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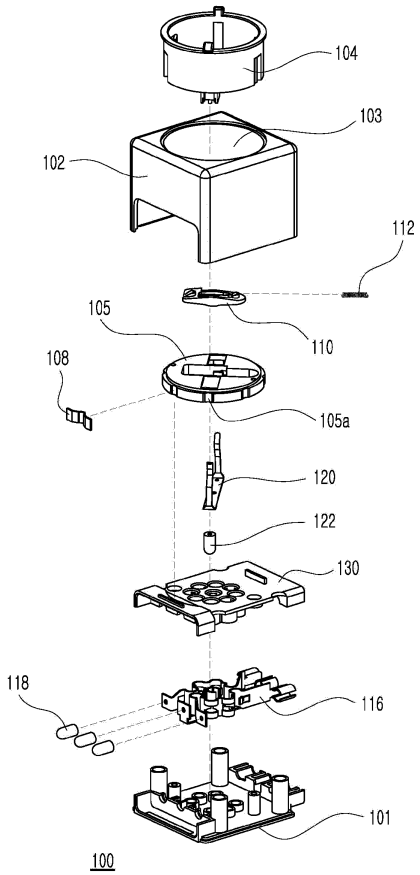
(54) ROTATABLE SOCKET

(57) The present invention relates to a power strip and more specifically, to a rotatable socket applied to a power strip in which sockets of the power strip are individually rotatable freely. To this end, the rotatable socket according to the present invention includes a socket inserted into an opening of an upper case and rotated therein, a position adjusting plate fastened to a lower portion of the socket, and a positioning plate spring installed on an inner wall of the upper case, in which, when the socket is rotated, the position adjusting plate is rotated and the positioning plate spring is fastened to grooves formed at predetermined intervals in a circumference of the position adjusting plate, so that the socket is rotated at predetermined intervals and fixed.

Fig.3



EP 4 207 512 A1

Description

Technical Field

[0001] The present invention relates to a power strip, and more specifically, to a rotatable socket applied to a power strip in which sockets of the power strip are individually rotatable freely.

Background Art

[0002] A power strip is a device in which a plurality of sockets (outlets) are connected to each other in parallel so that multiple plugs can be inserted at the same time for use.

[0003] As the number of electrical devices used in homes and offices increases, the number of required outlets also increases, but installing a large number of outlets in offices or homes is not cost-effective and aesthetically undesirable. Therefore, in most homes or offices, an appropriate number of buried outlets are provided in consideration of the size of the room, and power strips are additionally connected to the outlet for use as necessary.

[0004] When a plurality of plugs are plugged into the power strip in which several sockets are connected in parallel and used, interferences often occur between plugs inserted into adjacent sockets. This is because the interval between the plurality of sockets in the power strip is narrow, the sizes of the plugs are different from each other, and the width of the plug terminal is greater than the size of the terminal insertion hole of the socket.

[0005] In the case of the outermost socket of the power strip, the interference problem can be solved to some extent by adjusting the direction in which the plug is inserted, but there is a problem in that the socket located in the middle has interference with adjacent sockets regardless of which direction the plug is inserted.

[0006] In recent years, in order to solve the interference problem of the power strip, a power strip product is provided, which is configured in a module form and modules can be inserted in changed orientations to allow the plugs to be inserted in different directions.

[0007] However, in this modular power strip, there is an inconvenience of having to take out and insert a module to change the plug insertion orientation, and above all, because it uses a method of inserting the module itself, there is a limit to the rotation angle of the plug.

Detailed Description of Invention

Technical Problem

[0008] The present invention has been devised to solve the problems described above, and an object of the present invention is to provide a rotatable socket that has no interference between plugs when a plug is inserted into a socket of a power strip.

[0009] Another object of the present invention is to provide a rotatable socket capable of individually rotating in a power strip and rotating to varying rotation angles.

[0010] Yet another object of the present invention is to provide an electrode structure of a rotatable socket that can be applied to a modular power strip.

Technical Solution

[0011] To this end, the rotatable socket according to the present invention may include a socket inserted into an opening of an upper case and rotated therein, a position adjusting plate fastened to a lower portion of the socket, and a positioning plate spring installed on an inner wall of the upper case, in which, when the socket is rotated, the position adjusting plate may be rotated and the positioning plate spring may be fastened to grooves formed at predetermined intervals in a circumference of the position adjusting plate, so that the socket may be rotated at predetermined intervals and fixed.

[0012] In addition, the rotatable socket according to the present invention may include a socket inserted into an opening of an upper case and rotated therein, a position adjusting plate fastened to a lower portion of the socket and rotated according to a rotation of the socket, and an electrode mount attached with an electrode installed at a lower portion of the position adjusting plate, in which, when a plug pin is inserted into a plug pin hole of the socket, the plug pin may be passed through the plug pin hole of the position adjusting plate and inserted into the plug pin hole of the electrode mount, so that the rotation of the socket may be restrained.

[0013] In addition, the rotatable socket according to the present invention may include a socket inserted into an opening of an upper case and rotated therein, a position adjusting plate fastened to a lower portion of the socket; and a positioning pin installed on a side of the position adjusting plate, in which, when the socket is rotated, the position adjusting plate may be rotated and the positioning pin may be fastened to grooves formed at predetermined intervals in a circumference of the position adjusting plate, so that the socket may be rotated at predetermined intervals and fixed.

Effects of Invention

[0014] As described above, the rotatable socket according to the present invention has a structure such that it is rotated individually in a power strip, and has an effect of allowing the user to freely change the direction of the socket into which the plug is inserted conveniently without having to take out and insert the socket module like the conventional modular power strip.

[0015] The present invention has the effect of varying the rotation angle of the socket by forming different intervals between the grooves of the position adjusting plate fastened to the lower portion of the socket.

[0016] In addition, the present invention has an effect of stably using the power strip, by allowing free rotation

of individual socket in the power strip by attaching an electrode mount having the electrodes attached to the lower portion of the position adjusting plate, and restraining the rotation of the socket when the plug is inserted.

[0017] In addition, the present invention has the effect of stably using the power strip, by allowing free rotation of individual socket in the power strip by forming the fixing part inside the upper case into which the socket is inserted, and restraining the rotation of the socket when the plug is inserted.

Brief Description of The Drawings

[0018]

FIG. 1 shows views of a power strip including rotatable sockets according to an embodiment of the present invention.

FIG. 2 shows views of a rotatable socket module according to an embodiment of the present invention.

FIG. 3 is an exploded perspective view of a rotatable socket according to an embodiment of the present invention.

FIG. 4 is a view showing a position adjusting plate of a rotatable socket according to an embodiment of the present invention.

FIG. 5 is a bottom plan view of a position adjusting plate of a rotatable socket according to an embodiment of the present invention.

FIG. 6 is a view showing a rotatable socket in a state before a plug is inserted thereto, according to an embodiment of the present invention.

FIG. 7 shows views of a rotatable socket in a state in which a plug is inserted thereto, according to an embodiment of the present invention.

FIG. 8 shows views of an electrode mount of a rotatable socket according to an embodiment of the present invention.

FIG. 9 shows views of an electrode according to an embodiment of the present invention.

FIG. 10 is an exploded perspective view of a rotatable socket according to another embodiment of the present invention.

