the soldering terminal with a closed frame, and the free end of the elastic plate can be equipped with the crimping foot bended downward. Therefore, when the bare end of the wire is inserted into the conducting interface through the gap between the free end and the frame rim of the closed frame, the bare end of the wire will be clipped under the crimping foot under the effect of the elastic force of the elastic plate.

**[0004]** However, in the above stated patent, the main body of the soldering terminal main body has a rectangular hole. The welding foot is connected with the lower portion of the soldering terminal, while the elastic plate locates in the rectangular hole of the main body of the soldering terminal to make the elastic plate relatively fixed with the soldering terminal. As the soldering terminal has the rectangular hole, the current-carrying area is relatively small and the conductivity of the connector is relatively week. Moreover, as the elastic plate should locates in the rectangular hole of the soldering terminal, it will enlarge the manufacture difficulties and also make

the installation not easy if it is necessary to ensure the width of the rectangular hole matching with the width of the elastic plate.

**Summary of the invention**

**[0005]** It is an object of the present invention to provide an electrical connector with a soldering terminal which has a large current-carrying area behaving good electrical conductivity.

**[0006]** For achieving the above stated object, the electrical connector comprising:

at least two insulated bases jointing with each other, each base provided with a connecting hole for a wire to be inserted in;

a soldering terminal fixed in each base, which is used for the wire electric connecting with a circuit board; an elastic plate disposed on the soldering terminal, including a free end which tends to be arranged against the soldering terminal and a fixing end arranged on the soldering terminal; and

a button disposed on the upper portion of each base, the bottom of the button arranged against the free end of the elastic plate;

**characterized in that** the soldering terminal includes a current-carrying main plate, a supporting plate protruding outward on the lower portion of the current-carrying main plate which is arranged against the bottom of the fixing end of the elastic plate, and a resisting flange formed by folding outward the upper edge of the current-carrying main plate which is arranged against the top of the free end of the elastic plate;

the current-carrying main plate, the supporting plate and the resisting edge form the soldering terminal with a C-shaped transverse section;

and two welding feet formed on the bottom of the soldering terminal which respectively locate at two sides of the supporting plate and stagger fore and aft.

**[0007]** In order to improve the clamping force of the elastic plate, preferably, the transverse section of the spring plate is V-shaped, and the elastic plate includes a first side whose end refers to the free end, a second side whose end refers to the fixing end and a circular arc portion connecting the first side and the second side, a locating pin extending vertically outward is formed on the inner wall of each base and matches with the dimension of the circular arc portion. As the first side and the second side of the elastic plate form a V-shaped structure, compared with the U-shaped elastic plate, the distance between the free end and the fixing end of the V-shaped elastic plate is larger, so that the clamping force of the elastic plate becomes larger which can make the usage more reliable.

**[0008]** In order to make the connection between the elastic plate and soldering terminal more rapid and con-

venient, preferably, the edge of the second side of the elastic plate is provided with a square slot, the current-carrying main plate of the soldering terminal is provided with a gap at the side nearby the supporting plate for the fixing end to insert in, the gap and the lower portion of the current-carrying main plate form into a kidney-shape portion which matches with the dimension of the square slot and is provided for the square slot of the elastic plate to locate on, so as to make the fixing end of the elastic plate to connect with the soldering terminal. When assembling, only if the square slot of the second side of the elastic plate is aligned with the kidney-shape portion of the current-carrying main plate of the soldering terminal, the elastic plate can then be clamped on the soldering terminal. It makes the structure simple and makes the assembly and disassembly very convenient accordingly.

**[0009]** In order to make the electrical connection of the circuits between the adjacent bases more rapid and convenient, preferably, each base has a through hole formed nearby the bottom of each base and provided for one of two pins of a connecting bridge ware to insert in, a side plate extending vertically outward is formed on the side wall of the current-carrying main plate at the position corresponding to the through hole, the side plate has a hole aligning with the through hole for one of two pins of the connecting bridge ware to insert in. Therefore, only if one pin of a connecting bridge ware inserts into the through hole in one base and the aligned hole on the side plate of the corresponding soldering terminal, and the other pin of the connecting bridge ware inserts into the through hole in the adjacent base and the aligned hole on the side plate of the corresponding soldering terminal, then the welding foots between two adjacent bases will connect in series. Moreover, the connecting bridge ware can be designed and manufactured separately, which can increase the processing efficiency and be separate replaced in case of damage. If the series circuit is unnecessary, the connecting bridge ware can be just pulled out, it is convenient for the usage.

