(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 910 742 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.11.2021 Bulletin 2021/46

(21) Application number: **21174003.0**

(22) Date of filing: **17.05.2021**

(51) Int Cl.:
H01R 11/05 *(2006.01)* *H01R 4/40* *(2006.01)*
H01R 4/48 *(2006.01)* *H01R 12/58* *(2011.01)*
H01R 13/11 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **15.05.2020 CN 202010412530**

(71) Applicant: **Phoenix Contact Asia-Pacific (Nanjing) Co., Ltd.**
211100 Nanjing, Jiangsu (CN)

(72) Inventor: **CHE, Min**
Nanjing, Jiangsu Province, 211100 (CN)

(74) Representative: **Pfenning, Meinig & Partner mbB**
Patent- und Rechtsanwälte
Theresienhöhe 11a
80339 München (DE)

(54) A COMPACT WIRING TERMINAL

(57) The invention discloses a compact wiring terminal comprising a housing; and a wiring assembly located within the housing, the wiring assembly comprising a wiring frame, the wiring frame comprising a wire inlet for a wire in and out, and the wiring frame comprising conductive front and back side walls substantively parallel to a wire inletting direction, the wiring frame further comprising a current-guiding outlet part located on a side opposite to the wire inlet for forming an electrical contact, the current-guiding outlet part extending out from the front and back side walls and being integrated with the front and back side walls.

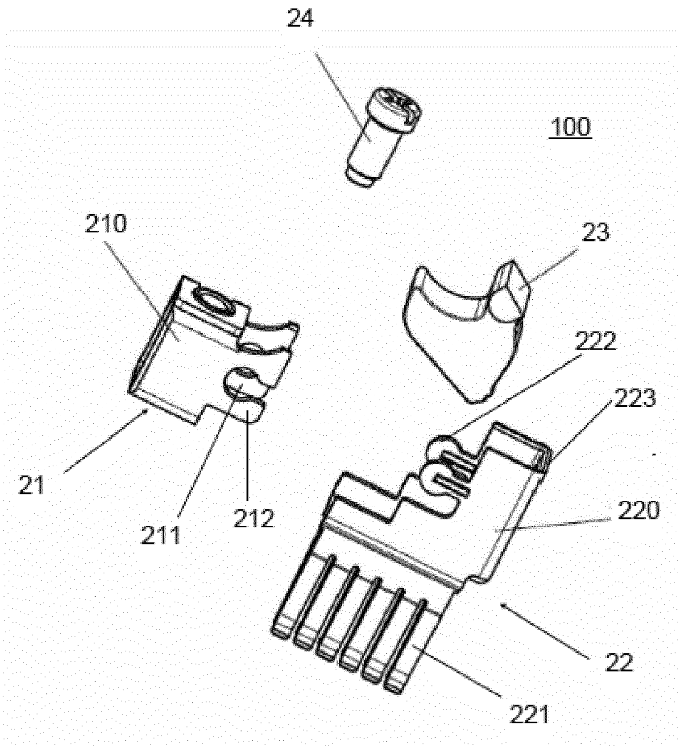

Fig. 3

Printed by Jouve, 75001 PARIS (FR)

Description

TECHNICAL FIELD

[0001] The present invention relates to a wiring terminal, in particular to a compact front wiring terminal, which belongs to the technical field of electrical connection.

BACKGROUND

[0002] With the continuous development of science and technology, the requirements for the performance of infrastructure equipment in communication and photovoltaic industries becomes higher and higher, while the requirements for the overall dimension of wiring terminals become smaller and smaller.

[0003] Front wiring technology is a common choice to meet the requirements of miniaturization of the wiring terminals. Fig. 9 discloses a conventional front screw wiring terminal 900, the wiring structure of which mainly comprises a closed wire clamping frame 902, a screw 903 and a cam press block 909 installed in the wire clamping frame, and a current-guiding strip 910. One end of the current-guiding strip 910 is to make electrical contact with the wire clamping frame 902, and the other end is to contact with a conductive spring clamp 911. The terminal adopts front wiring, and a wire inlet 904 for wire access is provided on the screw side (front side) of the wire clamping frame 902, and a tool for rotating the screw also enters from the front side, that is, the cable connection and screw operation are in the same horizontal plane. After the wire (not shown) enters into the wire inlet 904 from the front side, the tool is used to rotate the screw 903. When the screw 903 is driven down, it will drive the cam press block 909 in the wire clamping frame 902 to pivot, and press the wire on the current-guiding strip 910 to achieve conduction.

[0004] When the conventional front screw wiring technology is used in the front wiring occasions with limited space for PCB bracket and device, the size of the wiring terminal needs to be reduced due to the limited space, and the reduced size of the wiring terminal objectively results in a corresponding reduction of a conductive cross-sectional area (for example, the current-guiding strip becomes narrow). Therefore, the wiring capacity and current flowing capacity of the miniaturized wiring structure with an enclosed wire clamping frame plus a current-guiding strip are generally small. For example, a conventional front screw wiring terminal can only support 4 square millimeters (mm^2) of wiring capacity at most, and its current flowing capacity is about 30A. However, in practical application, it is desired that the wiring capacity and current flowing capacity will be greatly improved while the terminal size is substantially unchanged.

[0005] Other conventional front wiring technologies, such as a pull-back terminal based on cage-spring clamp, and a direct-plug terminal based on spring and button, are also usually employ the structure of the enclosed wire clamping frame plus the current-guiding strip. In the practical miniaturization application, the problem of insufficient wiring capacity similar to the front screw wiring technology would also arise.

[0006] Therefore, it is necessary to improve the conventional technology to solve its disadvantage.

SUMMARY

[0007] This invention provides a compact wiring terminal to solve the problems existing in the prior art, and proposes a structure integrating a wiring structure and a guiding structure, so as to increase an effective conductive cross-sectional area of the terminal and thus arrive at a wiring terminal with larger wiring capacity and current flowing capacity.

[0008] A wiring terminal according to the present invention comprises: a housing; and a wiring assembly located within the housing, the wiring assembly comprising a wiring frame, the wiring frame comprising a wire inlet for a wire in and out, and the wiring frame comprising conductive front and back side walls substantively parallel to a wire inletting direction, the wiring frame further comprising a current-guiding outlet part located on a side opposite to the wire inlet for forming an electrical contact, the current-guiding outlet part extending out from the front and back side walls and being integrated with the front and back side walls.

[0009] In the above wiring terminal, the wiring frame may further comprise a tool inlet for an operating tool in and out.

[0010] In the above wiring terminal, the current-guiding outlet part may comprise plug structures extending out from the front and back side walls respectively.

[0011] In the above wiring terminal, the plug structures may comprise one of a pin, an inserting needle and an inserting piece.

[0012] In the above wiring terminal, the current-guiding outlet part may comprise a pair of bases extending out from the front and back side walls respectively, the pair of bases converge with each other, the current-guiding outlet further comprises a plug structure or a conductive strip structure extending out from an end of the base.

[0013] In the above wiring terminal, the wiring frame may comprise a wire clamping operation frame and a wire inlet current-guiding frame, the wire clamping operation frame and the wire inlet current-guiding frame are capable of being assembled with each other to form a closed frame with internal spaces communicating with each other.

[0014] In the above wiring terminal, the wire clamping operation frame is made of a first material, the wire inlet current-guiding frame is made of a second material, the first material has a strength greater than the second material, and the second material has a conductivity greater than the first material.

[0015] In the above wiring terminal, the wire clamping operation frame may be formed as a semi-open structure enclosed by two opposite side walls, the wire inlet current-guiding frame is formed as the other semi-open structure enclosed by two opposite side walls and a connection part connecting the two opposite side walls, when assembling the wire clamping operation frame and the wire inlet current-guiding frame, the two side walls of the wire clamping operation frame engage with the two side walls of the wire inlet current-guiding frame respectively, so as to form a closed frame with internal spaces communicating with each other.