FIG. 11 shows plan views of a position adjusting plate of a rotatable socket according to another embodiment of the present invention.

FIG. 12 shows views of a rotatable socket in a state before a plug is inserted thereto, according to another embodiment of the present invention.

FIG. 13 shows views of a rotatable socket in a state in which a plug is inserted thereto, according to another embodiment of the present invention.

FIG. 14 shows views of a lower case and a ground terminal according to another embodiment of the present invention.

Best Mode

[0019] Hereinafter, embodiments disclosed herein will be described in detail with reference to the accompanying drawings. Similar components in each drawing are assigned the same reference numerals, and duplicate descriptions thereof will be omitted.

[0020] The term "module" or "part", "member", or the like used in the names of the components as used in the description are given only in consideration of the ease of writing the description, and not intended to have distinct meaning roles by themselves.

[0021] In addition, in describing embodiments disclosed herein, if it is determined that detailed description of related known technologies may obscure the gist of the embodiments disclosed herein, the detailed description thereof will be omitted.

[0022] In addition, it should be understood that the accompanying drawings are only for the purpose of facilitating understanding of the embodiments disclosed in description, and the technical idea disclosed in the description is not limited by the accompanying drawings and includes all modifications, equivalents and substitutes included in the spirit and scope of the present disclosure.

[0023] FIG. 1 shows views of a power strip including rotatable sockets according to an embodiment of the present invention.

[0024] Referring to FIG. 1, the power strip including the rotatable sockets according to the present invention includes a main module 10, a general type socket module 20, a rotatable socket module 30, and a connector cap 50.

[0025] A cord 11 is connected to the main module 10, thus connecting the main module 10 to an outlet. The main module 10 is connected to the general type socket module 20 and the general type socket module 20 is connected to the rotatable socket module 30. A connector cap 40 is connected to the rotatable socket module 30. The general type socket module 20 and the rotatable socket module 30 may be connected regardless of the order in which they are connected. A rotatable socket including an electrode mount structure according to the present invention is applied to the rotatable socket module 30.

[0026] FIG. 2 shows the rotatable socket module 30 applying a rotatable socket according to the present invention, and FIG. 3 shows an exploded perspective view of the rotatable socket module 30.

[0027] Referring to FIG. 2, it can be seen that the rotatable socket module 30 is provided with connectors 31 and 33 for module connection. The connectors 31 and 33 include a module connection female part 31 and a module connection male part 33. For connection between modules, the module connection female part 31 is inserted into the module connection male part 33 to be connected to each other.

[0028] For convenience of description of the present invention, the rotatable socket module 30 is the same as

a rotatable socket 100 according to the present invention.

[0029] Referring to FIG. 3, the rotatable socket 100 according to the present invention has a structure including a lower case 101 and an upper case 102 fastened to form an exterior, and a socket 104 inserted into an opening 103 of the upper case 102 and rotated therein.

[0030] A lower portion of the socket 104 is fastened to a position adjusting plate 105. When the socket 104 is rotated, the position adjusting plate 105 fastened with the socket 104 is rotated. Grooves 105a are formed on an outer periphery (circumference) of the position adjusting plate 105 at intervals of 45 degrees.

[0031] FIG. 4 shows the position adjusting plate of the rotatable socket according to an embodiment of the present invention, and FIG. 5 shows a bottom plan view of the position adjusting plate.

[0032] Referring to FIGS. 4 and 5, when the position adjusting plate 105 is rotated, a positioning plate spring 108 is fastened to the groove 105a of the position adjusting plate 105 such that the socket 104 is fixed. The positioning plate spring 108 is installed on an inner wall of the upper case 102.

[0033] The socket 104 may be rotated 360 degrees while changing its position by 45 degrees. When the position adjusting plate 105 is rotated, the positioning plate spring 108 is compressed, and upon meeting the groove 105a, the positioning plate spring 108 is restored and engaged with the groove 105a. As the positioning plate spring 108 is fastened to the groove 105a, the rotating socket 104 stops rotating and is fixed.

[0034] That is, when the socket 104 is rotated, the position adjusting plate 105 is rotated and the positioning plate spring 108 is fastened to the groove 105a of the position adjusting plate 105 such that the socket 104 can be rotated at 45 degree intervals and fixed. In the embodiment of the present invention, the rotation angle of the socket 104 is 45 degrees, but aspects are not limited thereto, and the rotation angle of the socket 104 may be variously changed by changing the intervals of the grooves 105a.

[0035] A safety cap receiving groove 105b and a ground terminal hole 105c are formed on an upper surface of the position adjusting plate 105. A safety cap 110 is seated in the safety cap receiving groove 105b and is movable in the receiving groove 105b. A ground terminal 120 is inserted into the ground terminal hole 105c.

[0036] The safety cap 110 includes a plug pin contact surface 110a to contact with the plug pin. The plug pin contact surface 110a is formed at inclination, and when the plug pin contacts and presses the inclined contact surface 110a, the safety cap 110 is moved in the opposite direction of the slope, that is, toward an empty space of the receiving groove 105b. At this time, a spring 112 disposed on a side of the safety cap 110 is compressed in the receiving groove 105b.

[0037] FIG. 6 is a view showing the rotatable socket in a state before the plug is inserted thereto, according to an embodiment of the present invention, and FIG. 7 shows views of the rotatable socket in a state in which the plug is inserted thereto.

[0038] Referring to FIG. 6 and 7, the position adjusting plate 105 is attached to the lower portion of the socket 104, and the safety cap 110, which corresponds to a plug pin hole 104a of the socket 104 and to a plug pin hole 105a of the position adjusting plate 105, is installed on the upper surface of the position adjusting plate 105, as described above with reference to FIG. 4.

[0039] When a plug 40 is inserted into the socket 104, a plug pin 41 is inserted through the plug pin hole 104a of the socket 104, and as the safety cap 110 is pushed by the plug pin 41, the safety cap 110 is moved in a direction opposite to the inclined direction of the contact surface 110a. When the safety cap 110 is moved, the plug pin hole 105a of the position adjusting plate 105 is opened and the plug pin 41 is inserted into the plug pin hole 105a. When the plug pin 41 enters the plug pin hole 105a, the socket 104 is not rotatable.

[0040] When the plug pin 41 is inserted into the plug pin hole 104a of the socket 104 and the safety cap 110 is pushed and moved, the spring 112 disposed on the side of the safety cap 110 is compressed, and then, when the plug pin 41 is pulled out, the compressed spring 112 is restored, and the safety cap 110 returns to its original position by the restoring force of the spring. When the protective cap 110 returns to its original position, the plug pin hole 104a of the socket 104 is covered by the protective cap 110 and the socket 104 is rotatable again.

[0041] FIG. 8 shows views of an electrode mount of the rotatable socket according to an embodiment of the present invention, and FIG. 9 shows views of an electrode according to an embodiment of the present invention.

[0042] Referring to FIGS. 8 and 9, an electrode mount 130 is a member installed under the position adjusting plate 105, and an electrode 116 is attached to the lower portion of the electrode mount 130.

[0043] A ground terminal pin hole 130b is formed on the upper surface of the electrode mount 130 to receive a ground terminal pin 122 to be inserted therein, and a plurality of plug pin holes 130a are formed at regular intervals around the ground terminal pin hole 130b.