**[0010]** In order to make the inserting and fixing of the wire more easy, preferably, the free end of the elastic plate is tilted outward along the edge of the first side of the elastic plate, a triangle apex is formed at the bottom of the resisting flange of the soldering terminal which is against the free end, moreover, the triangle apex has a guiding slope oppositely arranged to the connecting hole of each base, when the free end is against the triangle apex, the free end and the triangle apex form a V-shaped guiding mouth to make the wire be inserted easy. After the wire is inserted into the connecting hole of each base and the button is pressed down, the V-shaped guiding mouth formed by the free end and the triangle apex will open, then the wire can be easily inserted into the inner of each base from the V-shaped guiding mouth.

**[0011]** Compared with the prior art, in this invention, the soldering terminal is improved, that is, the main body of the prior soldering terminal with holes is now designed into a current-carrying main plate without holes, the sup-

porting plate and the resisting flange vertically arranged can ensure the locating of the elastic plate. As the soldering terminal includes a current-carrying main plate in an integral plane structure, the current-carrying area of the soldering terminal in the present invention is larger than that of the existing soldering terminal, which can increase the electrical conductivity accordingly. Moreover, the welding foots formed on the soldering terminal and staggered fore and aft can enlarge the creep distance, therefore, the value of permissible voltage of the electrical connector can be increased, and the electric strength of the manufacture can be improved further, resulting in better integral performance of the electrical connector.

### **Brief Description of the Drawings**

#### **[0012]**

FIG.1 is an exploded perspective view of an electrical connector in accordance with the first embodiment of the present invention.

FIG.2 is a perspective view of the soldering terminal in accordance with the first embodiment of the present invention.

FIG.3 is a perspective view of the soldering terminal connecting with the elastic plate in accordance with the first embodiment of the present invention.

FIG.4 is a perspective view of the electrical connector in accordance with the first embodiment of the present invention.

FIG.5 is an exploded perspective view of an electrical connector in accordance with the second embodiment of the present invention.

FIG.6 is a perspective view of the soldering terminal connecting with the connecting bridge ware in accordance with the second embodiment of the present invention.

FIG.7 is a transverse sectional view of FIG.6.

FIG.8 is a perspective view of the electrical connector in accordance with the second embodiment of the present invention.

### **Detailed Description of the Preferred Embodiment**

**[0013]** To enable a further understanding of the innovative and technological content of the invention herein, refer to the detailed description of the invention and the accompanying drawings below:

**[0014]** FIG.1~4 show the first preferred embodiment of the present invention.

**[0015]** In this embodiment, the electrical connector comprises two insulated bases 1 jointing with each other, each base 1 is provided with a connecting hole 15 for a wire to be inserted in;

a soldering terminal 2 fixed in each base 1, which is used for the wire electric connecting with a circuit

board;

an elastic plate 3 disposed on the soldering terminal 2, which includes a free end 311 which tends to be arranged against the soldering terminal 2 and a fixing end 321 connecting on the soldering terminal 2; and a button 4 disposed on the upper portion of each base 1, the transverse section of the button 4 is U-shaped, a crossbeam 11 is formed on each base 1 for the button 4 to insert, the bottom 41 of the button 4 is arranged against the free end 311 of the elastic plate 3, if the button 4 is pressed down, the button 4 can separate the free end 311 of the elastic plate 3 from the soldering terminal 2. Moreover, the button 4 with U-shaped transverse section can be in force balance while the button 4 is pressed down, it can make the usage reliable and easy accordingly.

In order to improve the clamping force of the elastic plate 3, the transverse section of the spring plate 3 is V-shaped, and the elastic plate 3 includes a first side 31 whose end refers to the free end 311, a second side 32 whose end refers to the fixing end 321 and a circular arc portion 33 connecting the first side 31 and the second side 32 which is helpful for the elastic plate 3 to be installed in each base 1. A locating pin 12 extending vertically outward is formed on the inner wall of each base 1 and matches with the dimension of the circular arc portion 33. The distance between the free end 311 and the fixing end 321 of the V-shaped elastic plate 3 becomes larger, so that the clamping force of the elastic plate 3 becomes larger which can make the usage more reliable.

