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(54) **A safe electrical adapter**

(57) The present invention relates to an electrical adapter device comprising: at least 2 slots for inserting pins of an electrical plug (160) ; at least 2 pins (120) for inserting into an electric socket; a fastening mechanism (121-123), located inside said adapter device, that can fasten said pins of said electric plug in said electrical adapter device upon insertion of said pins of said electrical plug into said slots of said adapter device; a release mechanism (130) for releasing said pins of said electric plug from said electrical adapter device ; and a rigid case (150) for protecting at least said fastening mechanism.

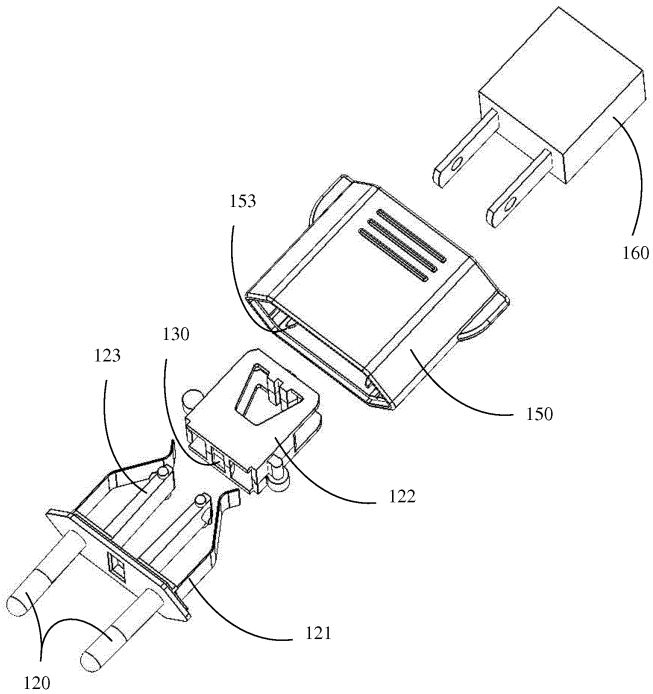

Fig. 6a

EP 2 838 165 A1

Description

Technical Field

[0001] The present invention relates to electrical adapters devices.

Background

[0002] Electric adapters are known to be used for adapting a plug of one standard to fit a socket of a different standard. Since the plug designs of today vary from place to place and from device to device, it is costly to make each product with a variety of different plug configurations for every standard socket. Thus, in many countries around the world, general electric adapters are used for fitting the plugs of different products to their standard sockets.

[0003] US 8,313,335 discloses a complex power adapter assembly which includes an adapter body, a replaceable plug and a rotation locking collar. The disclosed adapter body comprises a cylindrical casing and a circular plug receiving base fixed on top of the cylindrical casing. The plug receiving base has a recess on the top thereof and a circular peripheral surface, wherein the recess has an engagement block on the side wall thereof. The circular peripheral surface has a flange with an indentation on the top edge thereof, and a guiding groove formed from the indentation and extending downward to the bottom edge thereof. The replaceable plug is detachably mounted onto the plug receiving base and comprises a cylindrical support base comprising an upper portion and a lower portion sized to fit into the recess of the plug receiving base. The upper portion has an elongated engagement groove along its peripheral surface with one end extending to the bottom edge thereof and alignable with the guiding groove. The lower portion has an engagement groove adapted to engage with the engagement block. The rotation locking collar is detachably sleeved onto the plug receiving base and the support base, wherein the locking collar has a tab member on the inner top edge thereof adapted to enter the guiding groove and said one end of the elongated engagement groove. The tab member is further allowed to rotate into and engage with the elongated engagement groove by rotation of the locking collar.

[0004] It would therefore be desired to propose a system void of these deficiencies.

Summary

[0005] It is an object of the present invention to provide a safe electrical adapter.

[0006] It is another object of the present invention to provide a general electrical adapter which protects the user from an improper connection and from a dangerous disconnection.

[0007] It is still another object of the present invention to provide an adapter which is small, easily portable, and may be fastened to a plug of an electric appliance.

[0008] Other objects and advantages of the invention will become apparent as the description proceeds.

[0009] The present invention relates to an electrical adapter device comprising: (a) at least 2 slots for inserting pins of an electrical plug; (b) at least 2 pins for inserting into an electric socket; (c) a fastening mechanism, located inside said adapter device, that can fasten said pins of said electric plug in said electrical adapter device upon insertion of said pins of said electrical plug into said slots of said adapter device; (d) a release mechanism for releasing said pins of said electric plug from said electrical adapter device; and (e) a rigid case for protecting at least said fastening mechanism.

[0010] Preferably, the rigid case has at least 2 protrusions for preventing an incorrect insertion of the electrical plug.

[0011] Preferably, the at least 2 slots for inserting pins of an electric plug are slots designed for a NEMA 5-15R standard electric plug.

[0012] Preferably, the at least 2 pins for inserting into a socket are pins designed according to any one or more of the following standards: JIS, GOST, BS, SI, TIS, AS/NZS, IRAM, CPCS, Swiss SEV, Danish, SI32.

[0013] In one embodiment, there are 2 slots for an ungrounded plug.

[0014] In one embodiment, there are 3 slots for a grounded plug.

[0015] In one embodiment, there are 2 pins in the adapter.

[0016] In one embodiment, there are 3 pins in the adapter.

[0017] Preferably, the release mechanism electrically disconnects the pins of the electrical plug from the pins of the adapter device before releasing said pins of said electric plug from said adapter device.

