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(54) WATERPROOF PLUG CONNECTOR, DC PLUG AND LAMP

(57) The invention discloses a waterproof plug connector, which comprises a DC plug and a first DC socket, the DC plug is provided with an outer cylinder with enlarged diameter; a first elastic sealing member is provided between the DC plug and the first DC socket; and a movable connecting piece is arranged between the DC plug and the first DC socket. The invention also discloses a DC plug and a lamp. The DC plug adopted is in compliance with safety regulations. After assembly the plug connector can effectively prevent problems caused by poor electrical conductivity or even loosening of the component during use; and meanwhile it can carry out a more reliable and effective waterproof function.

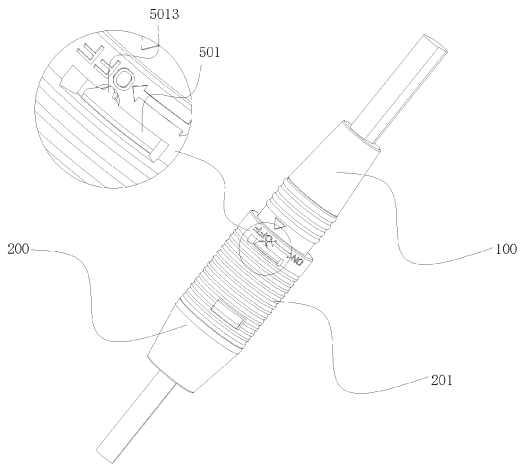

FIG.1

EP 4 287 414 A2

Description

[0001] This present application claims priority of Chinese patent application no. CN202210503850.8 filed on May. 10, 2022, the disclosures of which are incorporated herein by reference in its entirety.

Field of Invention

[0002] The present invention relates to an electrical connector for lighting, and in particular to a waterproof plug connector, a DC plug and a lamp.

Background of Invention

[0003] In the context of energy saving and environmental protection, LED lamps are increasingly used in home and commercial lighting fields because of their high light-emitting efficiency and good light-gathering performance. Display exhibits lighting is a very important category in commercial lighting, using low-voltage lamps generally. Then DC plugs can be adopted for power supply, which are easy to use and mature in technology.

[0004] However, when the male plug of the DC plug is actually used, it is easy to be inserted into the socket hole of the mains by mistake because the diameter is too small. So there is potential safety hazard. In addition, common DC plug cannot meet the high waterproof requirement.

Summary of Invention

[0005] In view of this, the present invention provides a waterproof plug connector, a DC plug and a lamp to solve the above technical problems.

[0006] A waterproof plug connector, comprising a DC plug and a first DC socket, the DC plug is provided with an outer cylinder with enlarged diameter, a first elastic sealing member is provided between the DC plug and the first DC socket, and a movable connecting piece is provided between the DC plug and the first DC socket.

[0007] Preferably, the movable connecting piece comprises:

a radial raised portion, provided on one of the DC plug and the first DC socket;

a first locking portion, provided on the other of the DC plug and the first DC socket in conjunction with the radial raised portion, comprising an entry section extending to the port

along the plugging direction and a clamp section communicating the end of the entry section and extending in the circumferential direction.

[0008] Preferably, the radial raised portion is L-shaped, and comprising a longitudinal section inserted into the entry section and a transverse section rotatably inserted into the clamp section.

[0009] Preferably, a hook portion for preventing disengagement and a stop groove matched with the hook portion are provided between the transverse section and the clamp section.

[0010] Preferably, first DC socket is provided with a mounting cylinder, and the first locking portion is arranged on the mounting cylinder.

[0011] Preferably, the first elastic sealing member is a first sealing ring arranged outside the first DC socket, and the outer cylinder is inserted into the inner wall of the first sealing ring.

[0012] Preferably, the inner wall of the first sealing ring is provided with a first step, and the end surface of the outer cylinder is pressed against the first step.

[0013] Preferably, the inner wall of the first sealing ring is provided with an annular first convex rib.

[0014] Preferably, at least two said first convex ribs are provided at intervals.

[0015] A DC plug, comprising a mounting base and a pin, wherein the DC plug further comprises an outer cylinder arranged outside the pin for expanding the diameter, and the mounting base is provided with a radial raised portion for turn-locking.

[0016] A lamp, comprising a lamp body and a lamp cap, the lamp cap comprising: an end cover sealing the mounting opening of the lamp body, a second DC socket electrically connected to the lamp body, and a second elastic sealing member disposed between the second DC socket and the lamp body. The end cover is provided with a jack aligned with the second DC socket, the inner wall of the jack is provided with a second locking portion, and the second locking portion comprises an inlet extending to the port along the plugging direction and a clamping block extending circumferentially from the end of the inlet.

[0017] Preferably, the second elastic sealing member is a second sealing ring arranged outside the second DC socket.

[0018] Preferably, the inner wall of the second sealing ring is provided with a second step.