[0044] As shown in FIG. 7, during insertion of the plug 40 into the socket 104, when the plug pin 41 passes through the plug pin hole 105a of the position adjusting plate 105, the plug pin 41 is inserted into the plug pin hole 130a of the electrode mount 130 and fixed by the electrode mount 130, such that the socket 104 is not rotatable.

[0045] The electrode mount 130 includes electrode body insertion holes 130c formed at a lower portion thereof, which extend in the plurality of plug pin holes 130a and a ground hole 103b to receive electrode bodies 116a, 116b, and 116c forming the electrode 116 to be inserted therein.

[0046] The electrode 116 includes the positive electrode body 116a, the negative electrode body 116b, and the ground electrode body 116c. Each electrode body

includes a module connection electrode pin 118 installed at one end, and an electrode pin connector 119 installed at the other end.

[0047] The module connection electrode pin 118 forms the module connection male part 33 of the rotatable socket 100, and the electrode pin contact body 119 forms the module connection female part 31.

[0048] FIG. 10 is an exploded perspective view of the rotatable socket module 30 according to another embodiment of the present invention. For convenience of description of the present invention, as described above, it is assumed that the rotatable socket module 30 is the same as the rotatable socket 100 according to another embodiment of the present invention.

[0049] Referring to FIG. 10, the rotatable socket 100 according to the present invention has a structure including a lower case 101 and an upper case 102 fastened to form an exterior, and a socket 104 inserted into an opening 103 of the upper case 102 and rotated therein.

[0050] A lower portion of the socket 104 is fastened to a position adjusting plate 105. When the socket 104 is rotated, the position adjusting plate 105 fastened with the socket 104 is rotated. Grooves 105a are formed on an outer periphery (circumference) of the position adjusting plate 105 at intervals of 45 degrees.

[0051] As shown in FIG. 11, when the position adjusting plate 105 is rotated, the socket 104 is fixed as the groove 105a is caught on a positioning pin 108. The positioning pin 108 is inserted into a positioning frame 107, and a spring 109 is installed on a rear surface of the positioning pin 108.

[0052] The socket 104 may be rotated 360 degrees while changing its position by 45 degrees. When the position adjusting plate 105 is rotated, the positioning pin 108 compresses the spring 109, and when the groove 105a meets the positioning pin 108, the compressed spring 109 is restored and the positioning pin 108 enters the groove 105a by the restoring force of the spring 109. As the positioning pin 108 is fastened to the groove 105a, the rotating socket 104 stops rotating and is fixed.

[0053] That is, when the socket 104 is rotated, the position adjusting plate 105 is rotated and the positioning pin 108 is fastened to the groove 105a of the position adjusting plate 105 such that the socket 104 can be rotated at 45 degree intervals and fixed. In the embodiment of the present invention, the rotation angle of the socket 104 is 45 degrees, but aspects are not limited thereto, and the rotation angle of the socket 104 may be variously changed by changing the intervals of the grooves 105a.

[0054] FIG. 12 shows views of the rotatable socket in a state before the plug is inserted thereto, according to another embodiment of the present invention, and FIG. 13 shows views of the rotatable socket in a state in which the plug is inserted thereto, according to another embodiment of the present invention.

[0055] Referring to FIGS. 12 and 13, the protective cap 110 corresponding to plug pin holes 112 is installed below the socket 104. In addition, a fixing part 106 is formed inside the upper case 102 to guide the rotation of the socket 104 and also to restrain the rotation of the socket 104. Fixing grooves 106a are formed at regular intervals on an outer periphery (circumference) of the fixing part 106.

[0056] When the plug pin 41 is inserted through the plug pin hole 112, the protective cap 110 is pushed by the plug pin 41 and inserted into the fixing groove 106a. When the protective cap 110 is caught in the fixing groove 106a, the socket 104 is not rotatable.

[0057] When the plug pin 41 is inserted and the protective cap 110 is pushed, a spring 111 installed in the protective cap 110 is compressed, and then, when the plug pin 41 is pulled out, the compressed spring 111 is restored, and the protective cap 110 returns to its original position by the restoring force of the spring. When the protective cap 110 returns to its original position, the socket 104 is rotatable again.

[0058] FIG. 14 shows views of a lower case and a ground terminal according to another embodiment of the present invention.

[0059] Referring to FIG. 14, a printed circuit board (PCB) 115 is attached to the inside of the lower case 101, and a plurality of electrodes 116 are installed on the PCB 115 as shown in FIG. 14A.

[0060] The plurality of electrodes 106 include a central ground electrode 116b, and plug pin electrodes 116a configured therearound. A lower terminal 122 of the ground terminal 120 is connected to the ground electrode 116b, and the plug pin 41 is connected to the plug pin electrode 116a.

[0061] The plug pin electrodes 116a are disposed at 45 degree intervals around the ground electrode 116b so that the plug 40 can be connected to the rotatable socket 100 at any angle while the socket 104 is rotated at 45 degree intervals.

[0062] The ground terminal 120 shown in FIG. 14B is installed in the socket 104. An upper terminal 121 of the ground terminal 120 is inserted into a ground hole 114 of the lower portion of the socket 104 and is seated on an inner wall of the socket 104, and the lower terminal 122 is inserted into a ground hole 113 formed in the position adjusting plate 105 and connected to the ground electrode 116b of the lower case 101.

[0063] The above detailed description should not be construed as limiting in all respects and should be considered illustrative. The scope of the present invention should be determined by reasonable interpretation of the appended claims, and all changes within the equivalent scope of the present invention are included in the scope of the present invention.

Industrial Applicability

[0064] The rotatable socket according to the present invention can be variously applied to a buried plug as well as a power strip product.

Claims

1. A rotatable socket comprising:

   a socket inserted into an opening of an upper case and rotated therein;
   a position adjusting plate fastened to a lower portion of the socket; and
   a positioning plate spring installed on an inner wall of the upper case, wherein,
   when the socket is rotated, the position adjusting plate is rotated and the positioning plate spring is fastened to grooves formed at predetermined intervals in a circumference of the position adjusting plate, so that the socket is rotated at predetermined intervals and fixed.

2. The rotatable socket according to claim 1, wherein a safety cap corresponding to a plug pin hole of the socket is provided on an upper surface of the position adjusting plate, and
   when a plug pin is inserted through the plug pin hole of the socket, the safety cap is pushed by the plug pin and the plug pin is inserted into the plug pin hole of the position adjusting plate.

3. The rotatable socket according to claim 2, wherein an electrode mount with an electrode attached thereto is installed at a lower portion of the position adjusting plate, and
   the plug pin passed through the plug pin hole of the position adjusting plate is inserted into the plug pin hole of the electrode mount to restrain the rotation of the socket.

4. The rotatable socket according to claim 3, wherein a ground terminal pin hole and a plurality of plug pin holes are formed on an upper surface of the electrode mount, and
   the electrode mount includes, formed at a lower portion, an electrode body insertion hole which extends in the holes and into which an electrode body forming the electrode is inserted.

5. The rotatable socket according to claim 4, wherein the electrode body includes a positive electrode body, a negative electrode body, and a ground electrode body, and
   each electrode body includes a module connection electrode pin installed at one end, and an electrode pin connector installed at the other end, to which the module connection electrode pin is connected.