[0018] In one embodiment, the device further comprises a spring for pushing and holding the fastening mechanism in place when the pins of the inserted plug are fastened in the electrical adapter.

[0019] In one embodiment, the release mechanism is operated by a screw driver

[0020] In one embodiment, the release mechanism is operated by hands alone.

Brief Description of the Drawings

[0021] The accompanying drawings, and specific references to their details, are herein used, by way of example only, to illustratively describe some of the embodiments of the invention.

[0022] In the drawings:

- Fig. 1 depicts an electrical adapter, according to an embodiment of the invention.
- Fig. 2 depicts the electrical adapter from a different

angle, according to an embodiment of the invention.

- Fig. 3 depicts some of the inner parts of the adapter without a cover, according to an embodiment of the invention.

- Fig. 4 depicts some more inner parts of the adapter, without the front side of the cage, according to an embodiment of the invention.

- Fig. 5a depicts the inner parts of the adapter, with an inserted plug, according to an embodiment of the invention

- Fig. 5b depicts an example plug, according to an embodiment of the invention.

- Fig, 6a depicts an exploded view of the adapter and a plug, according to an embodiment of the invention.

- Fig. 6b depicts some of the parts acting as part of the release mechanism of the adapter, without the cover, according to an embodiment of the invention.

- Fig. 7 depicts some more of the parts acting as part of the release mechanism of the adapter, without the front side of the cage, according to an embodiment of the invention.

- Fig. 8 depicts the inner parts of the adapter, with a spring, according to another embodiment of the invention.

- Fig. 9 depicts the adapter and an incorrect insertion of a plug, according to one embodiment.

Detailed Description

[0023] The terms of "front", "rear", "downward", "upwards", "bottom", "upper", "right", "left" or any reference to sides or directions are used throughout the description for the sake of brevity alone and are relative terms only and not intended to require a particular component orientation.

[0024] Prior art adapters may be unsafe and dangerous as they may allow the exposure of the pins of an electrical plug while electricity still flows through these pins. For example, when pulling the plug and adapter from a socket the plug's pins may start to partly withdraw out of the adapter effectively exposing parts of the plug's pins while the other parts of the plug's pins are still electrically connected in the adapter. Hence, since the adapter may still be electrically connected in the socket and electrically connected to parts of the plug's pins, any contact with the exposed parts of the plug's pins may be hazardously dangerous.

[0025] Fig. 1 depicts an electrical adapter device 100, according to an embodiment of the invention. In an embodiment, the adapter may have 2 slots 110, or more, which can receive a NEMA (National Electrical Manufacturers Association) electric plug, such as a plug of the NEMA 5-15R standard. In other embodiments the adapter 100 may have slots or holes of different shapes, sizes or number, for inserting electrical plugs or connectors of other standards. Once the 2 pins of an electric plug are inserted into the slots 110, 2 separate electrical connections, isolated from each other, are made between the 2 pins of the electric plug and the corresponding pins 120 of the adapter 100, for electrically adapting the inserted plug of one standard to a socket of a different standard. The pins 120 of the adapter 100 may belong to the standard CEE 7/16 Europlug, or may have any other shape or size and may belong to any other standard such as JIS, GOST, BS, SI, TIS, AS/NZS, IRAM, CPCS, Swiss SEV, Danish, SI32, etc. or to any combination thereof. When the 2 pins of an electric plug are inserted into the slots 110, they are also safely fastened within the plug 100 during their electrical connections to the pins 120, detailed further in relations to Fig. 5a. When the inserted plug is fastened within the adapter 100, the adapter 100 may be inserted into a socket safely and pulled from a socked safely without fear that the adapter 100 might be detached from the inserted plug. The adapter 100 may also have a rigid cover 150 made of plastic or any other rigid substance strong enough, among other reasons, for protecting the user from the inner parts of the adapter.

[0026] Fig. 2 depicts the electrical adapter 100, as described in relations to Fig. 1, from a different angle, according to an embodiment of the invention. In an embodiment, the release mechanism may be controlled by the button 130 which may be used for releasing the fastened plug from the adapter 100. The button 130 may have different shapes and sizes and may be located at different places, such as on top of the adapter 100. In one embodiment, the button 130 may be located within a slot. The button 130 may be designed to be controlled by a special tool, a standard tool such as a screwdriver, or without any tools such as by a finger. The button 130 may be a sunken button, a projecting button, a lever, a switch, or any other mechanical or electrical controller.

[0027] For the sake of brevity, Fig. 3 depicts some of the inner parts of the adapter 100, described in relations to Fig. 2, without the cover 150, according to an embodiment of the invention. The metal leaves 121 may be designed to electrically connect at one of their sides, e.g. their left side, to the pins 120, where on their other side the metal leaves 121 may be "S" shaped, according to an embodiment. The "S" shape design of the metal leaves 121 allows elasticity for easy connection with the pins of the inserted plug, as detailed in relation to fig. 5a. In other embodiments other designs are possible as long as the metal leaves 122 electrically connect between the pins of the inserted plug and the pins 120 of the adapter 100 accordingly. Cage 122 may be made of plastic or any other rigid insulating material, and will be described in greater detail in relations to Fig. 6b.