[0019] Preferably, the inner wall of the second sealing ring is provided with an annular second convex rib.

Technical effects of the present invention

[0020] The waterproof plug connector, DC plug and lamp of the present invention, in which the DC plug adopted is in compliance with safety regulations. When assembly is completed, the plug connector can effectively prevent the components from loosening during the use process, poor electrical conductivity or other problems caused by loosening. At the same time, it can carry out a more reliable and effective waterproof function.

Overview on drawings

[0021] Hereinafter, the invention will be disclosed with reference to the drawings and exemplary embodiments, from which further features, technical effects and problems to be solved will become apparent. In the drawings:

Fig. 1 is a schematic structural diagram of the waterproof plug connector (connected state) of Embodiment 1;

Fig. 2 is a schematic structural diagram of the waterproof plug connector (separated state) of Embodiment 1;

Fig. 3 is a schematic diagram of an exploded structure of the first DC socket of Embodiment 1;

Fig. 4 is a schematic cross-sectional structure diagram of the mounting cylinder of Embodiment 1;

Fig. 5 is a schematic cross-sectional structure diagram of the waterproof plug connector (connected state) of Embodiment 1;

Fig. 6 is a schematic structural diagram showing the connection between the lamp and the DC plug of Embodiment 2;

Fig. 7 is a schematic structural diagram showing the separation between the lamp and the DC plug of Embodiment 2;

Fig. 8 is a schematic diagram of the explosion structure of the lamp of Embodiment 2; and

Fig. 9 is a schematic structural diagram showing the connection between the lamp and the DC plug of Embodiment 2.

[0022] Throughout the drawings, like reference numerals designated identical or substantially equivalent elements or groups of elements.

Detailed description of preferred embodiments

[0023] Specific embodiments of the present invention will be further described in detail below based on the accompanying drawings. It should be understood that the descriptions of the embodiments of the present invention herein are not intended to limit the protection scope of the present invention.

Embodiment 1

[0024] As shown in FIG.1 to FIG.5, the waterproof plug connector of this embodiment comprises a DC plug 100 and a first DC socket 200. The DC plug 100 is provided with an outer cylinder 300 with enlarged diameter. A first elastic sealing member 400 is provided between the DC plug 100 and the first DC socket 200, and a movable connecting piece 500 is provided between the DC plug 100 and the first DC socket 200.

[0025] By setting the outer cylinder 300, the DC plug 100 can be made comply with safety regulations. And the first elastic sealing member 400 is used to seal the gap between the connectors, and can be arranged on either of the DC plug 100 and the first DC socket 200, and then press against the other to seal.

[0026] The movable connecting piece 500 is realized by the movable connection of the structure provided on the DC plug 100 and the first DC socket 200. Herein the movable connection refers to the structure that can be flexibly connected and separated, commonly using a snap. And there are many types of snap structures, the one selected in this embodiment to achieve connection is by rotating and locking. The movable connecting piece 500 comprises a radial raised portion 501 and a first locking portion 502. The radial raised portion 501 is provided on the DC plug 100. The first locking portion 502 is provided on the first DC socket 200 in conjunction with the radial raised portion 501, the first locking portion 502 comprises an entry section 5021 extending to the port along the plugging direction and a clamp section 5022 communicating the end of the entry section 5021 and extending in the circumferential direction.

[0027] In this embodiment, the movable connecting pieces 500 is provided with two groups, which are arranged along the circumferential direction. The quantity can be set as required, and the more groups, the better reliable connection, but the structure will be complicated.

[0028] The shape of the radial raised portion 501 can be round, square, etc. In this embodiment, the radial raised portion 501 is L-shaped, which comprises a longitudinal section 5011 inserted into the entry section 5021 and a transverse section 5012 rotatably inserted into the clamp section 5022. The above structure makes the connection more reliable.

[0029] In this embodiment, between the transverse section 5012 and the clamp section 5022, a hook portion 5013 for preventing disengagement and a stop groove 5023 for matching with the hook portion 5013 are provided. The above structure can effectively prevent the plug connector from being unlocked due to accidental touch.

[0030] In this embodiment, the first DC socket 200 is provided with a mounting cylinder 201, and the first locking portion 502 is arranged on the mounting cylinder 201. The mounting cylinder 201 is provided to realize various functions under the condition of simply adding one component. The mounting cylinder 201 and the first DC socket 200 are connected by a snap, and the first elastic sealing member 400 is arranged therein.

[0031] The first DC socket 200 is provided with a projection 202, and the mounting cylinder 201 is provided with a mounting hole 203 which is snap-fitted with the projection 202.

[0032] In this embodiment, the first elastic sealing member 400 is a first sealing ring arranged outside the first DC socket 200, and the outer cylinder 300 is inserted into the inner wall of the first sealing ring.