[0016] In the above wiring terminal, the wiring assembly may further comprise a wire clamping component located within the wire clamping operation frame, the wire clamping component is capable of being operated by the operating tool, so as to clamp the wire entering into the wire inlet current-guiding frame or loosen the wire clamped within the wire inlet current-guiding frame.

[0017] In the above wiring terminal, the wire clamping component may comprise a cam press block and a screw.

[0018] In the above wiring terminal, an upper end of the cam press block is always in close contact with the wire clamping operation frame during the rotation of the cam press block driven by the screw, a side close to the tool inlet of the wire clamping operation frame is provided with a thread for the screw to screw in, and the housing is provided with a stop portion to prevent the screw from falling off.

[0019] In the above wiring terminal, the wire clamping component may comprise a cage-spring clamp, an assembly strip for matching with the cage-spring clamp is formed in the wire inlet current-guiding frame.

[0020] In the above wiring terminal, the wire clamping component may comprise a spring leaf and a button, when the button is pressed down by the operating tool, the spring leaf deforms to loosen the wire clamped by the spring leaf.

[0021] In the above wiring terminal, a stop structure perpendicular to an insertion portion of the wire is included in the wire inlet current-guiding frame, and the stop structure is used to limit the termination position of wire insertion.

[0022] In the above wiring terminal, the stop structure may be set to be equal to or larger than an area of the wire inlet.

[0023] In the above wiring terminal, the wire clamping operation frame may be formed as a semi-open structure enclosed by two opposite side walls, the wire inlet current-guiding frame may be formed as the other semi-open structure enclosed by two opposite side walls and a connection part connecting the two opposite side walls, when assembling the wire clamping operation frame and the wire inlet current-guiding frame, the two side walls of the wire clamping operation frame engage with the two side walls of the wire inlet current-guiding frame respectively, so as to form a closed frame with internal spaces communicating with each other.

[0024] In the above wiring terminal, the wiring frame may comprise an upper frame and a lower frame, the wire inlet and the tool inlet are disposed on the upper frame, the current-guiding outlet part is disposed on the lower frame, the upper frame and the lower frame are capable of being assembled to form a closed frame with internal spaces communicating with each other.

[0025] The present invention further proposes a wiring assembly for the above wiring terminal.

[0026] The invention has the following beneficial effects: the front wiring terminal of the invention improves the configuration of the wiring frame, by integrating the guiding structure and the wiring frame, multiple sides of the wiring frame are involved in the current conduction path, which increases the effective cross-sectional area of the current conduction, such that the wiring capacity and current flowing capacity are greatly improved within a limited space, and the goal of miniaturization and high performance is achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Fig. 1 is a schematic diagram of a compact front screw wiring assembly according to an embodiment of the present invention.
Fig. 2 is a section diagram of the compact front screw wiring assembly shown in Fig. 1.
Fig. 3 is an exploded diagram of the front screw wiring assembly shown in Fig. 1.
FIG. 4A is a schematic diagram of two perspectives of a wire clamping operation frame shown in Fig. 3.
Fig. 4B is a schematic diagram of two perspectives of an wire inlet current-guiding frame shown in Fig. 3.
Fig. 5 shows schematic diagrams of a cam press block in the front screw wiring assembly shown in Fig. 1 in a free state and in connection with a wire.
Fig. 6 shows schematic diagrams of the cam press block in the front screw wiring assembly shown in Fig. 1 in a pressed state.
Figs. 7A-7C are schematic diagrams of a wiring assembly in an direct-plug terminal according to another embodiment of the present invention.
Figs. 8A-8D are schematic diagrams of a wiring assembly in a pull-back terminal according to another embodiment of the present invention.
Fig. 9 is a schematic diagram of a conventional front screw wiring terminal.

Reference Numerals:

[0028]

4 wire
11 stop structure
20 wiring frame structure
21 wire clamping operation frame
22 wire inlet current-guiding frame

23 cam press block
24 screw
100 front screw wiring assembly
210 body frame
211 arc depression
212 connection plate
221 current-guiding outlet part
222 arc body
223 connection segment
224 base
701 button
702 spring leaf
703 wiring frame
704 current-guiding outlet structure
801 cage-spring clamp
802 clamp port
803 wiring frame
804 current-guiding outlet structure
805 assembly strip
900 front screw wiring terminal
902 wire clamping frame
903 screw
904 wire inlet
909 cam press block
910 current-guiding strip
911 conductive spring clamp

DETAILED DESCRIPTION

[0029] In the following description, the present invention will be described with reference to various embodiments. However, those skilled in the art will recognize that various embodiments may be implemented without one or more specific details or in conjunction with other alternative and/or additional methods, materials, or components. In other cases, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of various embodiments of the present invention. Similarly, for the purpose of explanation, specific quantities, materials, and configurations are set forth in order to provide a full understanding of embodiments of the invention. However, the invention may be implemented without specific details. In addition, it is understood that various embodiments shown in the drawings are illustrative and are not necessarily drawn to scale.

[0030] The invention will be further described in combination with the drawings. Fig. 1 shows an overall structure of a compact front screw wiring assembly 100 according to an embodiment of the present invention. The front screw wiring assembly 100 includes a wiring frame structure 20, a wire 4 may access from the front side (a wire inlet side) of the wiring frame structure 20, and the wire may be clamped by rotating a screw 24. A conductive output is provided at the rear of the front screw wiring assembly 100. Note that the wire 4 itself is not a component part of the wiring assembly 100. Fig. 2 is a schematic diagram of the front screw wiring terminal 100 shown in Fig. 1 along the C-C longitudinal section. Although not shown in the drawings, it is understood that the front screw wiring assembly 100 may be accommodated in a housing, and one housing may include one or more front screw wiring assemblies 100 as required.

[0031] Fig. 3 is an exploded diagram of the front screw wiring assembly 100 shown in Fig. 1. As shown in Fig. 3, the wiring frame structure 20 of the front screw wiring assembly 100 may include hollow wire clamping operation frame 21 and a wire inlet current-guiding frame 22 which can be assembled with and communicated in internal spaces with the wire clamping operation frame 21. The front screw wiring assembly 100 may further include a cam press block 23 and a screw 24. FIG. 4A shows a schematic diagram of two perspectives of the wire clamping operation frame 21, and Fig. 4B shows a schematic diagram of two perspectives of the wire inlet current-guiding frame 22.

[0032] For the ease of illustration, when describing the wire clamping operation frame 21 and the wire inlet current-guiding frame 22 in conjunction with Figs. 1-3, a side facing an observer is the front, the opposite side is the back, and the left, right, up and down directions in the drawings are the left, right, up and down directions of the wire clamping operation frame 21 and the wire inlet current-guiding frame 22 shown in the figures. However, it should be understood by those skilled in the art that such expression of orientation is not limitative.

[0033] In the discussed wiring frame structure 20, the wire clamping operation frame 21 may include a body frame 210 and a pair of connection plates 212, the pair of connection plates 212 are formed by extending from the front and back walls of the body frame 210 to the right respectively and provided with arc depressions 211. The upper wall of the body frame 210 is provided with a thread (not shown) for the screw 24 to screw into the interior of the body frame 210.

[0034] In the discussed wiring frame structure 20, the wire inlet current-guiding frame 22 is formed of conductive materials, including a wire inlet connection part 220 in the upper portion for being electrically connected with the wire accessing from the front side, and a current-guiding outlet part 221 in the lower for forming an electrical connection with other electrical components in a plug-in or other way. As shown in Fig. 3, the wire inlet connection part 220 may be in U-shape, which includes a front wall, a back wall and a connection segment 223 connecting the right ends of the front wall and the back wall. The current-guiding outlet part 221 may include a pair of bases 224 formed by extending down from the front wall and the back wall of the wire inlet connection part 220 respectively, and the pair of bases 224 may gradually converge with each other. Thus, the current-guiding outlet part 221 is formed into an integrated structure with the wire inlet connection part 220. A comb-like plug structure is further formed at the end of the base 224. The left edges of the front wall and the back wall of the wire inlet connection part 220 may be raised respectively to form arc bodies 222, and the arc bodies 222 may be assembled in the arc depressions 211. Referring to Fig. 2 again, the wire inlet current-guiding frame 22 may be further provided with a stop structure 11. After the wire 4 is inserted into the wire inlet current-guiding frame 22, the lower surface of the wire may contact with the stop structure 11, thus prompting that the wire has been inserted in place.