[0028] Fig. 4 depicts some more inner parts of the adapter 100, described in relations to Fig. 3, without the front side of the cage 122, according to an embodiment of the invention. In this embodiment, 2 spikes 123, each with a pointed nose 125 faced outside are designed as a snap lock for the pins of an inserted plug. The spikes 123 may be molded together with the base 124 or may be physically connected in any other way to the base 124. The spikes 123 may be made of any relatively rigid material, such as plastic. The noses 125 may be designed with a slope to allow the easy insertion and for the snap lock fastening of the pins of an inserted plug. Each of the pikes 123 may also have an ear like projecting pins 126, which can also be seen in relations to Fig. 6a. In one embodiment, each of the pikes 123 may also have 2 ears like projecting pins 126 from 2 opposing side, e. g. front and rear. Fig. 5a, on the other hand, depicts the fastening mechanism of the inner parts of the adapter 100, described in relations to Fig. 4, with the inserted plug 160, such as shown as an example in Fig. 5b, according to an embodiment. In the diagram, each of the leaves 121 clings, i.e. electrically connects, to one of the pins 163 of the inserted plug 160 for creating an electrical connection between pins 163 of the plug 160 and the adapter's pins 120 while each of the spikes 123 fastens the pins 163, of the inserted plug 160, with their noses which are inserted into the holes of pins 163 of the inserted plug 160. In other embodiments the pins 163 of the inserted plug 160 may be held by other means such as by noses of spikes inserted from the pins' 163 outer side, instead of their inner side, into the holes of the pins of the inserted plug, or in any other way as long as the inserted plug 160 is fastened to the adapter 100. Other embodiments of the fastening mechanism may be used as well such as specially designed noses for plugs that have pins with cavities, thus, by inserting specially designed noses to fit in the cavities of an inserted plug, the inserted plug may be fastened. Other embodiments of the of the fastening mechanism may be used as well such as using elements with high friction that may hold and fasten pins, of inserted plugs that have no holes or cavities, or in any other way as long as the inserted plug is fastened to the adapter until released.

[0029] Fig, 6a depicts an exploded view of the adapter 100 and plug 160, described in relations to Fig. 5a, according to an embodiment of the invention. In this embodiment, the button 130, which is part of the release mechanism, as described in relations to Fig.2 is in fact the left edge of the cage 122, thus, pushing button 130 pushes the cage 130 in the same direction. The cover 150 may have inner tracks 153 for guiding the movement of the cage 122, such as when the cage 122 is pushed by its left edge, i.e. button 130. In an embodiment, cage 122 is made of 2 parts front and back for easy assembly over the pikes 123 and within the leaves 121.

[0030] Fig. 6b depicts some of the parts acting as part of the release mechanism of the adapter 100, described also in relations to Fig. 3, without the cover 150, according to an embodiment of the invention. In this diagram, the cage 122 is pushed away from the base 128 in order to bend the head of pikes 123 inwards for releasing the pins of the inserted plug. The ears like projecting pins 126 are designed to project into the "V" like shaped window 127, of cage 122. Thus when cage 122 is pushed away from the base 128, where the pikes are physically connected to, the edge of window 127 of cage 122 pushes the ears 126 towards each other and narrows the distance between the ears 126 of the pikes 123.

[0031] Fig. 7 depicts some more parts acting as part of the release mechanism of the adapter 100, described in relations to Fig. 6b, without the front side of the cage 122, according to an embodiment of the invention. As described in Fig. 6b, the cage 122 is pushed away from the base 128 by pressing the button 130. The button 130 may be pressed by hand, using a screwdriver, a specially designed tool, or any other method. When the cage 122 is pushed away from the base 128, the ears 126 are pushed towards each other, and the noses 125 of the pikes 123 are pulled from the holes in the pins 163 of the plug 160 thus unfastening the inserted plug. Before the pins 163 are unfastened they are also disconnected from the leaves 121 by cage 122, according to one embodiment. Once the pins 163 are unfastened, the plug 160 may be safely separated from the adapter 100. In one embodiment, the pins 163 are unfastened after they are disconnected from the leaves 121 by cage 122, therefore, the adapter 100 may also be separated from the plug 160 while the adapter is still inside the socket, without accidentally electrocuting the user.

[0032] Fig. 8 depicts some of the inner parts, with a spring, of another embodiment of the adapter 100, as described in relations to Fig. 3. In this embodiment, the spring 179 is located between the cover (not shown) and the right edge of cage 122. Thus, the spring 179 is added in order to push and hold the cage 122 back in its place near the base 128, when not pushed by the user. Thus the spring 179 can push and hold the fastening mechanism in place until the release mechanism is operated. In an embodiment the leaves 121, as described in relations to Fig. 7, may be designed also to push and hold the cage 122 back in its place near the base 128.

[0033] In one embodiment the unlocking of the inserted plug from the adapter may be done by hands alone without a tool. For example, cage 122, as described in relations to Fig. 6, may have at least one protrusion, which may be molded together with cage 122 as one piece, and where the cover 150 may have at least one slot for allowing the protrusion(s) to stick out and move freely at least in one direction. Thus it may be possible, with hands alone, to move the protrusion which moves the cage 122 which may release the inserted pin.

[0034] In an embodiment, another ground slot, for the ground pin, is added to the adapter, for accepting a grounded plug. In an embodiment, a ground pin may be added to the adapter as well. In an embodiment, the ground slot of the adapter may also be connected to the

ground pin of the adapter. In an embodiment, the ground slot is not fastened as the other 2 pins are fastened inside the adapter.

[0035] In one embodiment, the case of adapter 100 is designed to have 2 protrusions 190, as shown for example in Fig. 9. The protrusions, which may have different shapes, sizes, or number, may be designed to prevent a user from inserting the plug 160 incorrectly, as shown. Thus if a user may mistakenly insert the plug incorrectly by inserting only one of the pins of plug 160, for example, by inserting the left pin of plug 160 into the right slot of adapter 100, the right pin of plug 160 will be prevented by the protrusion 190 from further insertion, thus preventing the plug 160 and its left pin from insertion.