[0033] In this embodiment, the inner wall of the first sealing ring is provided with a first step 401, and the end surface of the outer cylinder 300 is tightly pressed against the first step 401. The above structure can improve the sealing effect.

[0034] In this embodiment, the inner wall of the first sealing ring is provided with an annular first convex rib 402. The above structure can improve the sealing effect.

[0035] In this embodiment, at least two of said first convex ribs 402 are provided as rings at intervals.

[0036] The DC plug 100 of this embodiment comprises a mounting base 101 and a pin 102, and also comprises an outer cylinder 300 arranged outside the pin 102 for expanding the diameter. And the mounting base 101 is provided with a radial raised portion 501 for turn-locking.

Embodiment 2

[0037] As shown in FIG.6 to FIG.9, the DC plug 100 can also be directly connected to a lamp. And the structure of the DC plug 100 in this embodiment is the same as that of the Embodiment 1.

[0038] The lamp of this embodiment comprises a lamp body 1000 and a lamp cap 2000. The lamp cap 2000 comprises an end cover 2001 for sealing the mounting opening of the lamp body 1000, a second DC socket 2002 electrically connected to the lamp body 1000, and a second elastic sealing member 2003 disposed between the second DC socket 2002 and the lamp body 1000. The end cover 2001 is provided with a jack 2011 aligned with the second DC socket 2002. The inner wall of the jack 2011 is provided with a second locking portion 2021. And the second locking portion 2021 comprises an inlet 2031 extending to the port along the plugging direction and a clamping block 2041 extending circumferentially from the end of the inlet 2031.

[0039] In this embodiment, the second locking portion 2021 is provided with two groups along the circumferential direction, each of which corresponds to one of the two radial raised portion 501 on the DC plug 100.

[0040] In this embodiment, the second elastic sealing member 2003 is a second sealing ring arranged outside the second DC socket 2002.

[0041] In this embodiment, the inner wall of the second sealing ring is provided with a second step 2013 .

[0042] In this embodiment, the inner wall of the second sealing ring is provided with an annular second convex rib 2023, and, is further provided with two as rings at intervals.

[0043] The above are only preferred embodiments of the present invention, and are not intended to limit the protection scope of the present invention. Any modifications, equivalent replacements or improvements within the spirit of the present invention are included within the scope of the claims of the present invention.

Claims

1. A waterproof plug connector, comprising a DC plug (100) and a first DC socket (200), wherein the DC plug (100) is provided with an outer cylinder (300) with enlarged diameter, a first elastic sealing member (400) is provided between the DC plug (100) and the first DC socket (200), and a movable connecting piece (500) is provided between the DC plug (100) and the first DC socket (200).

2. The waterproof plug connector as claimed in Claim 1, wherein the movable connecting piece (500) comprises:

   a radial raised portion (501), provided on one of the DC plug (100) and the first DC socket (200); a first locking portion (502), provided on the other of the DC plug (100) and the first DC socket (200) in conjunction with the radial raised portion (501), comprising an entry section (5021) extending to the port along the plugging direction and a clamp section (5022) communicating the end of the entry section (5021) and extending in the circumferential direction..

3. The waterproof plug connector as claimed in Claim 2, wherein the radial raised portion (501) is L-shaped, and comprising a longitudinal section (5011) inserted into the entry section (5021) and a transverse section (5012) rotatably inserted into the clamp section (5022).

4. The waterproof plug connector as claimed in Claim 3, wherein a hook portion (5013) for preventing disengagement and a stop groove (5023) matched with the hook portion (5013) are provided between the transverse section (5012) and the clamp section (5022).

5. The waterproof plug connector as claimed in any of the Claims 2 to 4, wherein the first DC socket (200) is provided with a mounting cylinder (201), and the first locking portion (502) is arranged on the mounting cylinder (201).

6. The waterproof plug connector as claimed in any of the preceding claims, wherein the first elastic sealing member (400) is a first sealing ring arranged outside the first DC socket (200), and the outer cylinder (300) is inserted into the inner wall of the first sealing ring.

7. The waterproof plug connector as claimed in Claim 6, wherein the inner wall of the first sealing ring is provided with a first step (401), and the end surface

of the outer cylinder (300) is pressed against the first step (401).

8. The waterproof plug connector as claimed in Claim 6 or 7, wherein the inner wall of the first sealing ring is provided with an annular first convex rib (402).

9. The waterproof plug connector as claimed in Claim 8, wherein at least two of said first convex ribs (402) are provided at intervals.

10. A DC plug (100), comprising a mounting base (101) and a pin (102), wherein the DC plug (100) further comprises an outer cylinder (300) arranged outside the pin (102) for expanding the diameter, and the mounting base (101) is provided with a radial raised portion (501) for turn-locking.