[0035] Compared with the structure of the wiring clamping frame plus the current-guiding strip shown in Fig. 9, the above-mentioned wiring frame structure described in conjunction with Figs. 1-3 is helpful to improve the wiring capacity.

[0036] In the wiring frame structure shown in Figs. 1-3, when the diameter of the wire 4 is substantially equal to the distance between the front wall and the back wall of the wire inlet current-guiding frame 22, the wire is in an electrical contact with the three conductive sides (the front wall, the rear wall and the connection segment 223) of the wire inlet connection part 220. Since the conduction of the current follows the principle of the shortest path, and the bases 224 of the current-guiding outlet part 221 are an integrated structure extending from the front wall and the back wall of the wire inlet connection 220, the current on the wire is transmitted to the bases 224 of the current-guiding outlet part 221 through the front wall and the back wall of the wire inlet connection part 220. However, in the structure of the wire clamping frame plus the current-guiding strip as shown in Fig. 9, the current substantially flows directly from the wire to the current-guiding strip 910, and then continues to conduct along the current-guiding strip 910. Although the wire is also connected with the front and back walls of the wire clamping frame 902 in this case, most of the current would not conduct through the front and back walls of the wire clamping frame 902 according to the shortest path principle. Therefore, the wiring frame structure 20 of the embodiments of the present application achieves a larger effective conductive cross section compared with the conventional wiring terminal shown in Fig. 9 in the case of the same size, thus improving the wiring capacity.

[0037] When installing the front screw wiring assembly 100 shown in Figs. 1-3, the arc depressions 211 on the wire clamping operation frame 21 and the arc bodies 222 on the current-guiding frame 22 can be assembled together, such that the wire clamping operation frame 21 and the wire inlet current-guiding frame 22 form an approximately closed wiring slot, the cam press block 23 is installed into the inner space of the wire inlet current-guiding frame 22 and the wire clamping operation frame 21 from the upper side of the current-guiding frame 22, and the upper end of the cam press block 23 is lapped on the connection plates 212 of the wire clamping operation frame 21. The cam press block 23 can rotate freely in the approximately closed wiring slot.

[0038] The use process of the front screw wiring assembly 100 shown in Figs. 1-3 is illustratively described below. As shown in Figs. 4-5, when wiring the terminal having the front screw wiring assembly 100, the screw 24 may be reversed to the highest position with a tool (such as a screwdriver), at this moment the cam press block 23 is in a free state; the wire 4 may be inserted from the front side of the wire inlet current-guiding frame 22, and into the position where the lower surface of the wire contacts the stop structure 11 disposed in the current-guiding frame; after the wire 4 is inserted, the screw 24 is tightened with a screwdriver to drive the cam press block 23 to rotate, such that the wire 4 is pressed on the wire inlet current-guiding frame 22 to achieve conduction. During the rotation of the cam press block 23, the upper end of the cam press block 23 is always in a close contact with the connection plates 212.

[0039] As shown in Fig. 6, when de-wiring the terminal having the front screw wiring assembly 100, the screw 24 is first loosened to the highest position with a screwdriver, and when the cam press block 23 is in the free state, the wire is directly pulled outward to complete the de-wiring. It should be understood that in order to prevent the screw 24 from falling off when de-wiring, a stop portion may be provided on the housing containing the front screw wiring assembly 100.

[0040] Although an embodiment of the present invention is described in conjunction with Figs. 1-6, the implementation of the present invention is not limited to this. For example, the changes and substitutions described below should also be regarded as the contents of the present disclosure.

[0041] Figs. 1-6 show the front screw wiring assembly 100, but do not show the housing (usually formed of insulating material). It should be understood that the form of the housing and the number of wiring components contained in the housing may be selected and adjusted according to the actual application requirements.

[0042] Figs. 1-3 show a frame structure formed by assembling the wire clamping operation frame 21 and the wire inlet current-guiding frame 22. In the scene of miniaturization, such frame structure is beneficial to ensure the current flowing capacity and strength at the same time. Specifically, the wire inlet current-guiding frame 22 may be made of high conductivity material such as copper to ensure the flow of the current, while the wire clamping operation frame 21 may be made of high strength material such as steel to ensure the required strength with a small size. However, it should be understood that the present invention is not limited to this. Under the condition of meeting the requirements of material strength and conductivity, the wire clamping operation frame and the wire inlet current-guiding frame may be formed into an integrated structure, that is, a single frame structure is used to realize the functions of wire clamping, wire inletting and current-guiding. It can also be understood that for the two-bodies and multi-bodies implementation of the frame, the scheme different from Figs. 1-3 may also be adopted as required. For example, a variant embodiment may be implemented by assembling a upper frame and a lower frame. The upper frame is provided with a screw inlet and a wire inlet, which substantively corresponds to the structure and function of the wire clamping operation frame 21 and the wire inlet connection part 220, while the lower frame substantively corresponds to the structure and function of the current-guiding outlet part 221.

[0043] For the assembly mode of the two-bodies structure of the wiring frame structure, although Fig. 3 shows that the connection plates 212 with the arc depressions 211 are formed on the wire clamping frame 21, and the arc bodies 222 are formed on the wire inlet current-guiding frame 22, it should be understood that this technical means is only one of many means for assembling the wire clamping operation frame 21 and the wire inlet current-guiding frame 22, and there are many alternative or equivalent ways. In one embodiment, the wire clamping operation frame 21 may not have connection plates extending laterally, but directly forms depression structures in the front and back side walls of the wire clamping operation frame 21 for assembling. In another embodiment, the arc bodies may be formed on the wire clamping operation frame 21, and the arc depressions may be formed on the wire inlet current-guiding frame 22. In another embodiment, the structure for assembling with each other may not be the arc and corresponding depression, but any other structure that can realize assembling (for example, various forms of interlocking engagement).

[0044] Although Fig. 2 shows that the area occupied by the stop structure 11 in the current-guiding frame 22 is less than the entering area of the wire, in another embodiment, the stop structure 11 can be set equal to or greater than the area of the wire inlet to ensure a full contact with the end of the inserted wire and further ensure the current flowing capacity.

[0045] Although it is shown in Figs. 1-6 that the current-guiding outlet part 221 of the front screw wiring assembly 2 has a plug structure formed as a pair of comb teeth, this is only an example. The front screw wiring assembly of the invention is not limited to this, but may employ any plug structure suitable for forming electric contact at the lower end of the wiring assembly (for example, various forms of pins, inserting needles, and inserting pieces), or may employ a conductive strip at the end of the current-guiding outlet part instead of any specific plug structure, and add a spring clamp to lead the current/signal from the lower end of the front screw wiring assembly. In some embodiments, the plug structures may be formed by extending directly from the front wall and the back wall of the wire inlet connection part 220 without a transition portion such as the bases 224 (for example, the plug structure described below in conjunction with Figs. 7A-7C).

[0046] Further variant embodiments should not be limited to screw wiring schemes, but various types of wire inlet current-guiding structures can be employed.

[0047] For example, for a direct-plug terminal based on spring and button, the spring leaf and the button may be placed in the assembled or integrated wiring frame structure, and the current-guiding outlet part is formed in the wiring frame structure by extending out from front and back side walls of the wiring frame structure, so as to form a current conduction path from the front and back side walls to the current-guiding outlet part.