6. A rotatable socket comprising:

   a socket inserted into an opening of an upper case and rotated therein;
   a position adjusting plate fastened to a lower portion of the socket and rotated according to a rotation of the socket; and
   an electrode mount attached with an electrode installed at a lower portion of the position adjusting plate, wherein,
   when a plug pin is inserted into a plug pin hole of the socket, the plug pin is passed through the plug pin hole of the position adjusting plate and inserted into the plug pin hole of the electrode mount, so that the rotation of the socket is restrained.

7. A rotatable socket comprising:

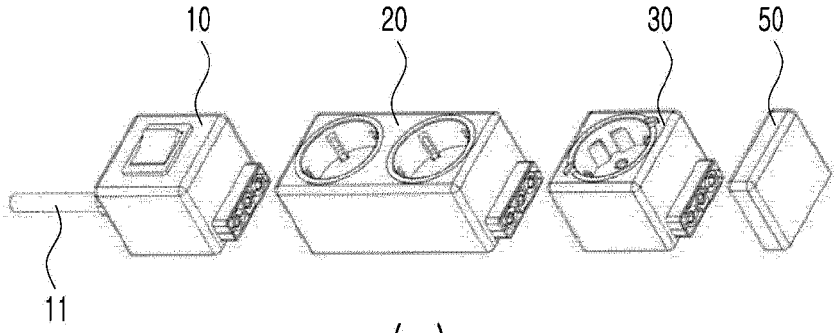
   a socket inserted into an opening of an upper case and rotated therein;
   a position adjusting plate fastened to a lower portion of the socket; and
   a positioning pin installed on a side of the position adjusting plate, wherein,
   when the socket is rotated, the position adjusting plate is rotated and the positioning pin is fastened to grooves formed at predetermined intervals in a circumference of the position adjusting plate, so that the socket is rotated at predetermined intervals and fixed.

8. The rotatable socket according to claim 7, wherein a protective cap corresponding to a plug pin hole is installed at the lower portion of the socket,
   a fixing part for guiding the rotation of the socket is formed inside the upper case, and when a plug pin is inserted through the plug pin hole, the protective cap is pushed by the plug pin and inserted into a fixing groove formed in the fixing part, so that the rotation of the socket is restrained.

9. The rotatable socket according to claim 7, wherein a printed circuit board is attached to a lower case fastened to the upper case, and a ground electrode connected to a ground terminal of the socket is disposed at a center of the printed circuit board.

10. The rotatable socket according to claim 9, wherein a plurality of plug pin electrodes for connecting with plug pins are arranged around the ground electrode at intervals corresponding to a rotation interval of the socket.

Fig.1



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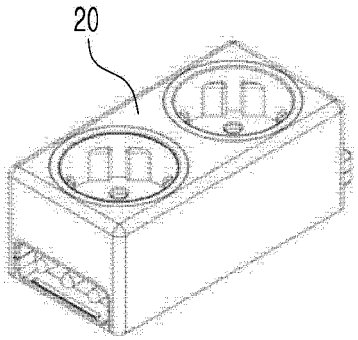

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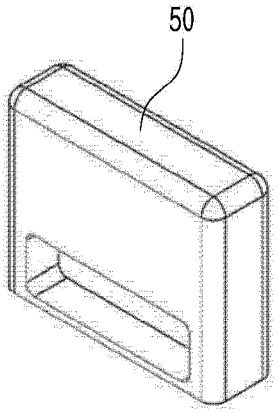

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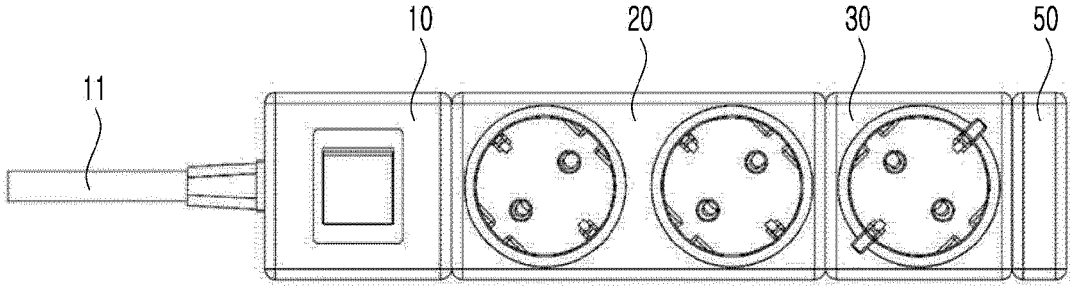
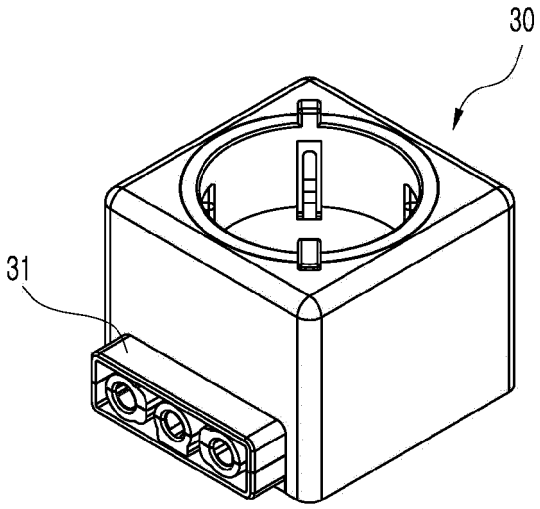


(d)

Fig.2



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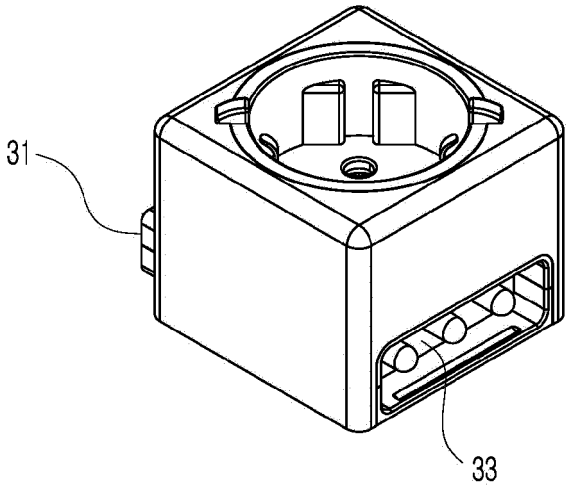