11. A lamp, comprising a lamp body (1000) and a lamp cap (2000), the lamp cap (2000) comprising: an end cover (2001) sealing the mounting opening of the lamp body (1000), a second DC socket (2002) electrically connected to the lamp body (1000), and a second elastic sealing member (2003) disposed between the second DC socket (2002) and the lamp body (1000);
the end cover (2001) is provided with a jack (2011) aligned with the second DC socket (2002), the inner wall of the jack (2011) is provided with a second locking portion (2021), and the second locking portion (2021) comprises an inlet (2031) extending to the port along the plugging direction and a clamping block (2041) extending circumferentially from the end of the inlet (2031).

12. The lamp as claimed in Claim 11, wherein the second elastic sealing member (2003) is a second sealing ring arranged outside the second DC socket (2002).

13. The lamp as claimed in Claim 12, wherein the inner wall of the second sealing ring is provided with a second step (2013).

14. The lamp as claimed in Claim 12 or 13, wherein the inner wall of the second sealing ring is provided with an annular second convex rib (2023).

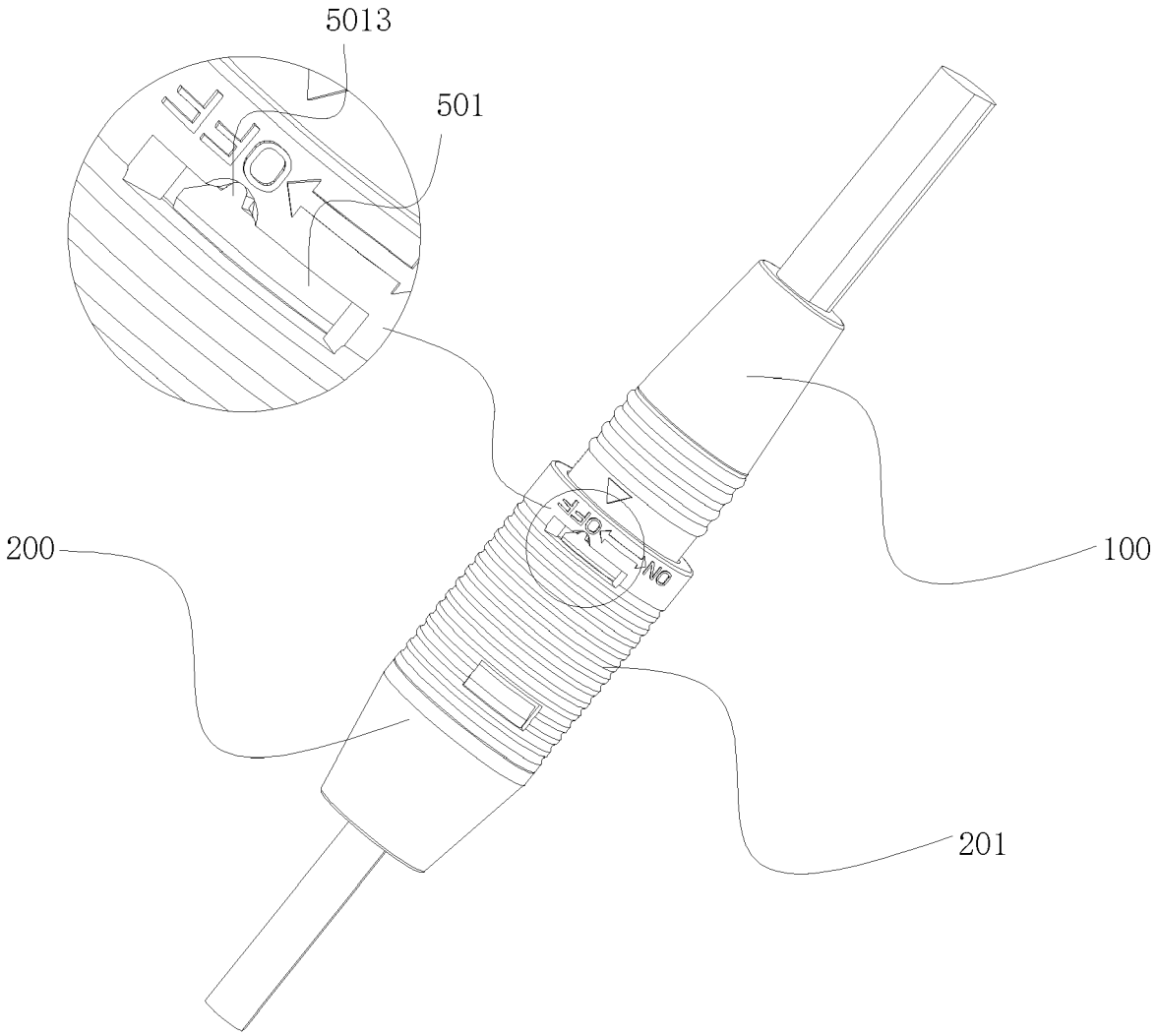