[0048] Figs. 7A-7C illustratively show a wiring assembly (a housing is not shown) suitable for a direct-plug terminal, in which a wire clamping component includes a spring leaf 702 and a button 701. When the button 701 is pressed down by an operating tool, the spring leaf 702 deforms to loosen the wire clamped by the spring leaf. Two walls of a wiring frame 703 extend downward to form a pin-type current-guiding outlet structure 704. When the wire accesses the wiring frame 703 and in an electrical contact with the two walls of the wiring frame 703, the current is mainly conducted along the two walls to the current-guiding outlet structure 704. It can be understood that when an overall cross-sectional area provided by four current-guiding outlet structures 704 is larger than a cross-sectional area of a current-guiding stripe of a conventional inserted frame, the current flowing capacity is increased.

[0049] For example, for a pull-back terminal based on cage-spring clamp, the cage-spring clamp may be placed in an integrated or assembled wiring frame structure, and a current-guiding outlet part is formed in the wiring frame structure by extending out from front and back side walls of the wiring frame structure, so as to form a current conduction path from the front and back side walls to the current-guiding outlet part.

[0050] Figs. 8A-8D illustratively show, in an exemplary way, a wiring assembly (a housing is not shown) suitable for a direct-plug terminal, in which a wire clamping component includes a cage-spring clamp 801, on which a clamp port 802 is formed. An assembly strip 805 for matching with the cage-spring clamp 801 is also formed in the wiring frame. Referring to Fig. 8B, when using a tool to push the cage-spring clamp 801 from the right to the left (as shown by the arrow), the coupling relationship between the spring and the assembly strip 805 is released, and a wire may be inserted from the left of the assembly strip 805, and then the tool is removed, and the inserted wire is clamped on the assembly strip 805 by a restoring force of the cage-spring clamp 801. Two walls of the wiring frame 803 extend downward to form a pin-type current-guiding outlet structure 804. When the wire accesses the wiring frame 803 and in an electrical contact with the two walls of the wiring frame 803, the current is mainly conducted along the two walls to the current-guiding outlet structure 804. It can be understood that when an overall cross-sectional area provided by four current-guiding outlet structures 804 is larger than a cross-sectional area of a current-guiding stripe of a conventional inserted frame, the current flowing capacity is increased.

[0051] In some variant embodiments, the wire clamping and loosening operations do not need an external tool, so a tool inlet for tool in and out is not provided in a wiring scheme.

[0052] The compact wiring terminal of the invention, by improving the wiring frame structure on the basis of the existing wiring technology, eliminates the bottleneck affecting the current flowing capacity in the miniaturization wiring scene, improve the wiring capacity and the current flowing capacity, and achieve the goal of miniaturization and high performance.

[0053] The basic concepts have been described above, and it is clear that for those skilled in the art, the disclosure above is only an example and does not limit the present application. Although not clearly stated herein, those skilled in the art may make various modifications, improvements and amendments to the present application. Such modifications, improvements and amendments are recommended in the present application, so such modifications, improvements and amendments still fall into the spirit and scope of the embodiments of the application.

Claims

1. A wiring terminal, comprises:

a housing; and
a wiring assembly located within the housing, the wiring assembly comprising a wiring frame, the wiring frame comprising a wire inlet for a wire in and out, and the wiring frame comprising conductive front and back side walls substantively parallel to a wire inletting direction, the wiring frame further comprising a current-guiding outlet part located on a side opposite to the wire inlet for forming an electrical contact, the current-guiding outlet part extending out from the front and back side walls and being integrated with the front and back side walls.

2. The wiring terminal of claim 1, wherein the wiring frame further comprises a tool inlet for an operating tool in and out.

3. The wiring terminal of claim 1, wherein the current-guiding outlet part comprises plug structures extending out from the front and back side walls respectively.

4. The wiring terminal of claim 3, wherein the plug structures comprise one of a pin, an inserting needle and an inserting piece.

5. The wiring terminal of claim 1, wherein the current-guiding outlet part comprises a pair of bases extending out from the front and back side walls respectively, the pair of bases converge with each other, the current-guiding outlet further comprises a plug structure or a conductive strip structure extending out from an end of the base.

6. The wiring terminal of claim 2, wherein the wiring frame comprises a wire clamping operation frame and a wire inlet current-guiding frame, the wire clamping operation frame and the wire inlet current-guiding frame are capable of being assembled with each other to form a closed frame with internal spaces communicating with each other.

7. The wiring terminal of claim 6, wherein the wire clamping operation frame is made of a first material, the wire inlet current-guiding frame is made of a second material, the first material has a strength greater than the second material, and the second material has a conductivity greater than the first material.

8. The wiring terminal of claim 6, wherein the wire clamping operation frame is formed as a semi-open structure enclosed by two opposite side walls, the wire inlet current-guiding frame is formed as the other semi-open structure enclosed by two opposite side walls and a connection part connecting the two opposite side walls, when assembling the wire clamping operation frame and the wire inlet current-guiding frame, the two side walls of the wire clamping operation frame engage with the two side walls of the wire inlet current-guiding frame respectively, so as to form a closed frame with internal spaces communicating with each other.

9. The wiring terminal of claim 6, wherein the wiring assembly further comprises a wire clamping component located within the wire clamping operation frame, the wire clamping component is capable of being operated by the operating tool, so as to clamp the wire entering into the wire inlet current-guiding frame or loosen the wire clamped within the wire inlet current-guiding frame.

10. The wiring terminal of claim 9, wherein the wire clamping component comprises a cam press block and a screw.

11. The wiring terminal of claim 10, wherein an upper end of the cam press block is always in close contact with the wire clamping operation frame during the rotation of the cam press block driven by the screw, a side close to the tool inlet of the wire clamping operation frame is provided with a thread for the screw to screw in, and the housing is provided with a stop portion to prevent the screw from falling off.

12. The wiring terminal of claim 9, wherein the wire clamping component comprises a cage-spring clamp, an assembly strip for matching with the cage-spring clamp is formed in the wire inlet current-guiding frame.

13. The wiring terminal of claim 9, wherein the wire clamping component comprises a spring leaf and a button, when the button is pressed down by the operating tool, the spring leaf deforms to loosen the wire clamped by the spring leaf.

14. The wiring terminal of claim 6, wherein the wire clamping operation frame is formed as a semi-open structure enclosed by two opposite side walls, the wire inlet current-guiding frame is formed as the other semi-open structure enclosed by two opposite side walls and a connection part connecting the two opposite side walls, when assembling the wire clamping operation frame and the wire inlet current-guiding frame, the two side walls of the wire clamping operation frame engage with the two side walls of the wire inlet current-guiding frame respectively, so as to form a closed frame with internal spaces communicating with each other.

15. The wiring terminal of claim 2, wherein the wiring frame comprises an upper frame and a lower frame, the wire inlet and the tool inlet are disposed on the upper frame, the current-guiding outlet part is disposed on the lower frame, the upper frame and the lower frame are capable of being assembled to form a closed frame with internal spaces communicating with each other.