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Fig.3

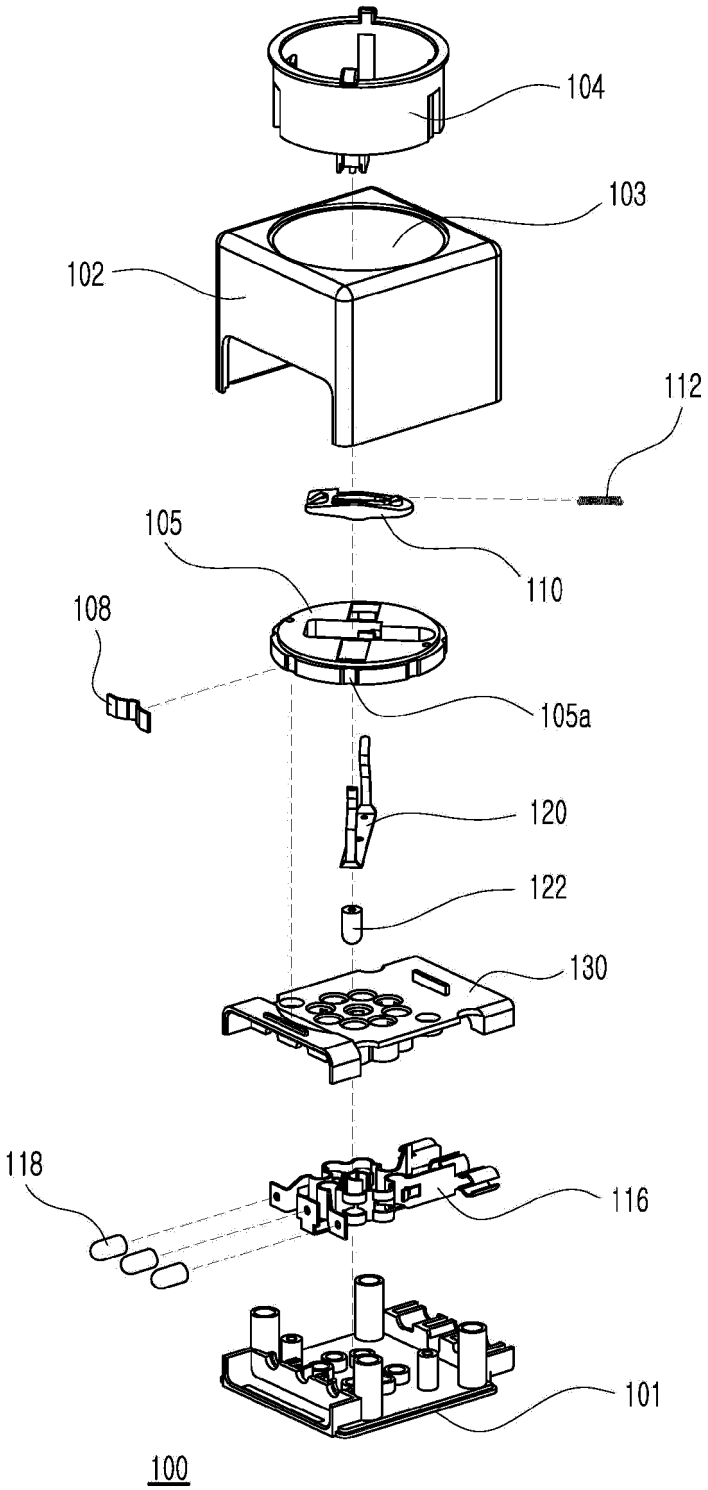


Fig.4

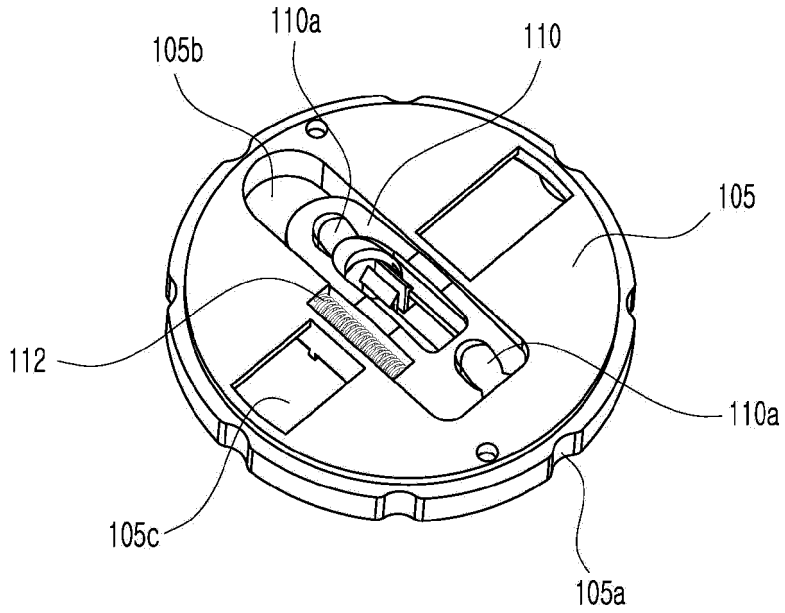


Fig.5

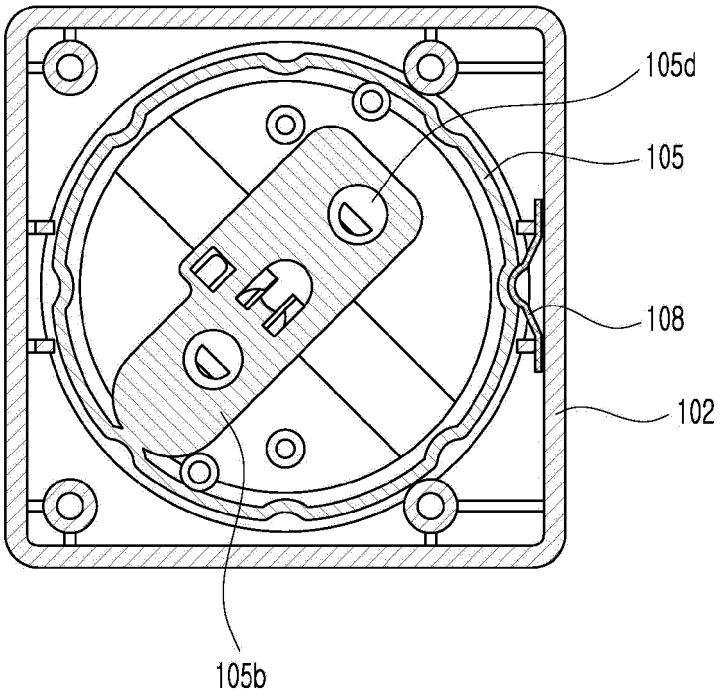


Fig.6

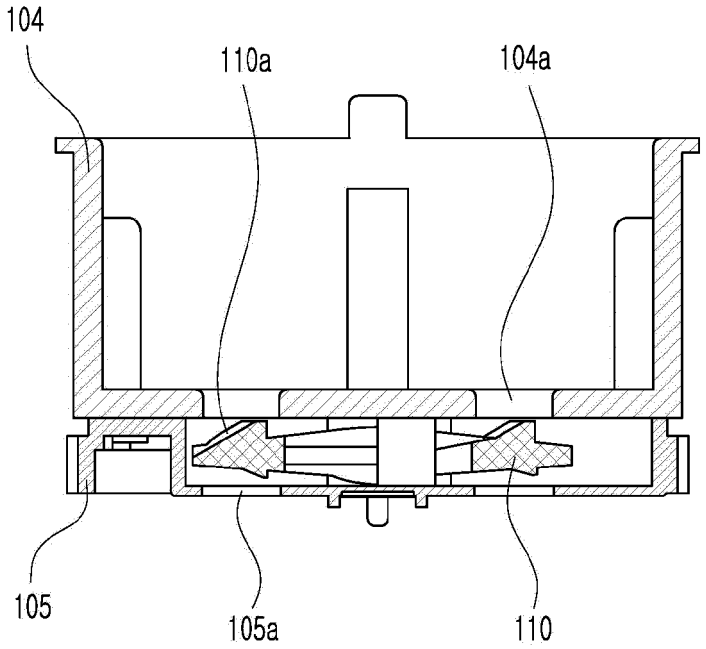
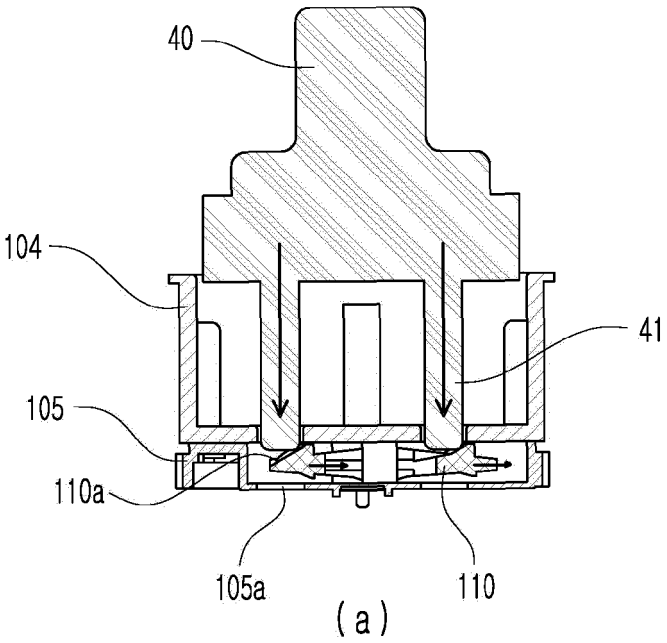


Fig.7