[0036] While the above description discloses many embodiments and specifications of the invention, these were described by way of illustration and should not be construed as limitations on the scope of the invention. The described invention may be carried into practice with many modifications which are within the scope of the appended claims.

Claims

1. An electrical adapter device comprising:

a. at least 2 slots for inserting pins of an electrical plug;
b. at least 2 pins for inserting into an electric socket;
c. a fastening mechanism, located inside said adapter device, that can fasten said pins of said electric plug in said electrical adapter device upon insertion of said pins of said electrical plug into said slots of said adapter device;
d. a release mechanism for releasing said pins of said electric plug from said electrical adapter device ; and
e. a rigid case for protecting at least said fastening mechanism.

2. A device according to claim 1, where the rigid case has at least 2 protrusions for preventing an incorrect insertion of the electrical plug.

3. A device according to claim 1, where the at least 2 slots for inserting pins of an electric plug are slots designed for a NEMA standard electric plug.

4. A device according to claim 1, where the at least 2 pins for inserting into an electric socket are pins designed according to any one or more of the following standards: JIS, GOST, BS, SI, TIS, AS/NZS, IRAM, CPCS, Swiss SEV, Danish, SI32.

5. A device according to claim 1, where there are 2 slots for an ungrounded plug.

6. A device according to claim 1, where there are 3 slots for a grounded plug.

7. A device according to claim 1, where there are 2 pins in the adapter.

8. A device according to claim 1, where there are 3 pins in the adapter.

9. A device according to claim 1, where the release mechanism electrically disconnects the pins of the electrical plug from the pins of the adapter device before releasing said pins of said electric plug from said adapter device.

10. A device according to claim 1, further comprising a spring for pushing and holding the fastening mechanism in place when the pins of the inserted plug are fastened in the electrical adapter.