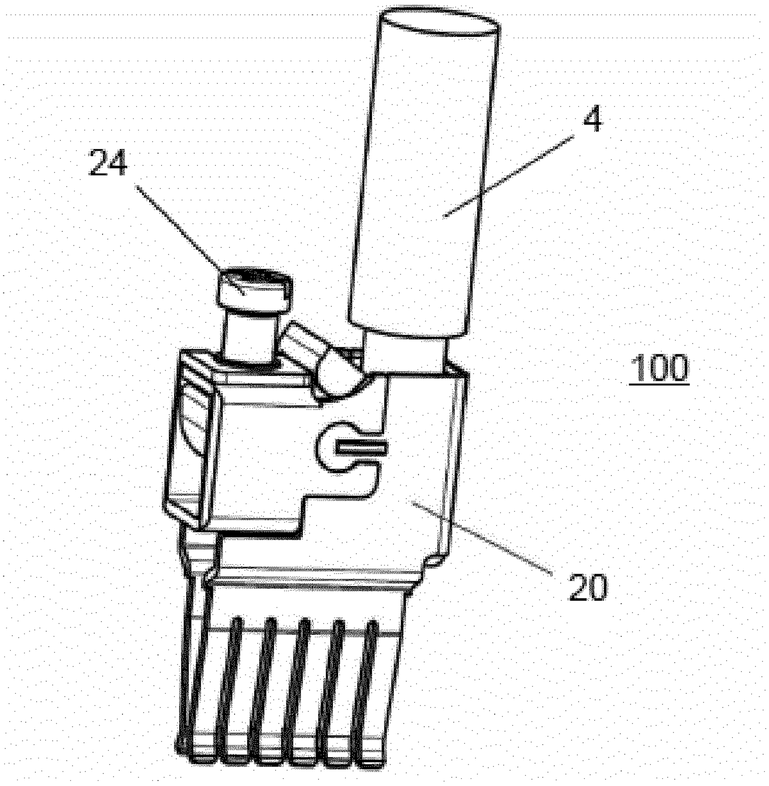

Fig. 1

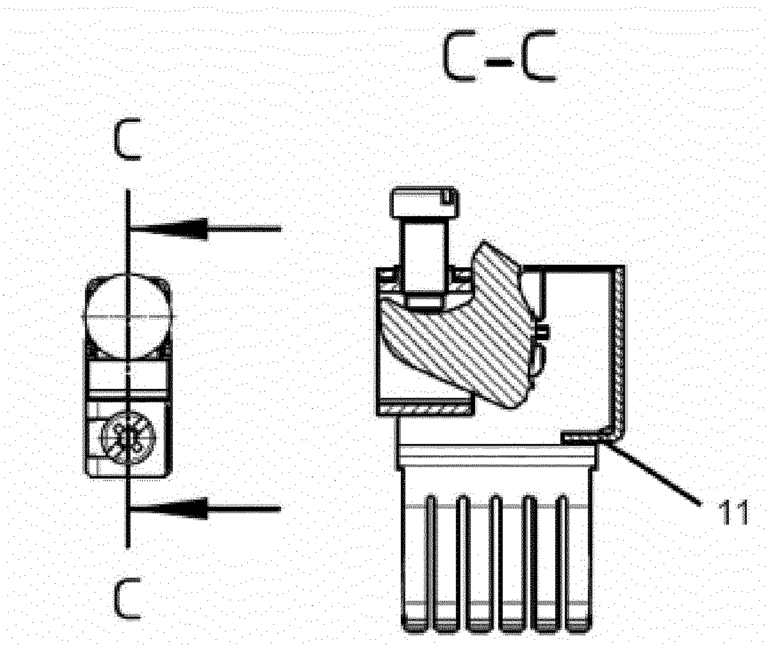

Fig. 2

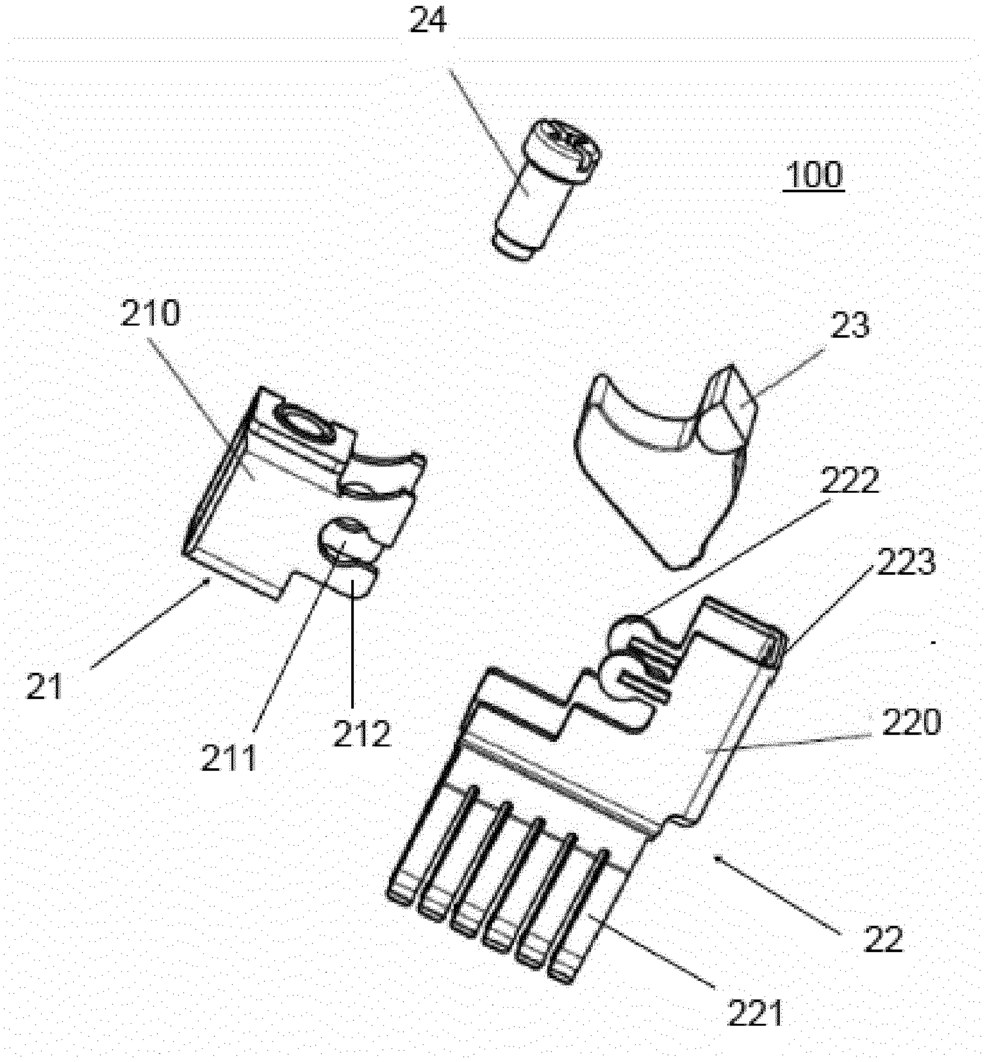

Fig. 3

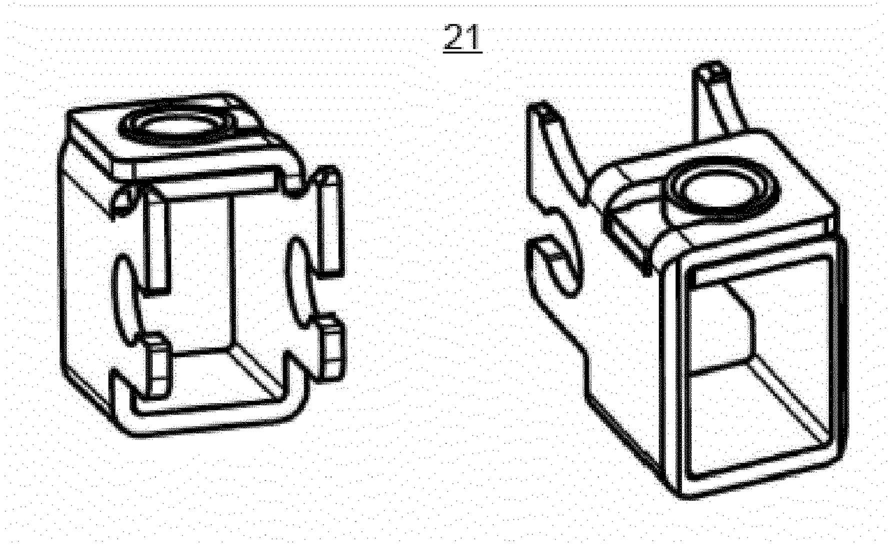

Fig. 4A

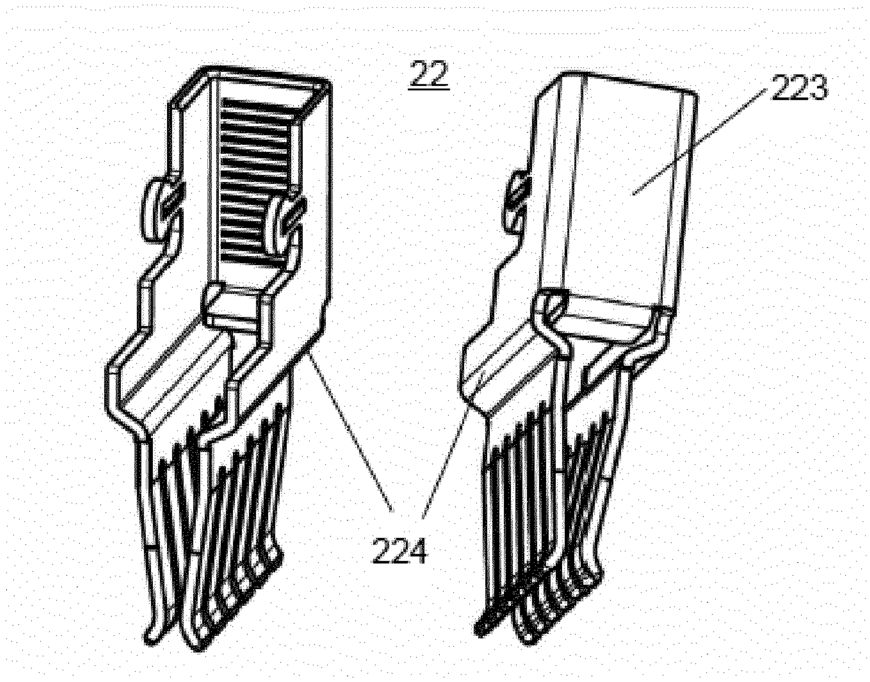

Fig. 4B

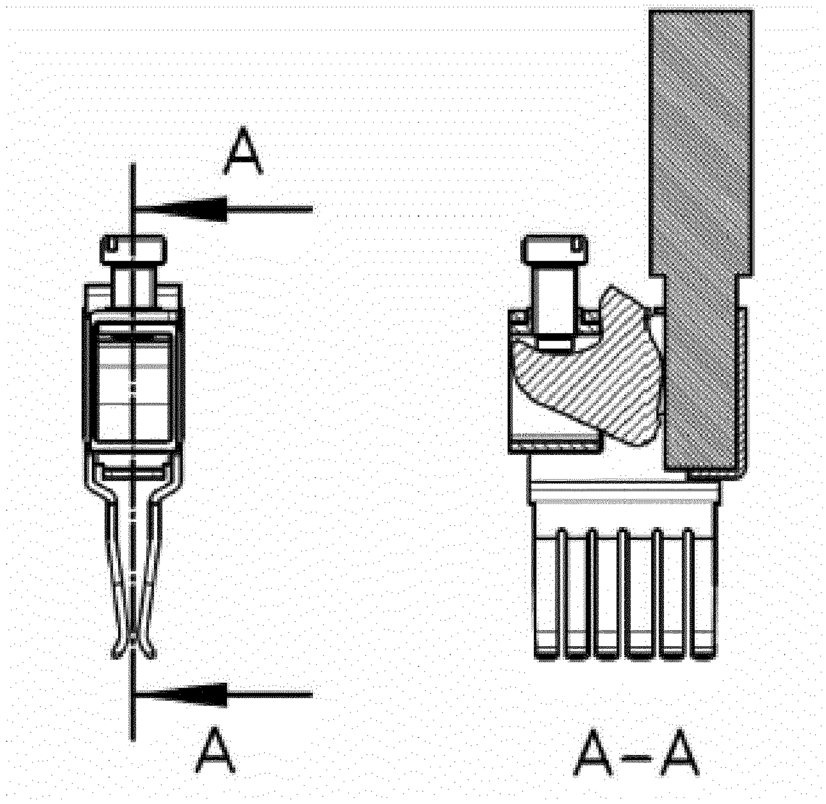

Fig. 5

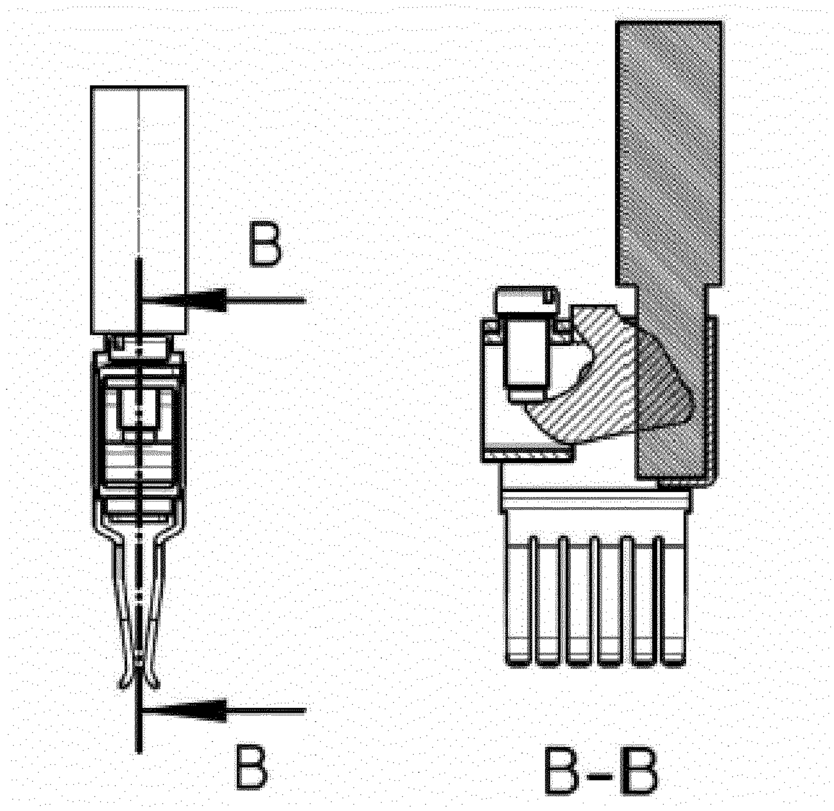

Fig. 6

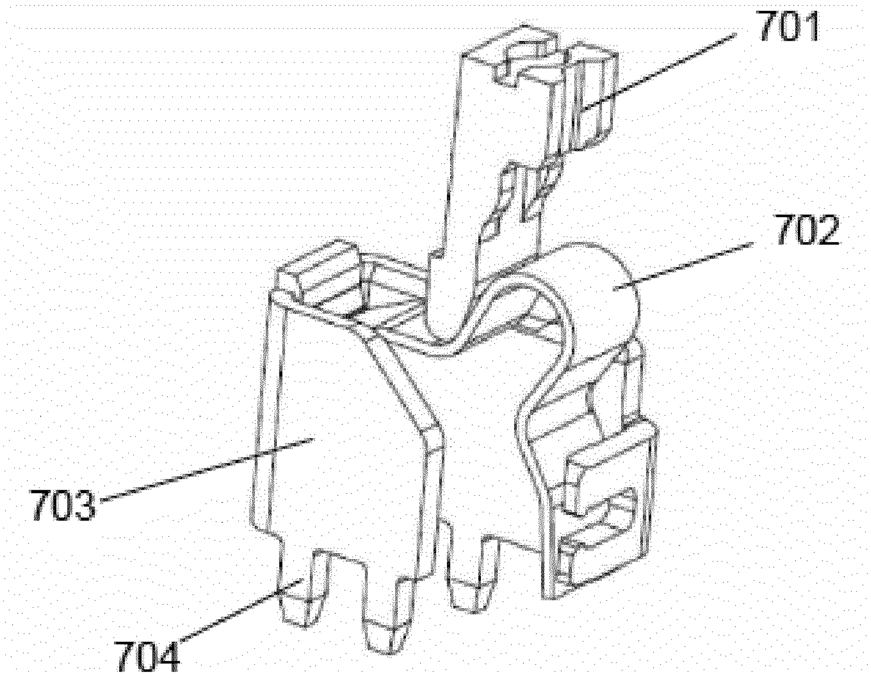

Fig. 7A

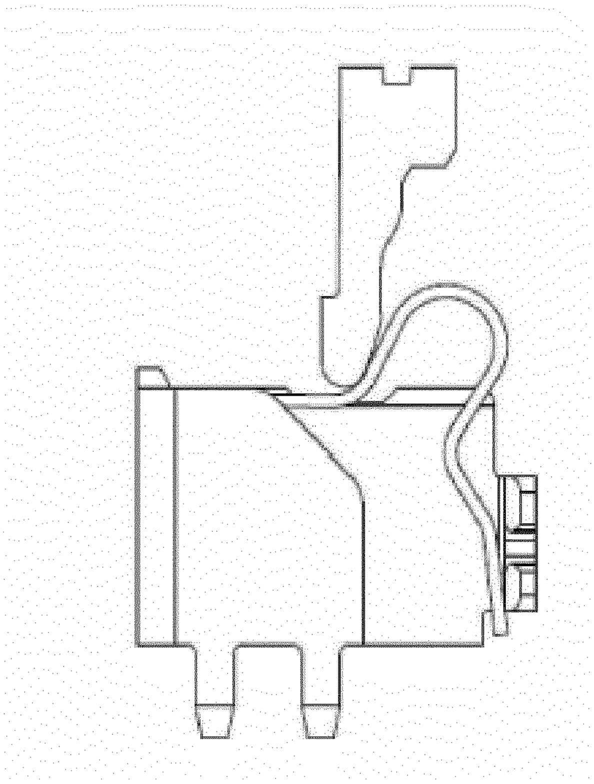

Fig. 7B

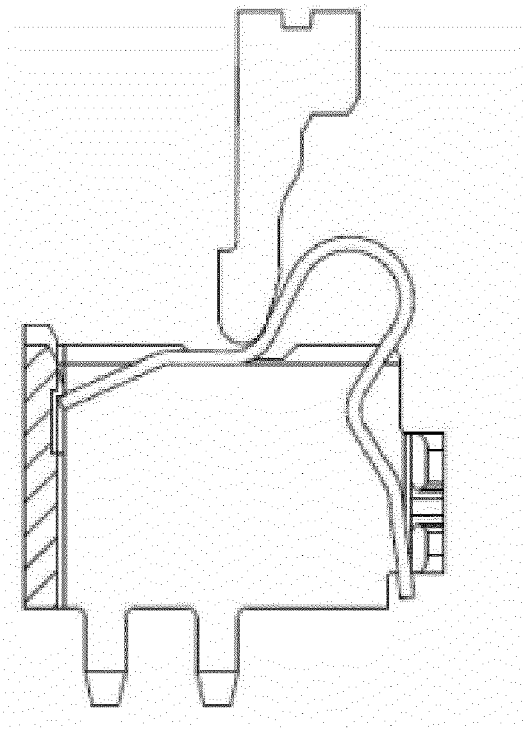

Fig. 7C

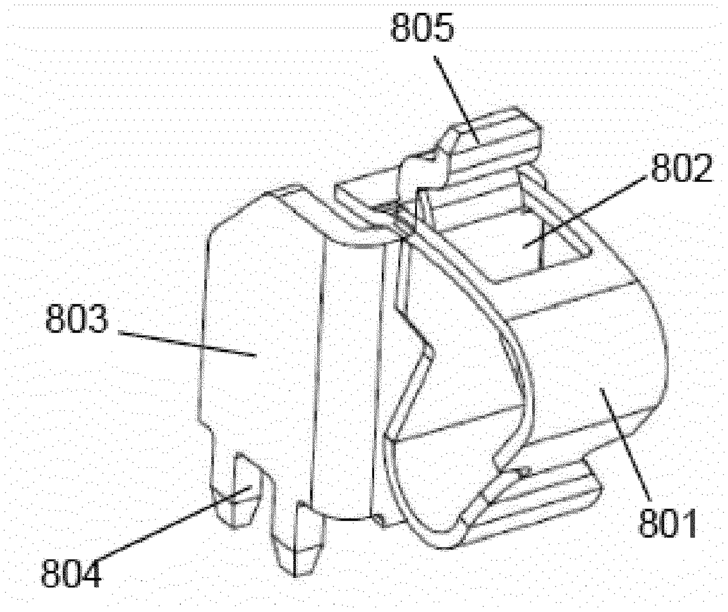

Fig. 8A

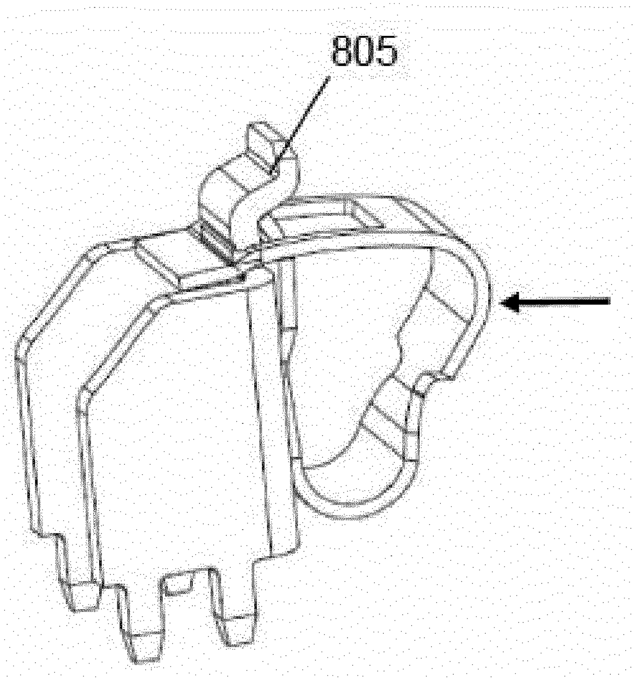

Fig. 8B

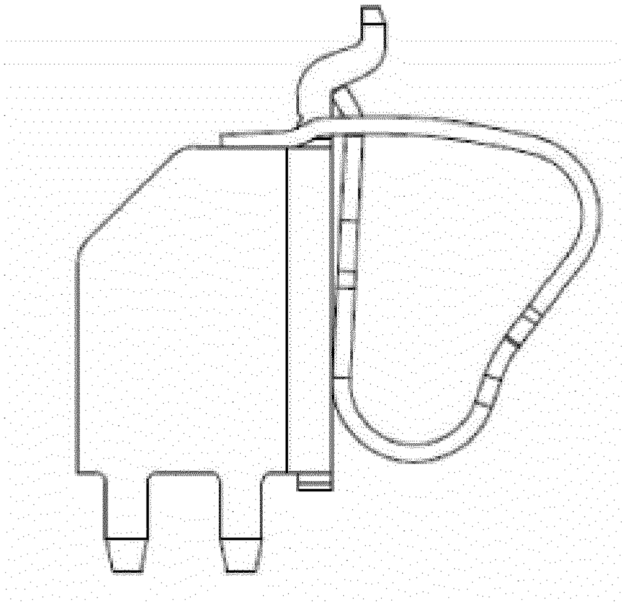

Fig. 8C

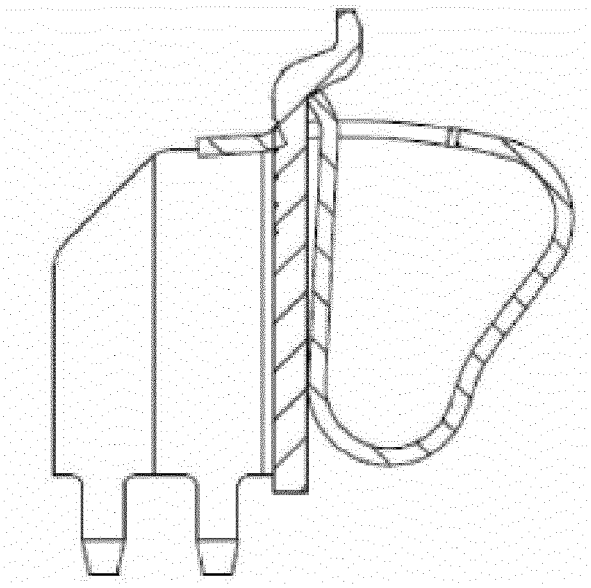

Fig. 8D

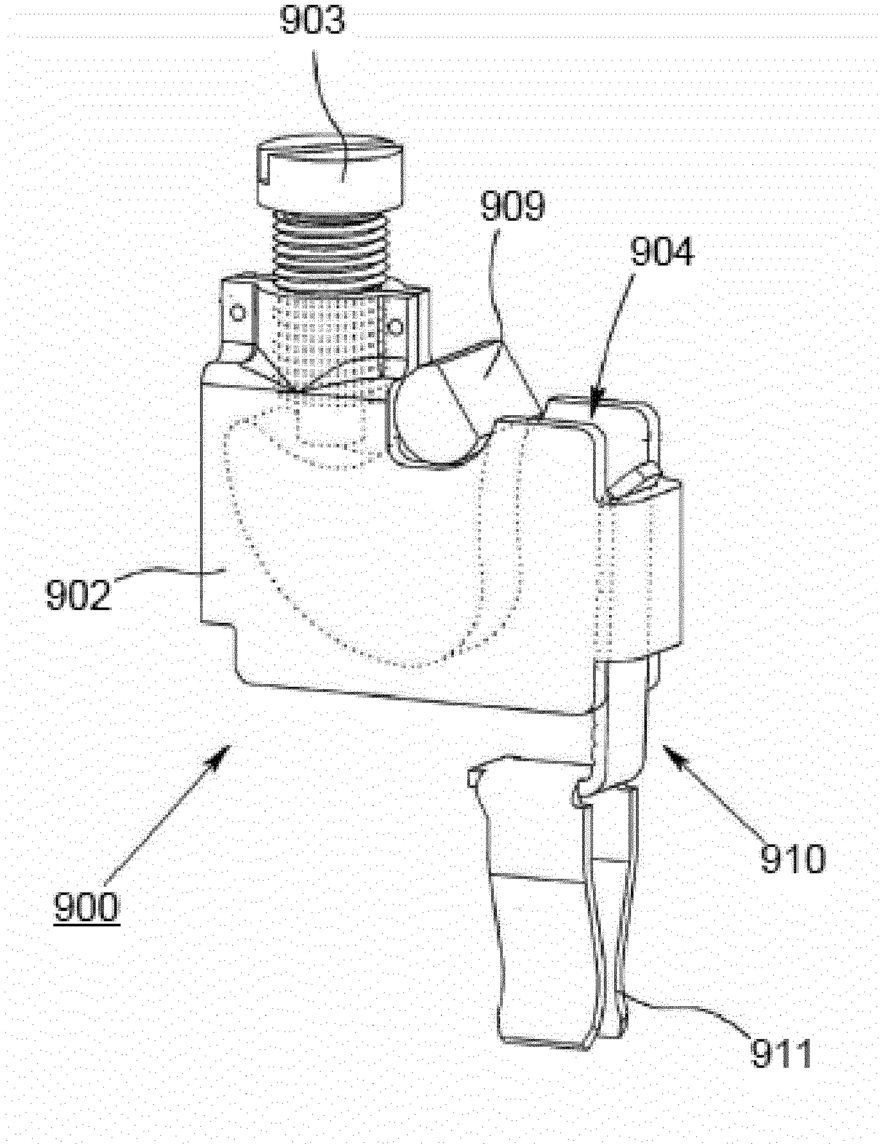

Fig. 9

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 4003