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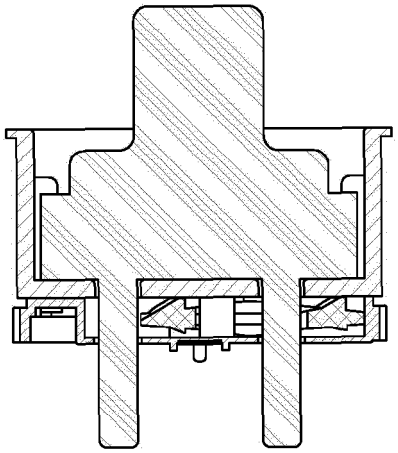
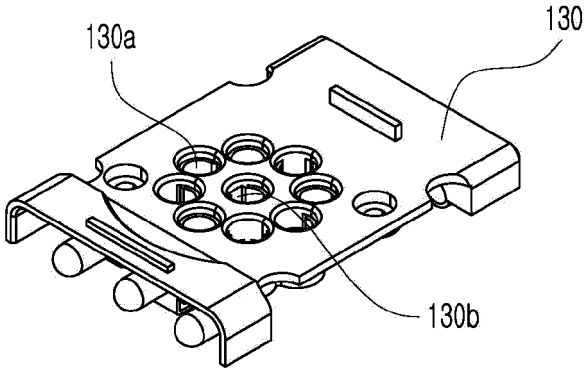


(b)

Fig.8



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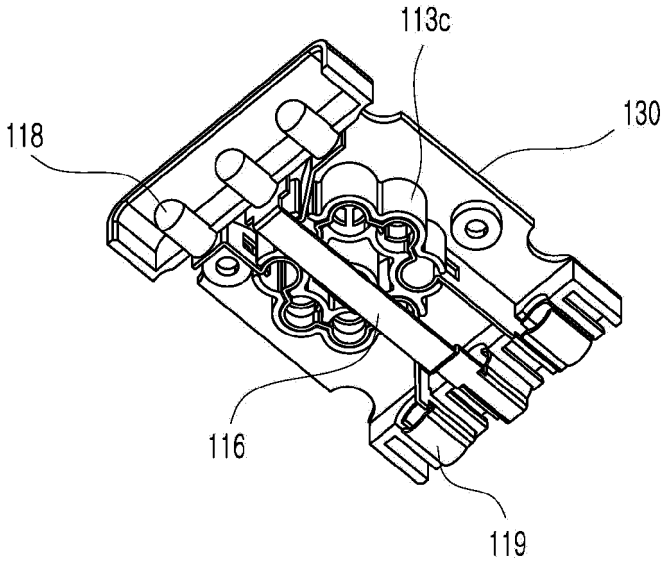
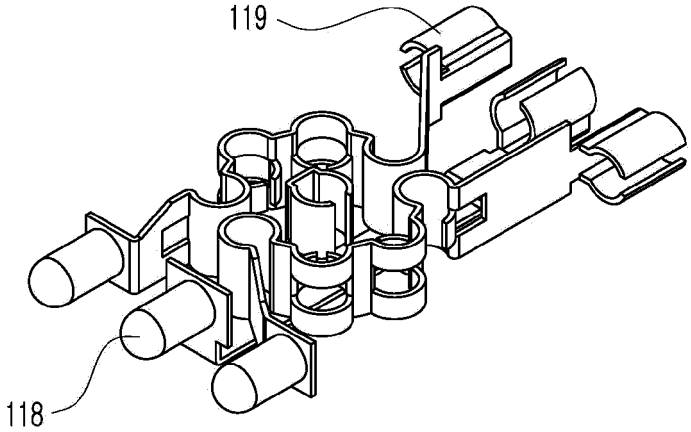
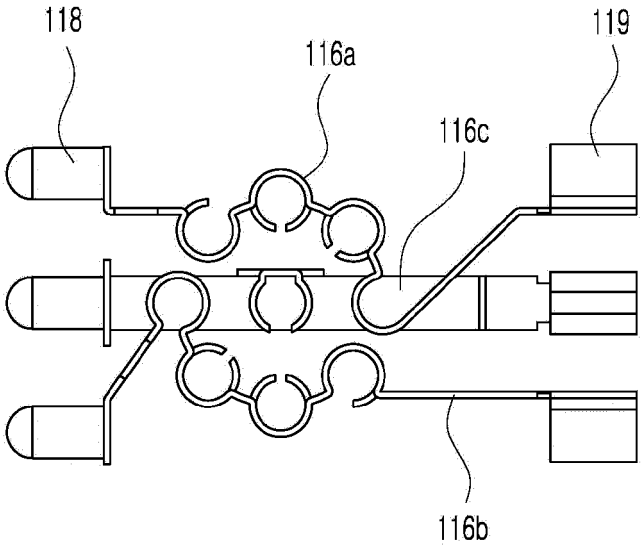


(b)

Fig.9



(a)



(b)