**[0016]** The structure of the soldering terminal 2 of this embodiment is the main innovative portion of present invention. The soldering terminal 2 includes a current-carrying main plate 21 without holes for the elastic plate to insert in the current-carrying main plate 21 is an integral plane plate, the current-carrying area of the soldering terminal increases, which can increase the electrical conductivity accordingly.

**[0017]** Wherein a supporting plate 22 protrudes outward on the lower portion of the current-carrying main plate 21, which is arranged against the bottom of the fixing end 321 of the elastic plate 3. The upper edge of the current-carrying main plate 21 folds outward forming into a resisting flange 23 which is arranged against the top of the free end 311 of the elastic plate 3. Accordingly, the current-carrying main plate 21, the supporting plate 22 and the resisting edge 23 form the soldering terminal 2 with a C-shaped transverse section. In order to make the electrical conduction perfect, the free end 311 of the elastic plate 3 is tilted outward along the edge of the first side 31 of the elastic plate 3, a triangle apex 231 is formed at the bottom of the resisting flange 23 of the soldering terminal 2 which is against the free end 311, moreover, the triangle apex 231 has a guiding slope 232 oppositely arranged to the connecting hole 15 of each base 1, when

the free end 311 is against the triangle apex 231, the free end 311 and the triangle apex 231 form a V-shaped guiding mouth 5 to make the wire be inserted easy. After the wire is inserted into the connecting hole 15 of each base 1 and the button 4 is pressed down, the V-shaped guiding mouth 5 formed by the free end 311 and the triangle apex 231 will open, then the wire can be easily inserted into the inner of each base 1 from the V-shaped guiding mouth 5.

**[0018]** In order to make the connection between the elastic plate 3 and soldering terminal 2 more rapid and convenient, the edge of the second side 32 of the elastic plate 3 is provided with a square slot 322, the current-carrying main plate 21 of the soldering terminal 2 is provided with a gap 211 at the side nearby the supporting plate 22 for the fixing end 321 to insert in, the gap 211 and the lower portion of the current-carrying main plate 21 form into a kidney-shape portion 212 which matches with the dimension of the square slot 322 and is provided for the square slot 322 of the elastic plate 3 to locate on, so as to make the fixing end 321 of the elastic plate 3 to connect with the soldering terminal 2. When assembling, only if the square slot 322 of the second side 32 of the elastic plate 3 is aligned with the kidney-shape portion 212 of the current-carrying main plate 21, the elastic plate 3 can then be clamped on the soldering terminal 2. It makes the structure simple and makes the assembly and disassembly very convenient accordingly.

**[0019]** Additionally, two welding foots 24 are formed on the bottom of the soldering terminal 2 which respectively locate at two sides of the supporting plate 22 and stagger fore and aft. The welding foots formed on the soldering terminal and staggered fore and aft can enlarge the creep distance, therefore, the value of permissible voltage of the electrical connector can be increased, and the integral performance of the electrical connector becomes better.

**[0020]** In this embodiment, a cover 7 is disposed on the opening end of each base 1 to cover the opening of each base 1. To make the installation of the cover 7 on each base 1 more easy, four protrusions 14 for jointing the cover 7 are formed on the side wall of the opening end face of each base 1, wherein three of them are arranged on the side wall of the outer surface of each base 1 and the rest is arranged on the end of the locating pin 12. Correspondingly, four small holes 71 are arranged on the cover 7 for the corresponding protrusions 14 to insert in.

**[0021]** FIGS.5-8 show the second preferred embodiment of the present invention.

**[0022]** The difference of this embodiment compared with the first embodiment is that: each base 1 has a through hole 13 formed nearby the bottom of each base 1 and provided for one of two pins 61 of a connecting bridge ware 6 to insert in. The connecting bridge ware 6 generally is an electric conductor with two pins 61 to achieve rapid conduction of the circuits between two adjacent bases. A side plate 25 extending vertically outward

is formed on the side wall of the current-carrying main plate 21 at the position corresponding to the through hole 13, the side plate 25 has a hole 251 aligning with the through hole 13 for one of two pins 61 of the connecting bridge ware 6 to insert in.