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	CA 858 089 A (SIMSON SAMUEL) 8 December 1970 (1970-12-08) * page 2, paragraph 1; figures 4-6 *	1-4 6-11,14	INV. H01R11/05 ADD. H01R4/40 H01R4/48 H01R12/58 H01R13/11
X Y	EP 3 525 289 A1 (PHOENIX CONTACT ASIA PACIFIC NANJING CO LTD [CN]) 14 August 2019 (2019-08-14) * paragraph [0022]; figures 6,7 *	1-4 6-11,14	
X	DE 85 33 714 U1 (LICENTIA GMBH) 2 January 1987 (1987-01-02) * figures 1,2 *	1-3, 5-11,14	
X Y	FR 3 035 747 A1 (MERSEN FRANCE SB SAS [FR]) 4 November 2016 (2016-11-04) * figures 1,2 *	1-3 6-11,14	
X	DE 10 2014 101048 A1 (JIANGMEN KREALUX ELECTRICAL APPLIANCES CO [CN]) 25 June 2015 (2015-06-25) * figures 4-6,15-22 *	1-4,13	TECHNICAL FIELDS SEARCHED (IPC)
X	US 2019/386407 A1 (MASTEL RUDOLF [DE]) 19 December 2019 (2019-12-19) * figures 7,10-12 *	1-4,15	H01R
X	DE 201 20 811 U1 (WEIDMUELLER INTERFACE [DE]) 30 April 2003 (2003-04-30) * figures 1,3,4,6,7 *	1-3,12	