Fig.10

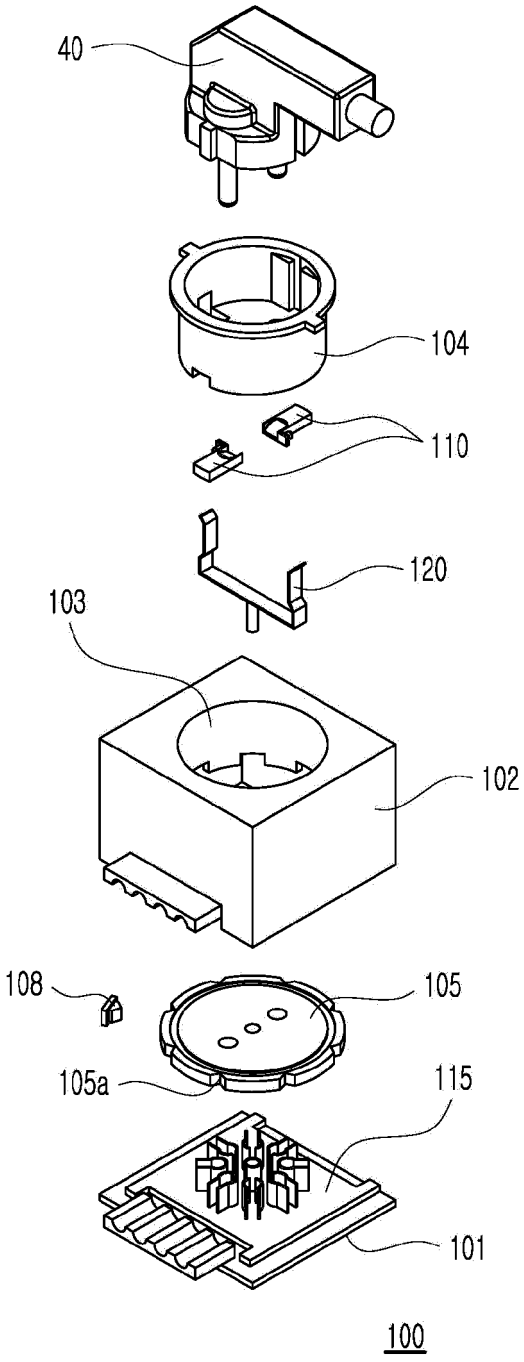
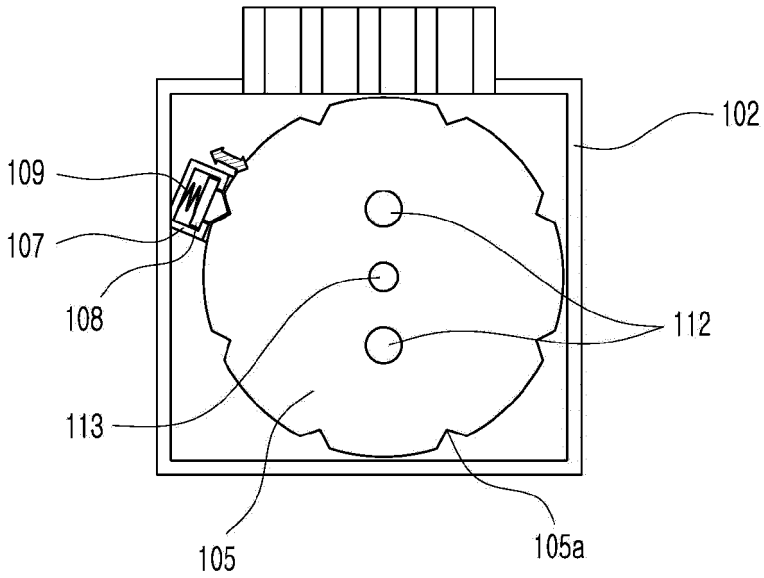
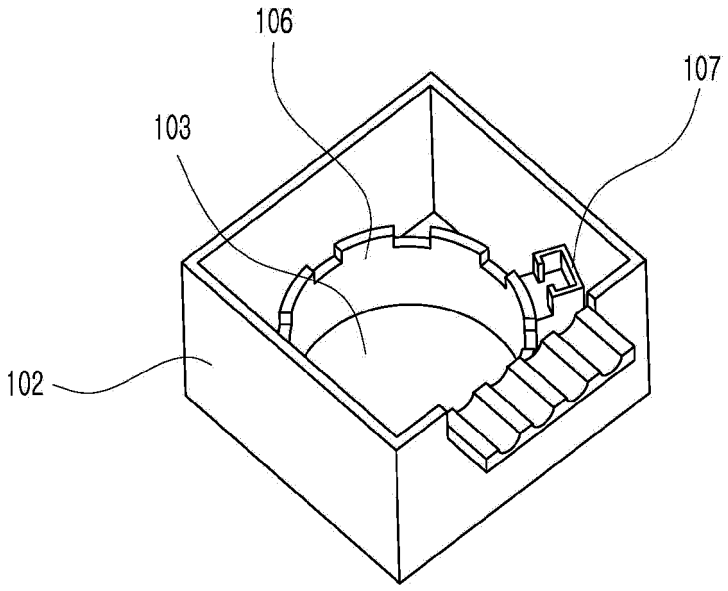


Fig.11

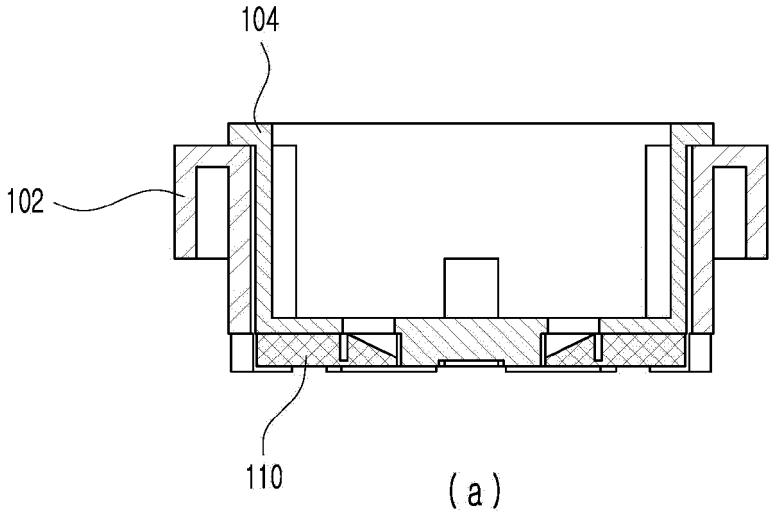


(a)



(b)