**[0023]** When the rapid conduction of the circuits between two adjacent bases is required, only if each pin 61 of the connecting bridge ware 6 inserts into the through hole 13 on each base 1 and the aligned hole 251 on the side plate 25 of the corresponding soldering terminal 2, then the welding foots 24 between two adjacent bases 1 are connected through the connection bridge ware 6, so as to realize the rapid conduction of the circuits between the adjacent bases 1. When the connected circuits want to be cut off, just pull the connecting bridge ware 6 out of the through holes of the base 1, thus, the function of the electrical connector is consistent with the first embodiment, and the usage is very convenient. Moreover, as the connecting bridge ware 6 has no assembling relationship with the inner structure of the base 1, the connecting bridge ware 6 can be designed and manufactured separately, which can increase the processing efficiency and be separate replaced in case of damage.

## Claims

### 1. An electrical connector comprising:

at least two insulated bases (1) jointing with each other, each base (1) provided with a connecting hole (15) for a wire to be inserted in;

a soldering terminal (2) fixed in each base (1), which is used for the wire electric connecting with a circuit board;

an elastic plate (3) disposed on the soldering terminal (2), including a free end (311) which tends to be arranged against the soldering terminal (2) and a fixing end (321) arranged on the soldering terminal (2); and

a button (4) disposed on the upper portion of each base (1), the bottom of the button (4) arranged against the free end (311) of the elastic plate (3);

**characterized in that** the soldering terminal (2) includes a current-carrying main plate (21), a supporting plate (22) protruding outward on the lower portion of the current-carrying main plate (21) which is arranged against the bottom of the fixing end (321) of the elastic plate (3), and a resisting flange (23) formed by folding outward the upper edge of the current-carrying main plate (21) which is arranged against the top of the free end (311) of the elastic plate (3);

the current-carrying main plate (21), the supporting plate (22) and the resisting edge (23) form the soldering terminal (2) with a C-shaped transverse section;

and two welding foots (24) formed on the bottom of the soldering terminal (2) which respectively locate at two sides of the supporting plate (22) and stagger fore and aft.

2. The electrical connector of claim 1, wherein the transverse section of the spring plate (3) is V-shaped, and the elastic plate (3) includes a first side (31) whose end refers to the free end (311), a second side (32) whose end refers to the fixing end (321) and a circular arc portion (33) connecting the first side (31) and the second side (32), a locating pin (12) extending vertically outward is formed on the inner wall of each base (1) and matches with the dimension of the circular arc portion (33).

3. The electrical connector of claim 2, wherein the edge of the second side (32) of the elastic plate (3) is provided with a square slot (322), the current-carrying main plate (21) of the soldering terminal (2) is provided with a gap (211) at the side nearby the supporting plate (22) for the fixing end (321) to insert in, the gap (211) and the lower portion of the current-carrying main plate (21) form into a kidney-shape portion (212) which matches with the dimension of the square slot (322) and is provided for the square slot (322) of the elastic plate (3) to locate on, so as to make the fixing end (321) of the elastic plate (3) to connect with the soldering terminal (2).

4. The electrical connector of claim 1 or claim 2 or claim 3, wherein each base (1) has a through hole (13) formed nearby the bottom of each base (1) and provided for one of two pins (61) of a connecting bridge ware (6) to insert in, a side plate (25) extending vertically outward is formed on the side wall of the current-carrying main plate (21) at the position corresponding to the through hole (13), the side plate (25) has a hole (251) aligning with the through hole (13) for one of two pins (61) of the connecting bridge ware (6) to insert in.

5. The electrical connector of claim 4, wherein the free end (311) of the elastic plate (3) is tilted outward along the edge of the first side (31) of the elastic plate (3), a triangle apex (231) is formed at the bottom of the resisting flange (23) of the soldering terminal (2) which is against the free end (311), moreover, the triangle apex (231) has a guiding slope (232) oppositely arranged to the connecting hole (15) of each base (1), when the free end (311) is against the triangle apex (231), the free end (311) and the triangle apex (231) form a V-shaped guiding mouth (5) to make the wire be inserted easy.