11. A device according to claim 1, where the release mechanism is operated by a screw driver

12. A device according to claim 1, where the release mechanism is operated by hands alone.

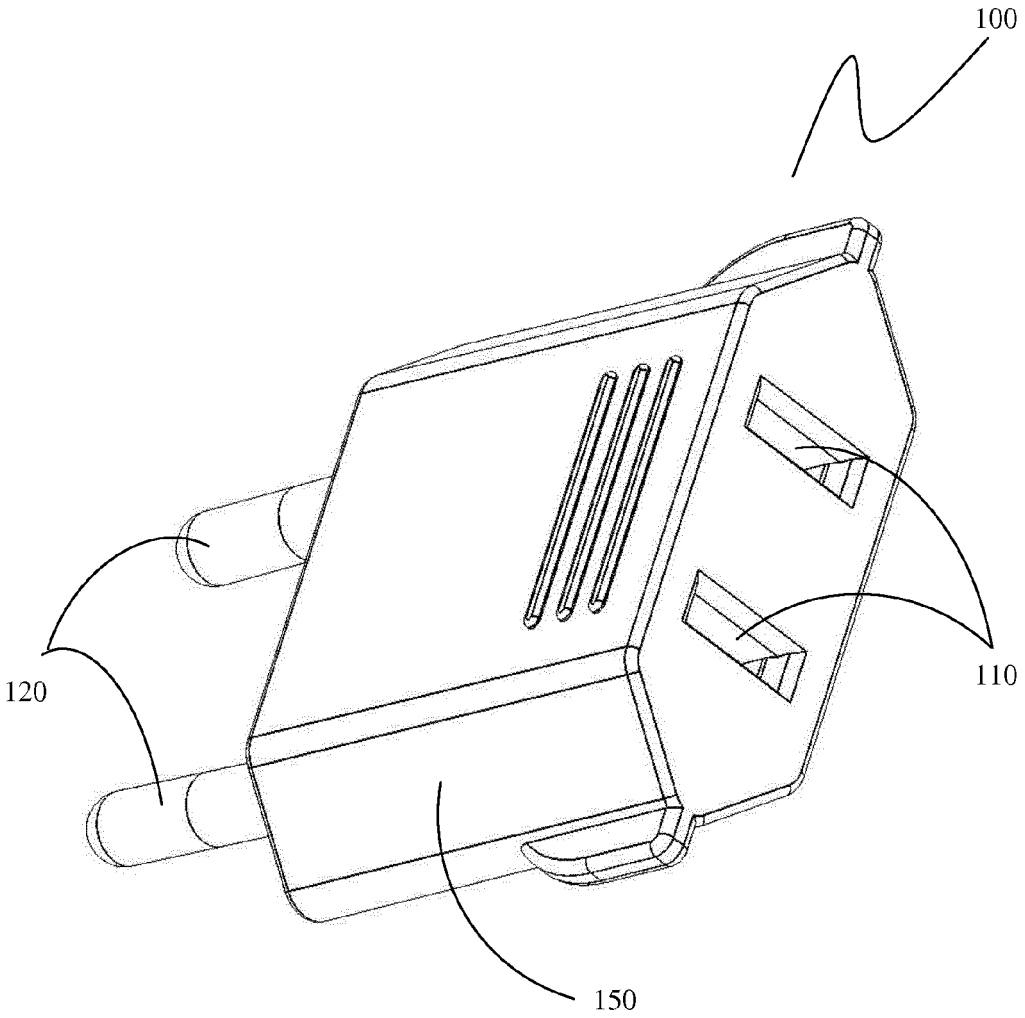

Fig. 1

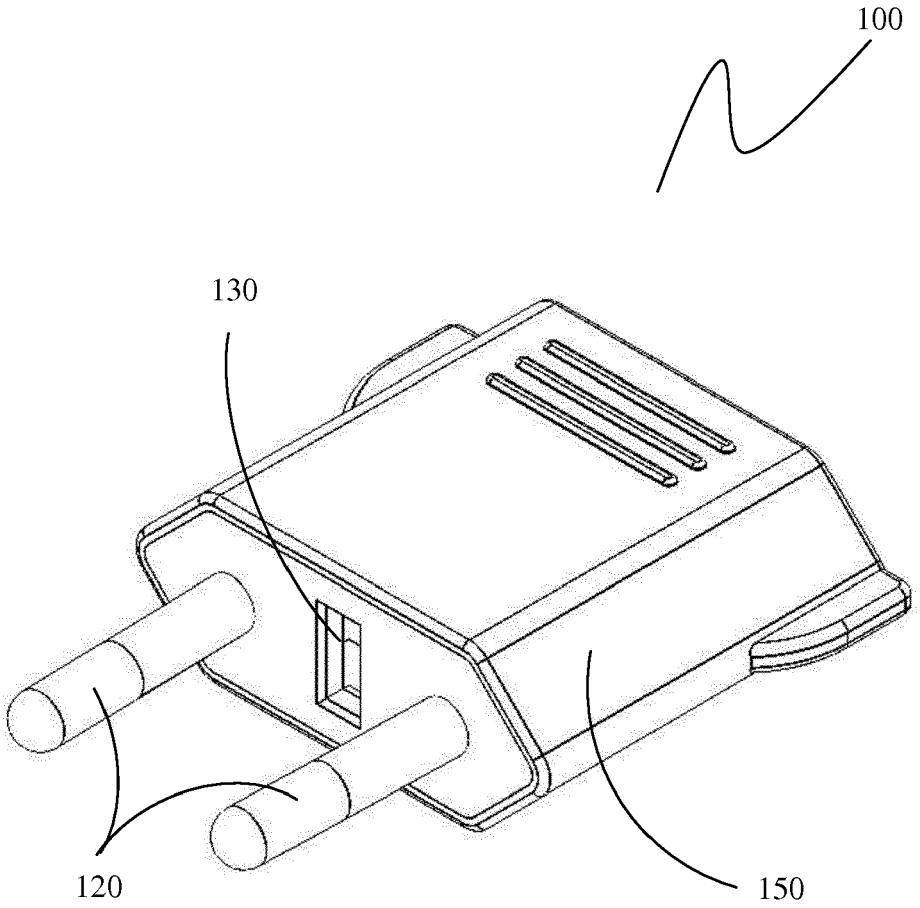

Fig. 2

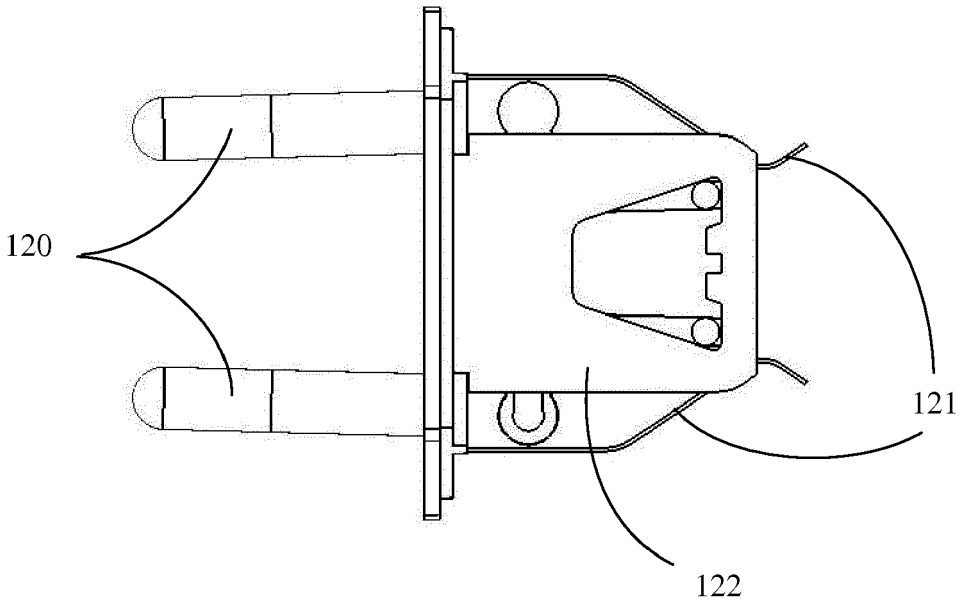

Fig. 3

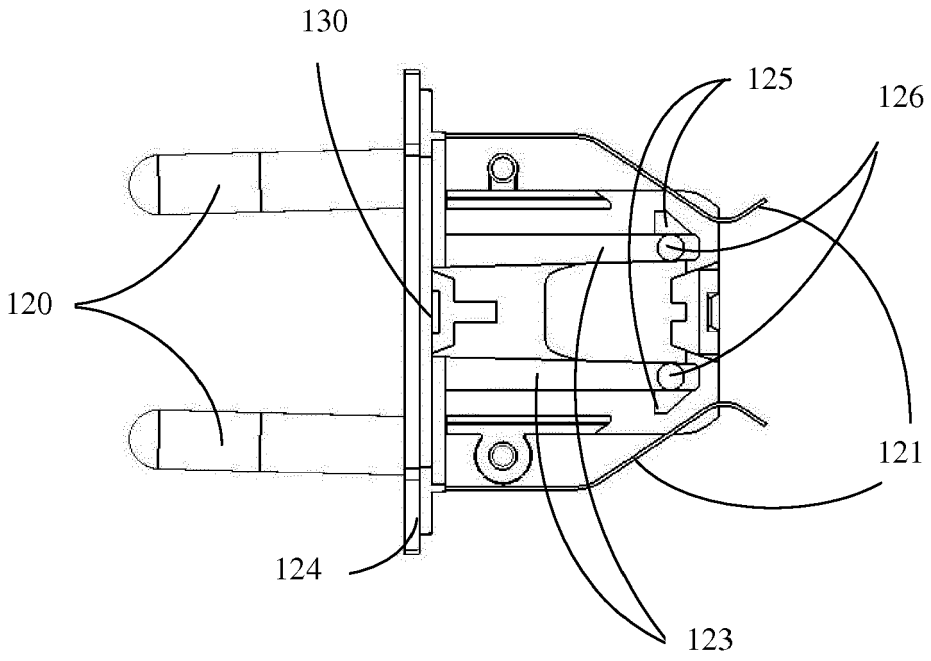

Fig. 4

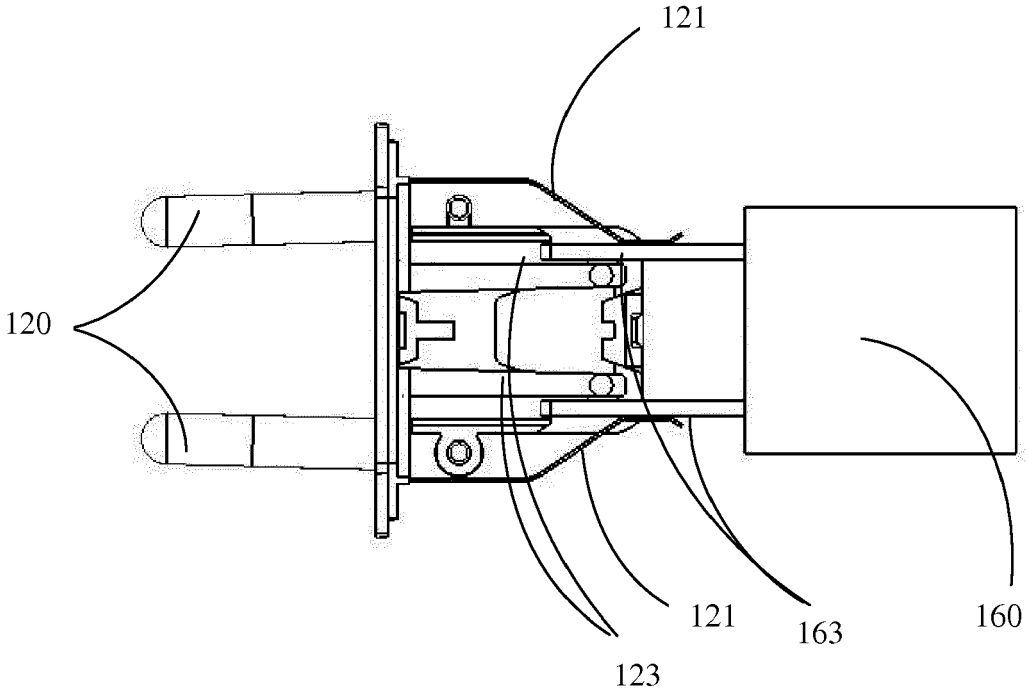

Fig. 5a