Fig.12



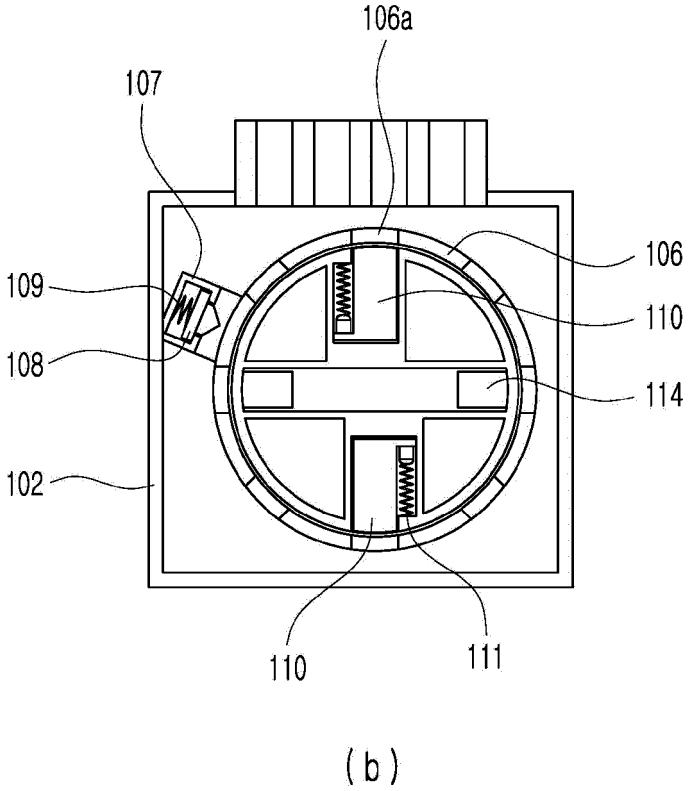
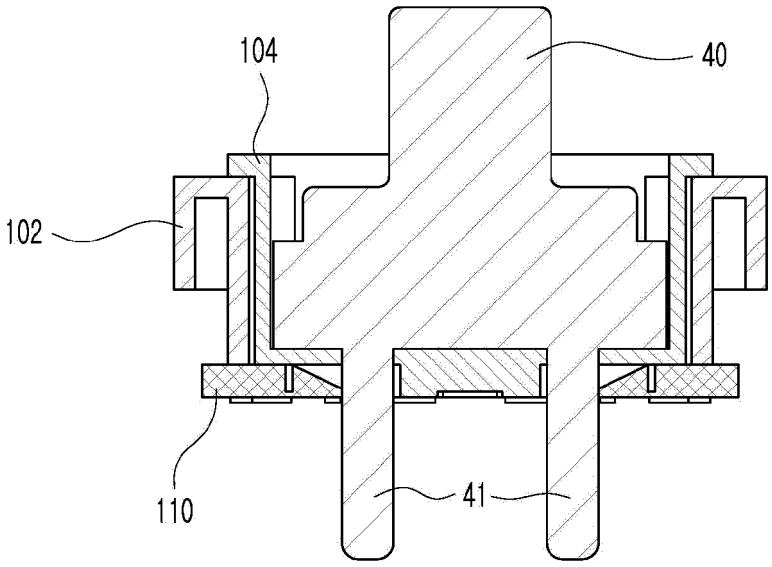
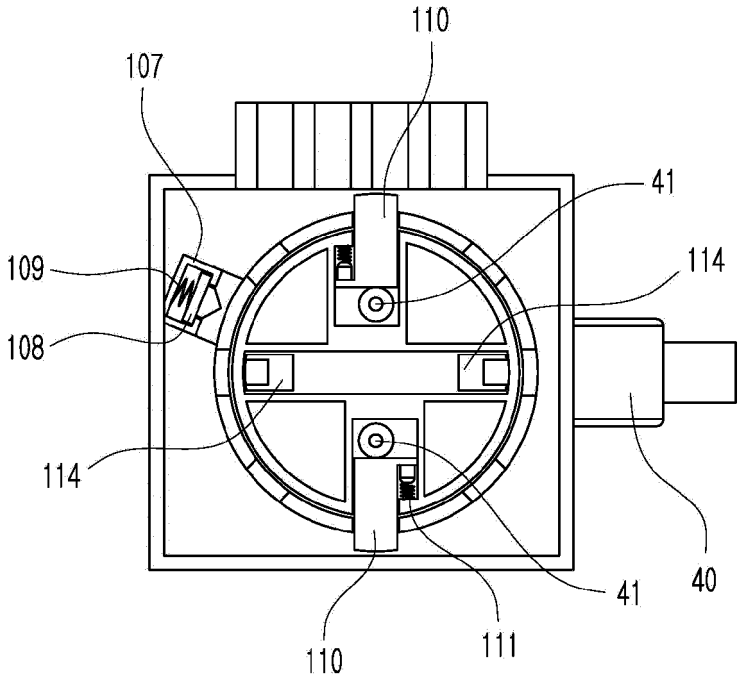


Fig.13

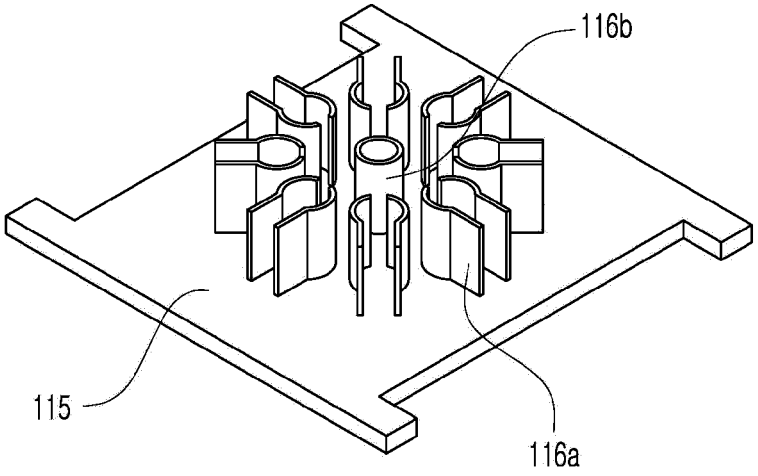


(a)



(b)

Fig.14



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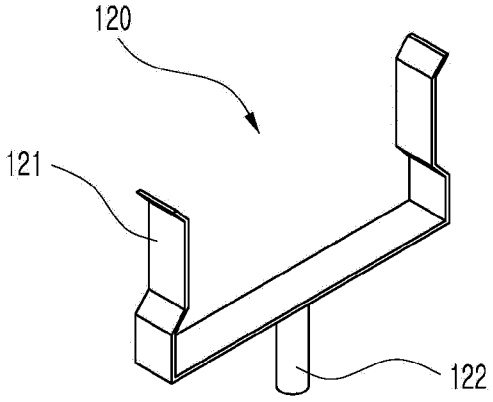

(b)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2020/095139

A. CLASSIFICATION OF SUBJECT MATTER

H01R 35/02(2006.01)i; **H01R 13/66**(2006.01)i; **H01R 13/10**(2006.01)i; H01R 103/00(2006.01)n

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01R 35/02(2006.01); H01R 13/10(2006.01); H01R 13/639(2006.01); H01R 13/66(2006.01); H01R 35/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 멀티탭(multi-tap), 회전(rotation), 판스프링(plate spring), 전극 마운트(electrode mount), 위치 지정 핀(positioning pin)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2016-0109123 A (BYEON, Eungi et al.) 21 September 2016 (2016-09-21) See paragraph [0031]; claims 1-2; and figures 1-5.	1
Y		6-7,9-10
A		2-5,8
Y	KR 20-0370565 Y1 (SHIN DONG-A ELECTRIC CORP.) 14 December 2004 (2004-12-14) See pages 2-3; and figure 8.	6
Y	KR 10-2015-0084459 A (KIM, Sun Moo et al.) 22 July 2015 (2015-07-22) See paragraphs [0020]-[0022] and [0024]; and figures 2-6.	7,9-10
A	US 6786744 B1 (LEE, Chang Woo) 07 September 2004 (2004-09-07) See column 3, lines 9-57; and figures 1-2.	1-10

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
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"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"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
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07 June 2021	**07 June 2021**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2020/095139

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2015-0089861 A (LEE, Jaeryong et al.) 05 August 2015 (2015-08-05) See paragraphs [0016]-[0024]; and figures 1-3.	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2020/095139

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
KR 10-2016-0109123 A	21 September 2016	None	
KR 20-0370565 Y1	14 December 2004	None	
KR 10-2015-0084459 A	22 July 2015	KR 10-1645466 B1	05 August 2016
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		CA 2400535 A1	01 November 2001
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		WO 01-82417 A1	01 November 2001
KR 10-2015-0089861 A	05 August 2015	None	

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