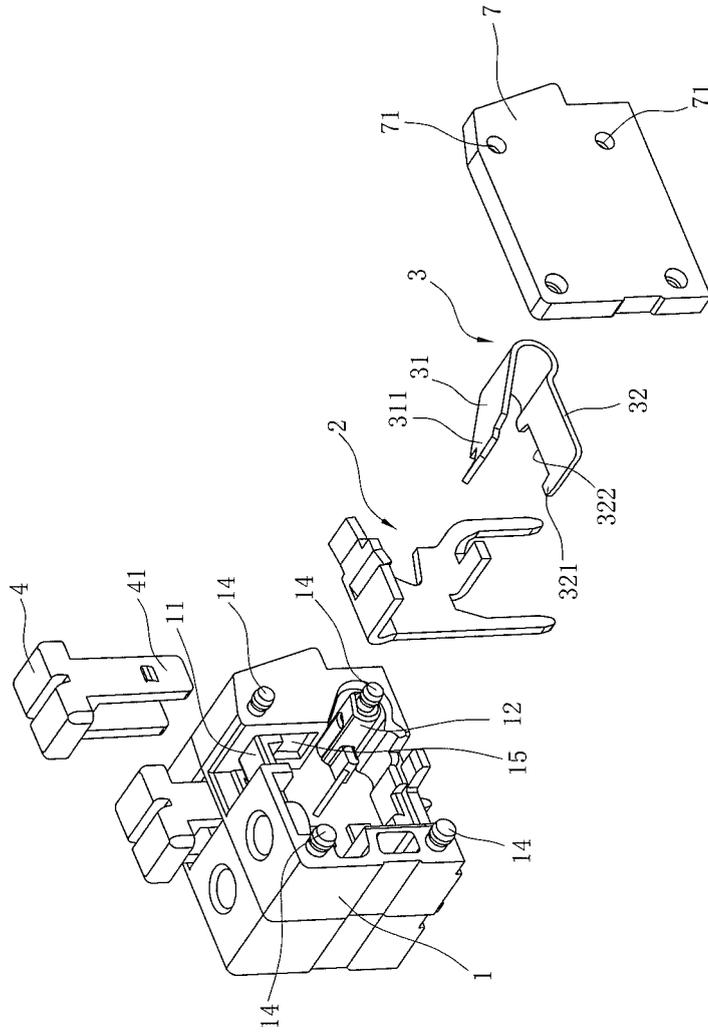


Fig. 1

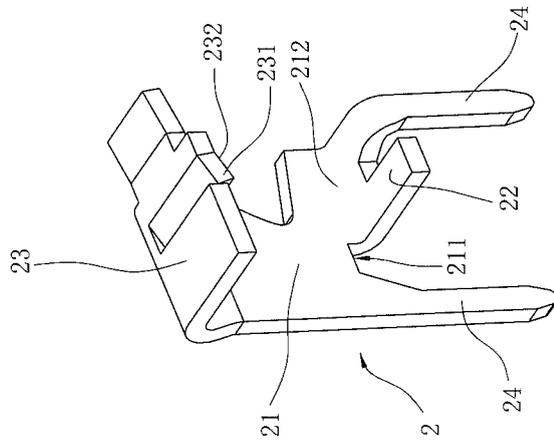


Fig. 2

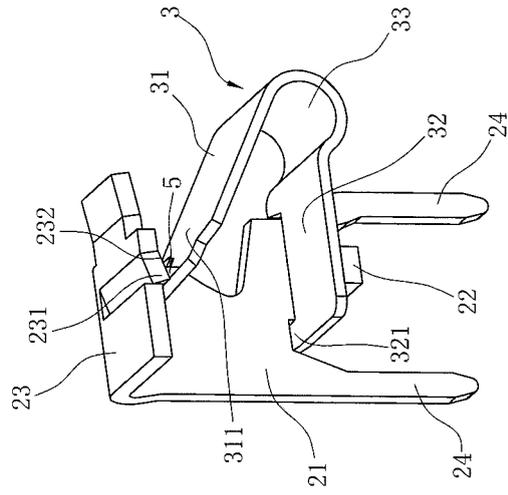


Fig. 3

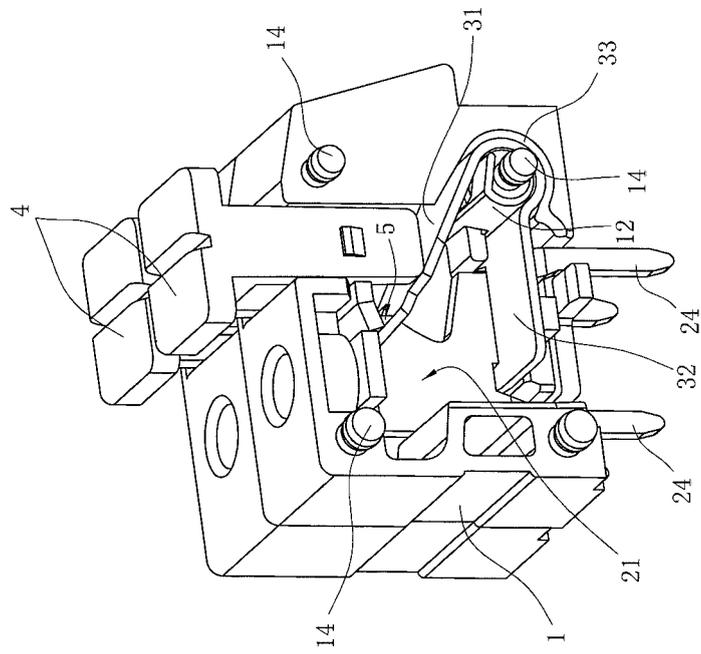


Fig. 4

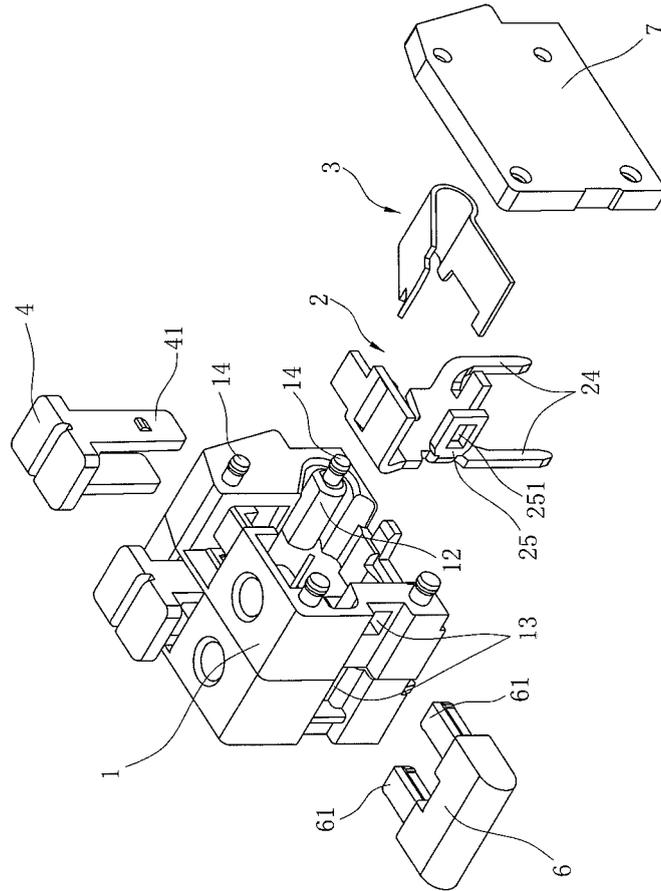


Fig. 5

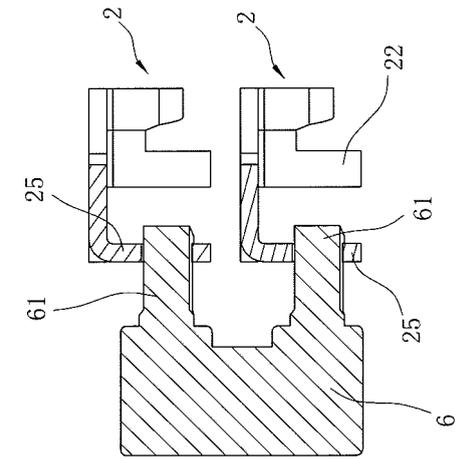


Fig. 7

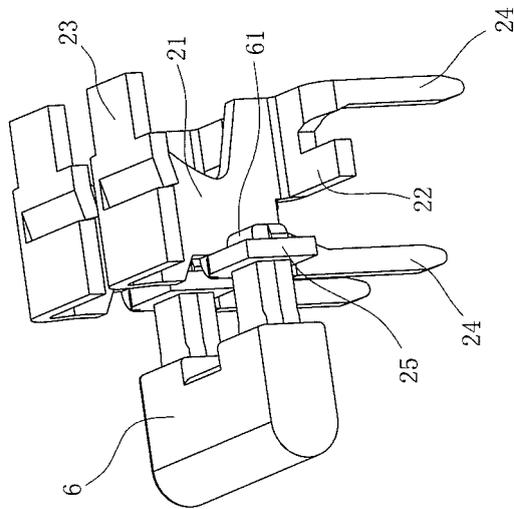


Fig. 6

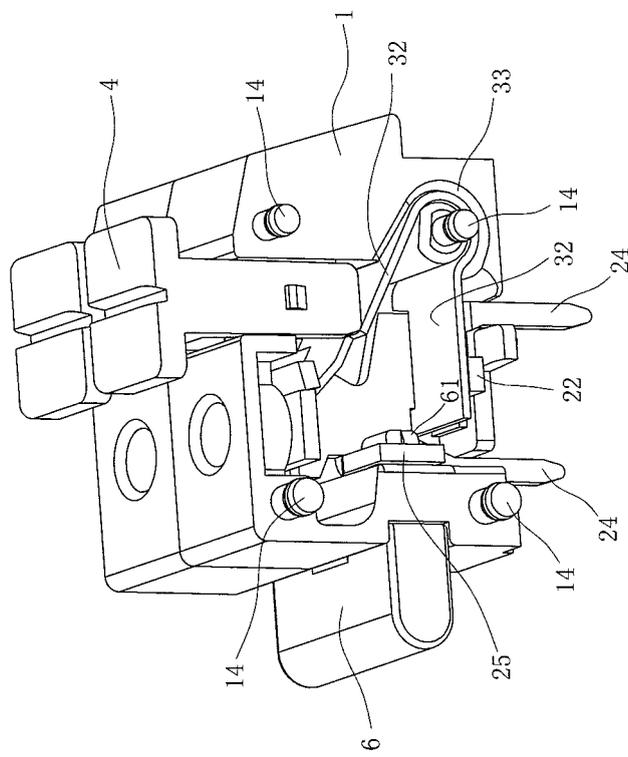


Fig. 8

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2010/000557

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
H01R4/48(2006.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
IPC:H01R4/48,H01R4/28,H01R12		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
WPI;EPODOC;CNKI,CPRS: WIRE,BUTTON,ELASTIC,SPRING,FLEXIBL+,GROOVE,SLOT,OPENING,BRIDGE,CROSSOVER,JUMPER		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP2003-77558A (SATO PARTS CO LTD) 14 Mar. 2003(14.03.2003) column 2 paragraph [0009]-column 4 paragraph [0020] in the description, figures 1,3	1,2,4,5
X	CN1205697C (OMRON TATEISI ELECTRONICS CO) 08 Jun. 2005(08.06.2005) the whole document	1,2,4,5
PX	CN101562282A (NINGBO DEGSON ELECTRONICS CO L) 21 Oct. 2009(21.10.2009) claims 1-5	1-5
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A	JP2001-160431A(OMRON TATEISI ELECTRONICS CO) 12 Jun. 2001(12.06.2001) the whole document	1-5
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	
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“P” document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
17 Jul. 2010(17.07.2010)	<b>05 Aug. 2010 (05.08.2010)</b>	
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer  LU,Shuiru Telephone No. (86-10)62411746	

**INTERNATIONAL SEARCH REPORT**  
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