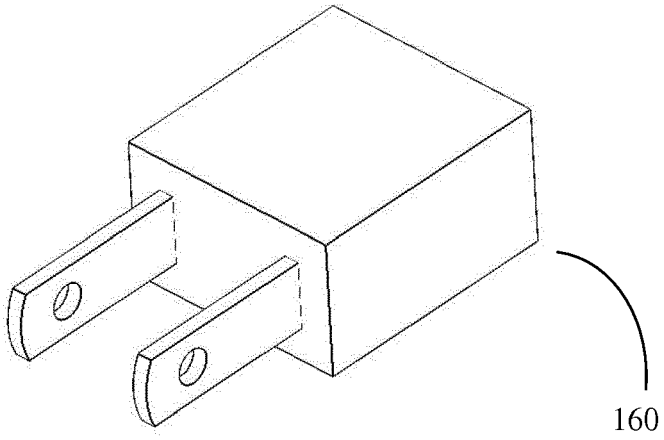

Fig. 5b

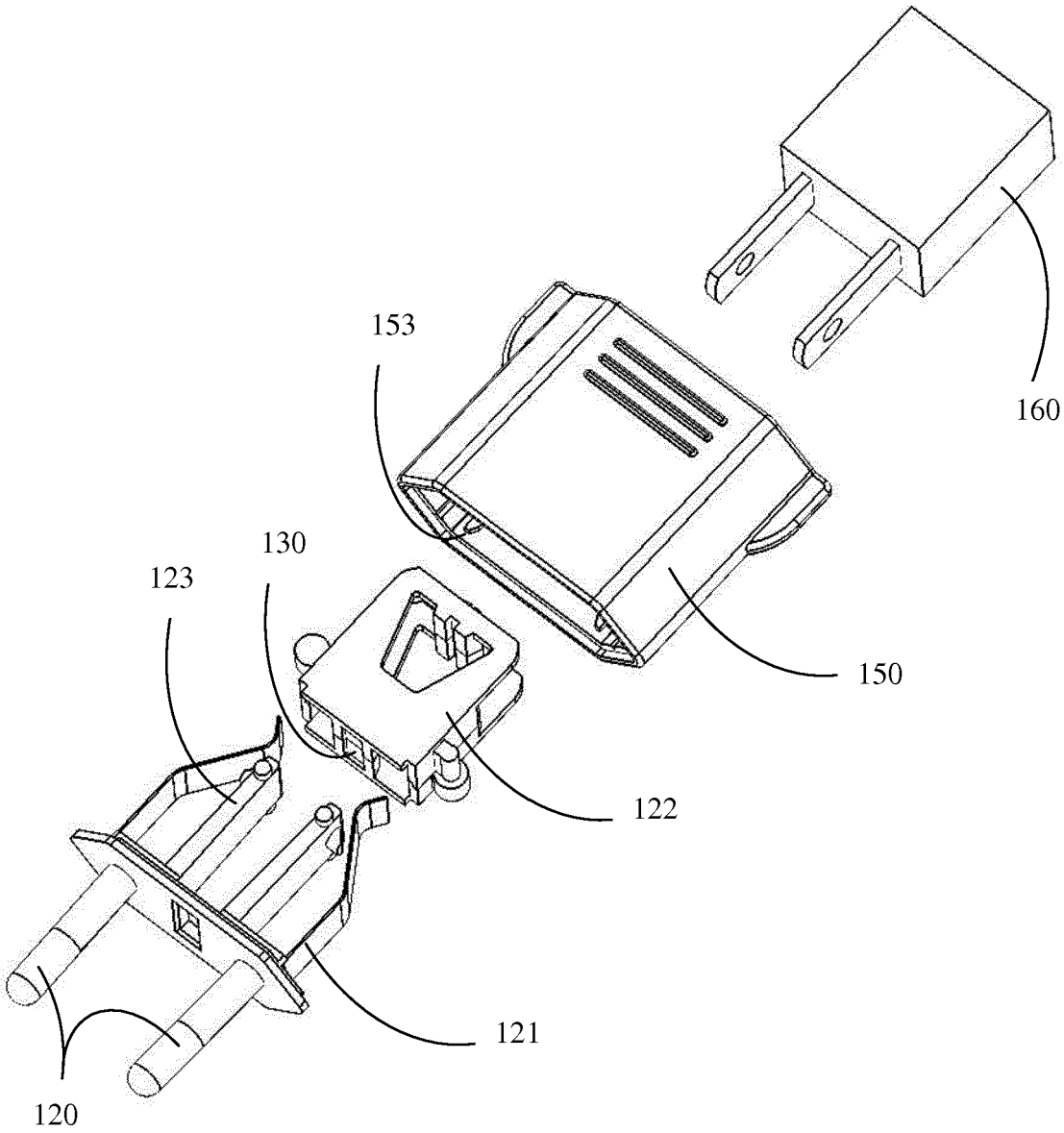

Fig. 6a

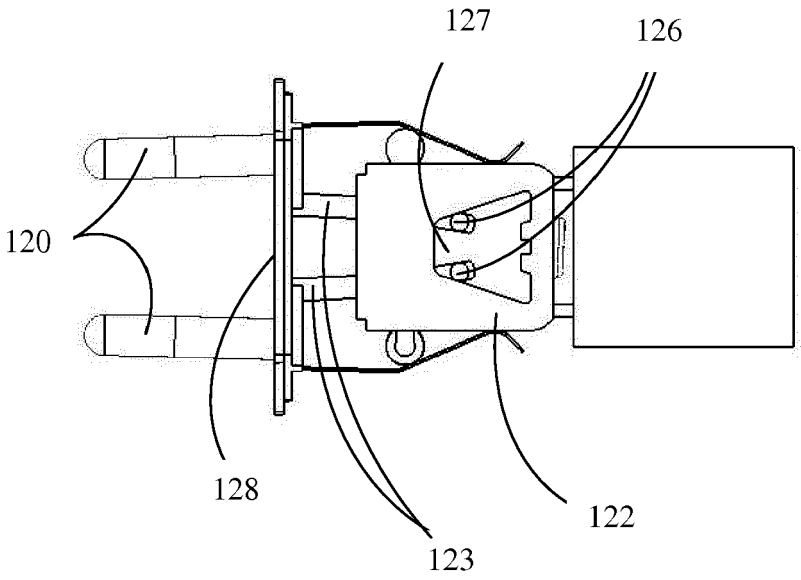

Fig. 6b

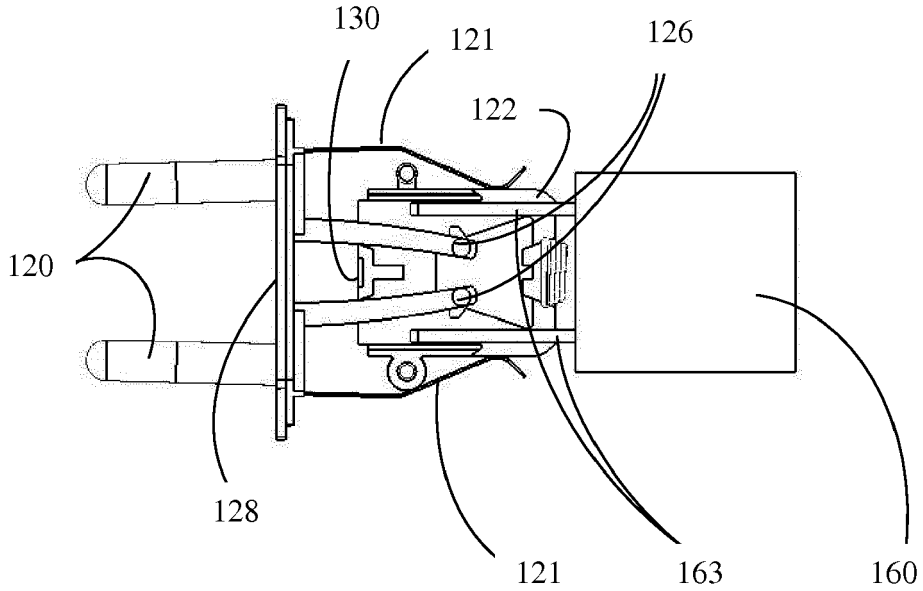

Fig. 7

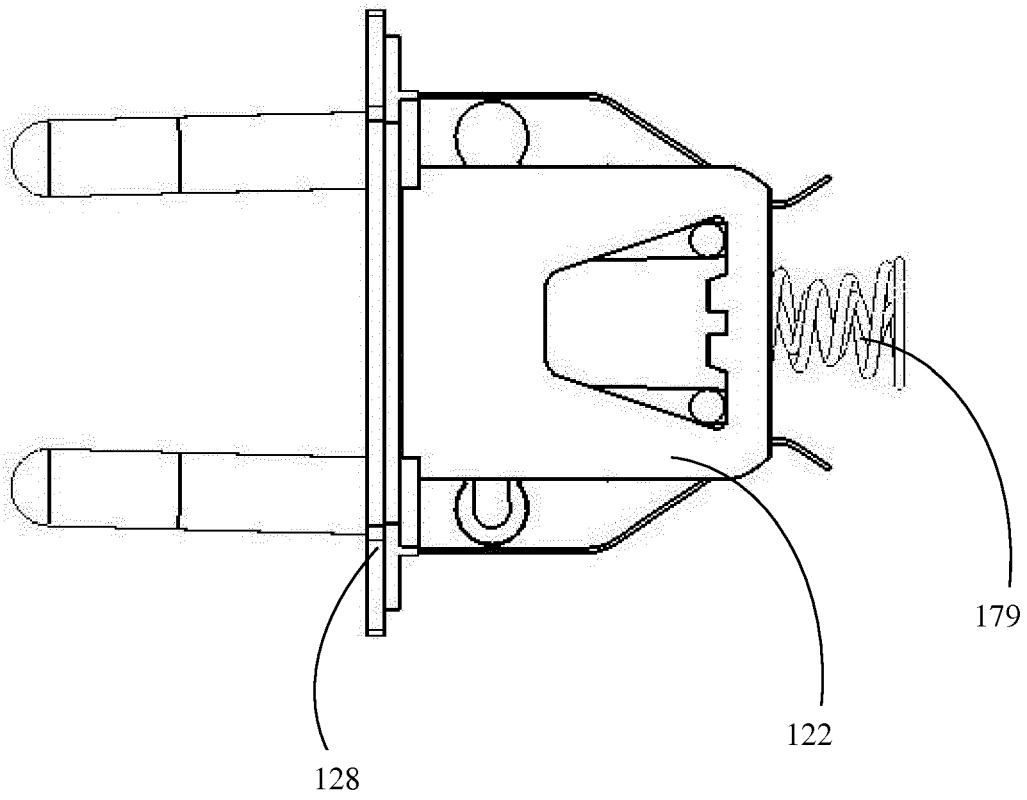

Fig. 8

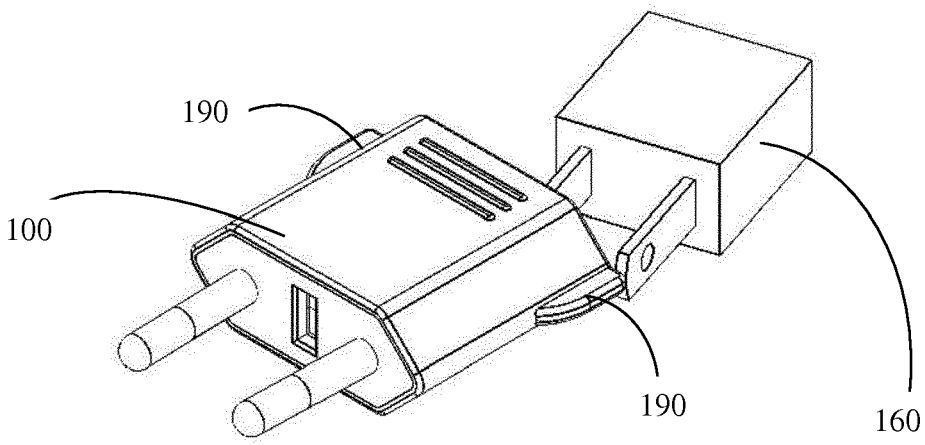

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 8381

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	WO 99/44263 A1 (MOTOROLA INC [US]) 2 September 1999 (1999-09-02) * page 2, line 11 - page 3, line 37; figures 1-8 *	1-12	INV. H01R31/06 H01R13/627 ADD. H01R13/71 H01R103/00
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A	US 5 551 884 A (BURKHART SR STEVEN A [US]) 3 September 1996 (1996-09-03) * figures 2,3 *	1-12	
A	US 4 167 658 A (SHERMAN ROBERT S) 11 September 1979 (1979-09-11) * the whole document *	1-12	
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			TECHNICAL FIELDS SEARCHED (IPC) H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 December 2014	Philippot, Bertrand

CATEGORY OF CITED DOCUMENTS

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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
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11-12-2014

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

REFERENCES CITED IN THE DESCRIPTION

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