X	IT MI20 090 662 A1 (MORSETTITALIA SPA) 22 October 2010 (2010-10-22) * figures 1-5 *	1-3,5,12	
Y	GB 2 345 389 A (MATSUSHITA ELECTRIC WORKS LTD [JP]) 5 July 2000 (2000-07-05) * figure 7 *	6-11,14	

-/--

The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
The Hague	23 September 2021	Teske, Ekkehard

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 4003

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 37 19 483 A1 (HOELSCHER HEINRICH TECH BUERO [DE]) 22 December 1988 (1988-12-22) * column 3, lines 44-47; figure 2 * -----	11	

TECHNICAL FIELDS SEARCHED (IPC)

1

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 September 2021	Teske, Ekkehard

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
& : member of the same patent family, corresponding document

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 17 4003

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-09-2021

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
CA 858089	A	08-12-1970	NONE		
EP 3525289	A1	14-08-2019	CN 108232528	A	29-06-2018
			EP 3525289	A1	14-08-2019
DE 8533714	U1	02-01-1987	DE 8533714	U1	02-01-1987
			FR 2591041	A3	05-06-1987
FR 3035747	A1	04-11-2016	NONE		
DE 102014101048	A1	25-06-2015	CN 103855529	A	11-06-2014
			DE 102014101048	A1	25-06-2015
US 2019386407	A1	19-12-2019	CN 110199439	A	03-09-2019
			DE 102017103508	B3	07-06-2018
			EP 3586403	A1	01-01-2020
			US 2019386407	A1	19-12-2019
			WO 2018153733	A1	30-08-2018
DE 20120811	U1	30-04-2003	AT 277432	T	15-10-2004
			DE 20120811	U1	30-04-2003
			EP 1322000	A2	25-06-2003
IT MI20090662	A1	22-10-2010	NONE		
GB 2345389	A	05-07-2000	GB 2345389	A	05-07-2000
			HK 1026308	A1	08-12-2000
			JP 3690165	B2	31-08-2005
			JP 2000243473	A	08-09-2000
DE 3719483	A1	22-12-1988	NONE		

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82