FIG.1

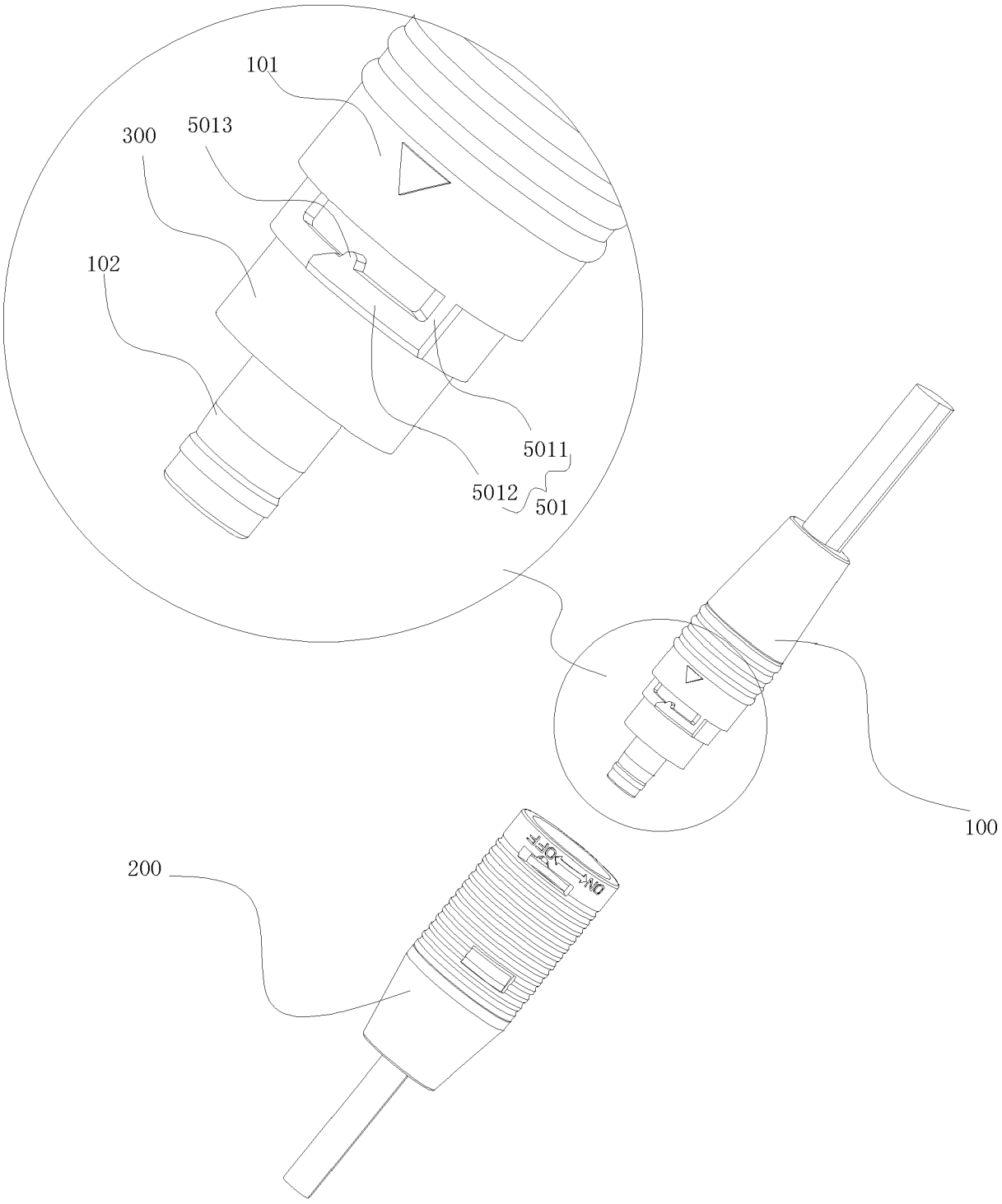

FIG.2

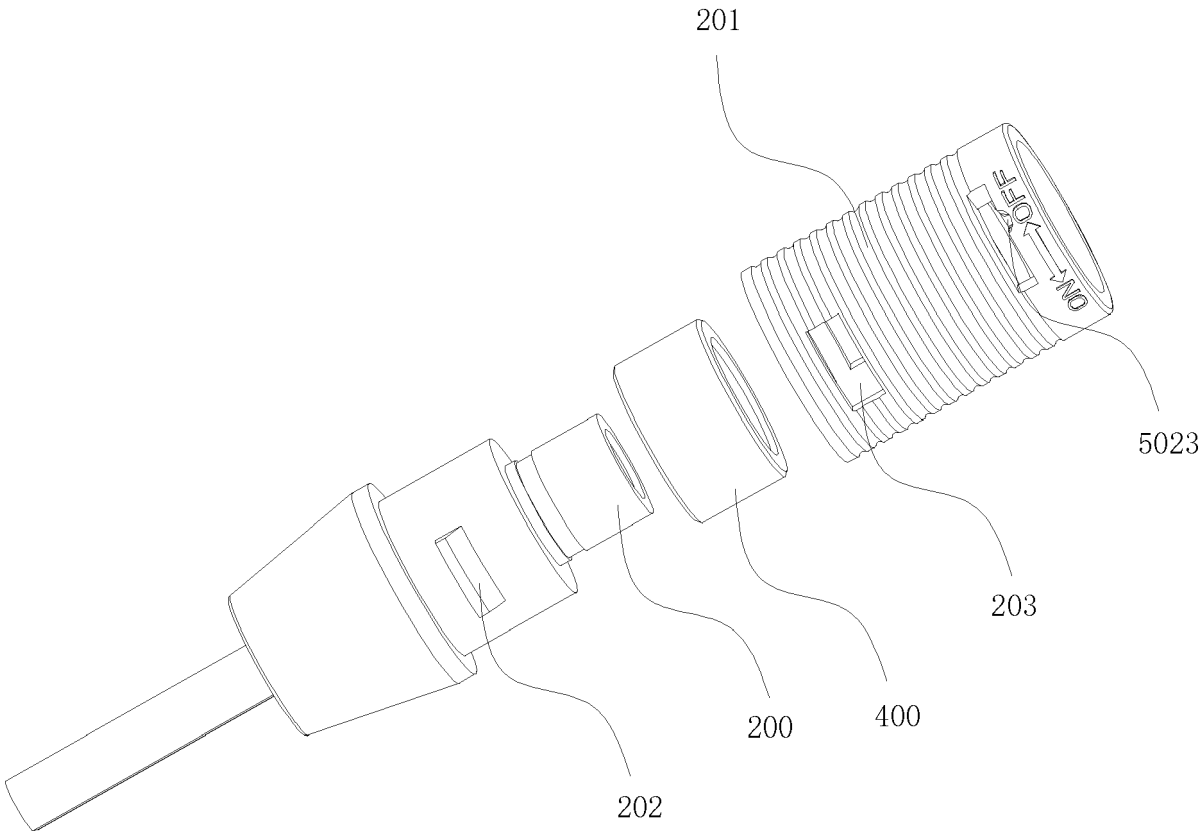

FIG.3

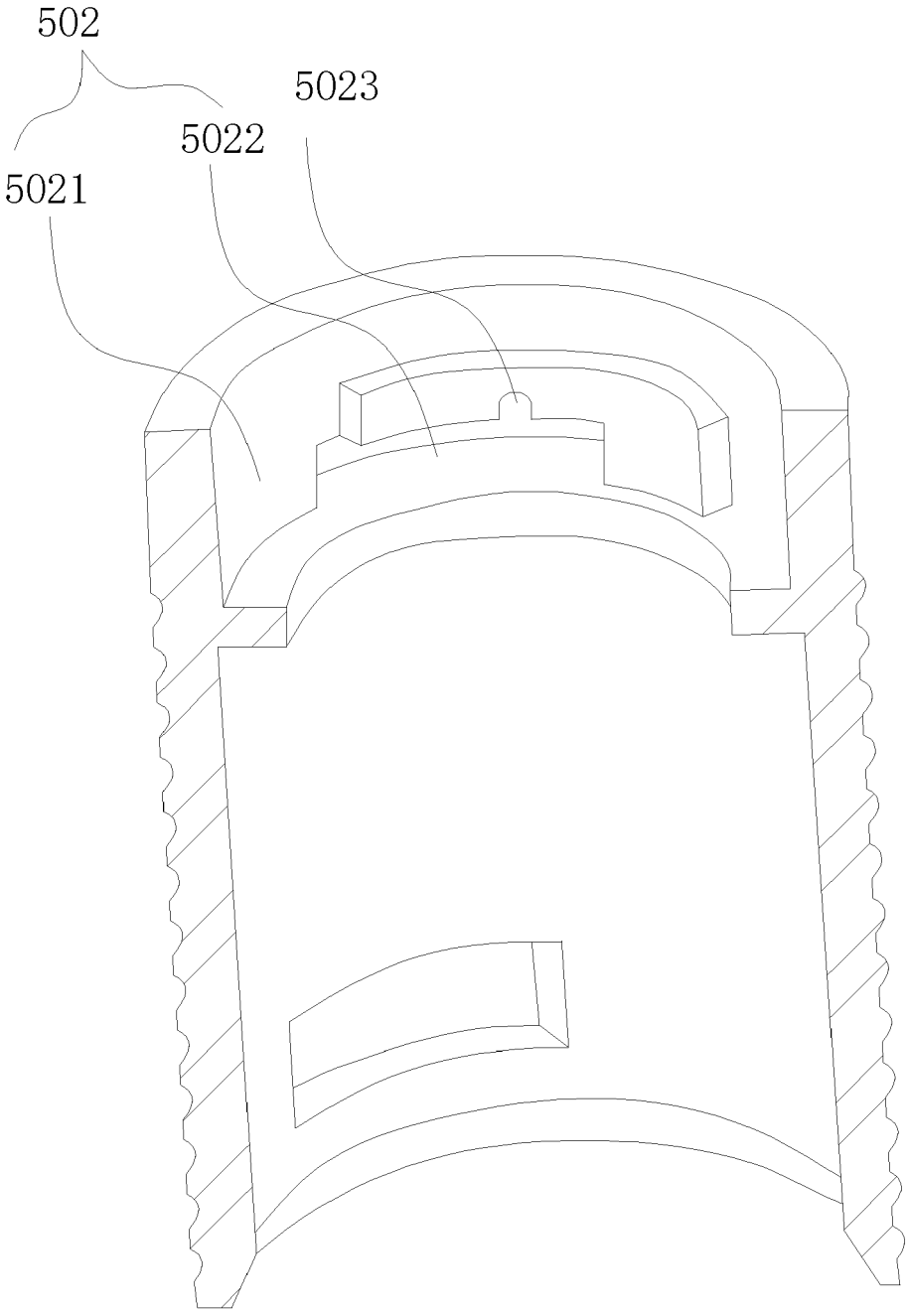

FIG.4

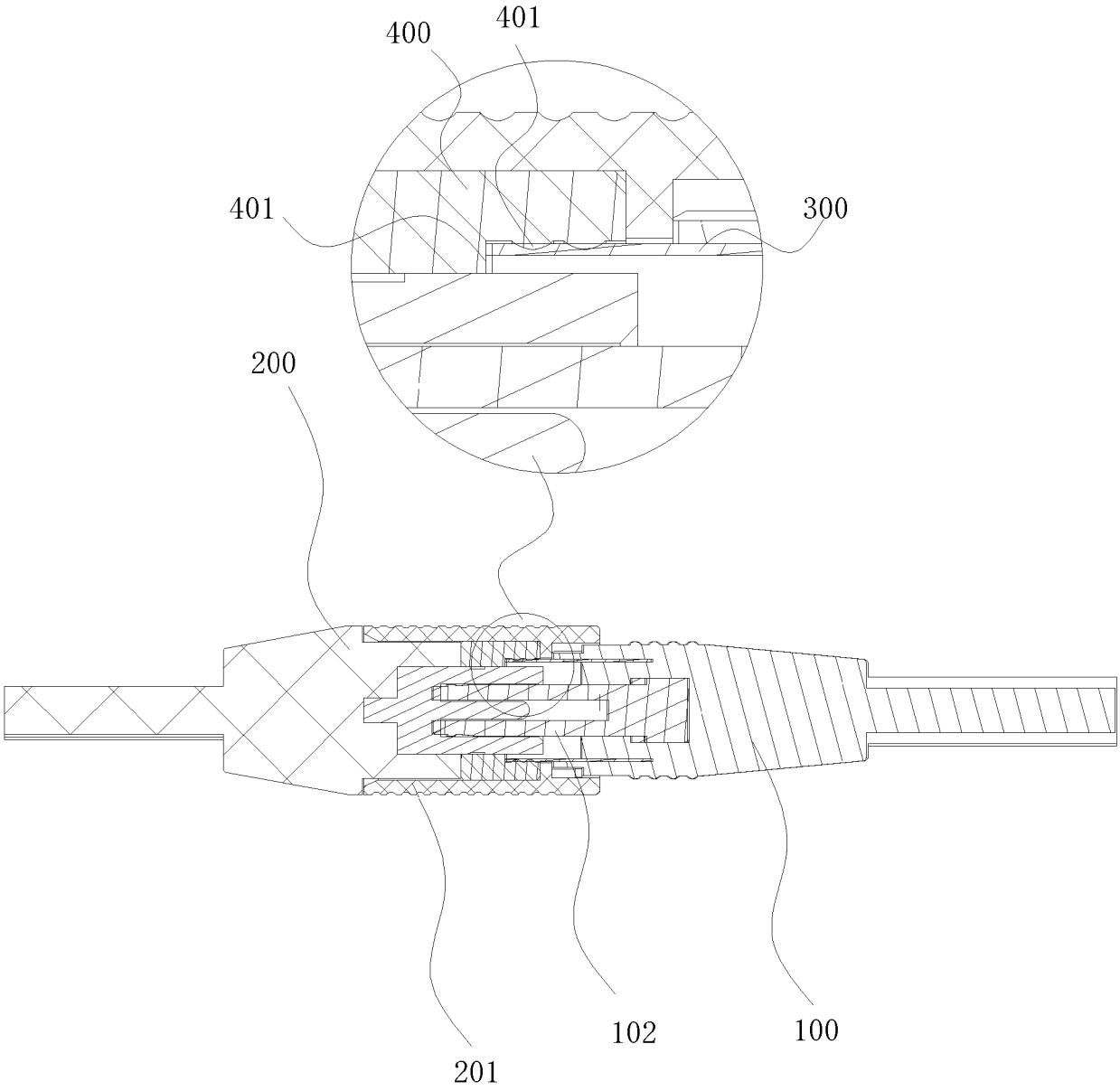

FIG.5

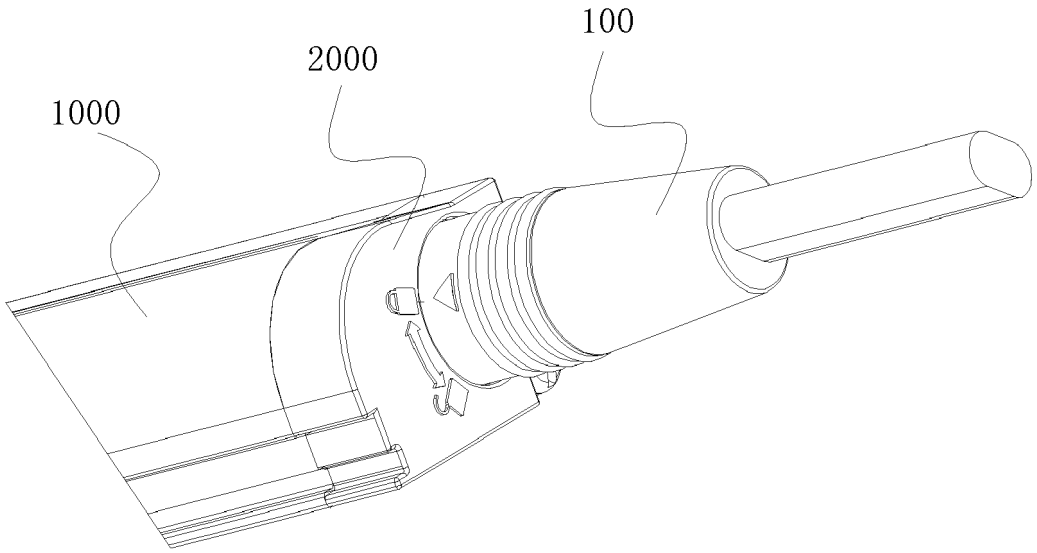

FIG.6

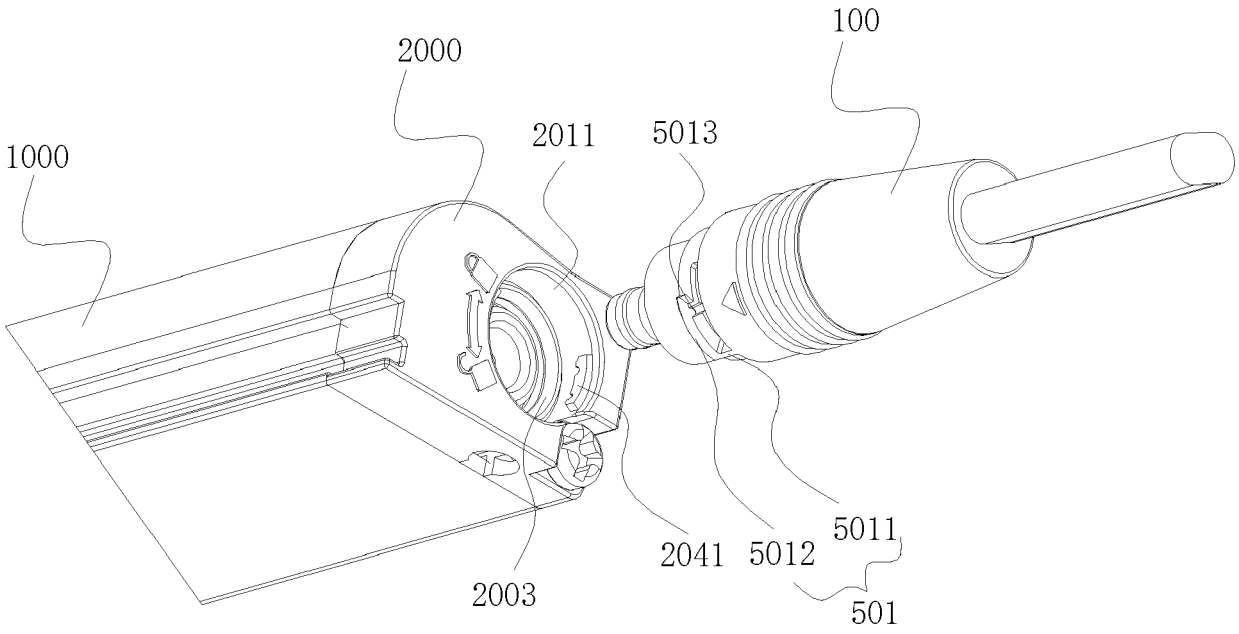

FIG.7

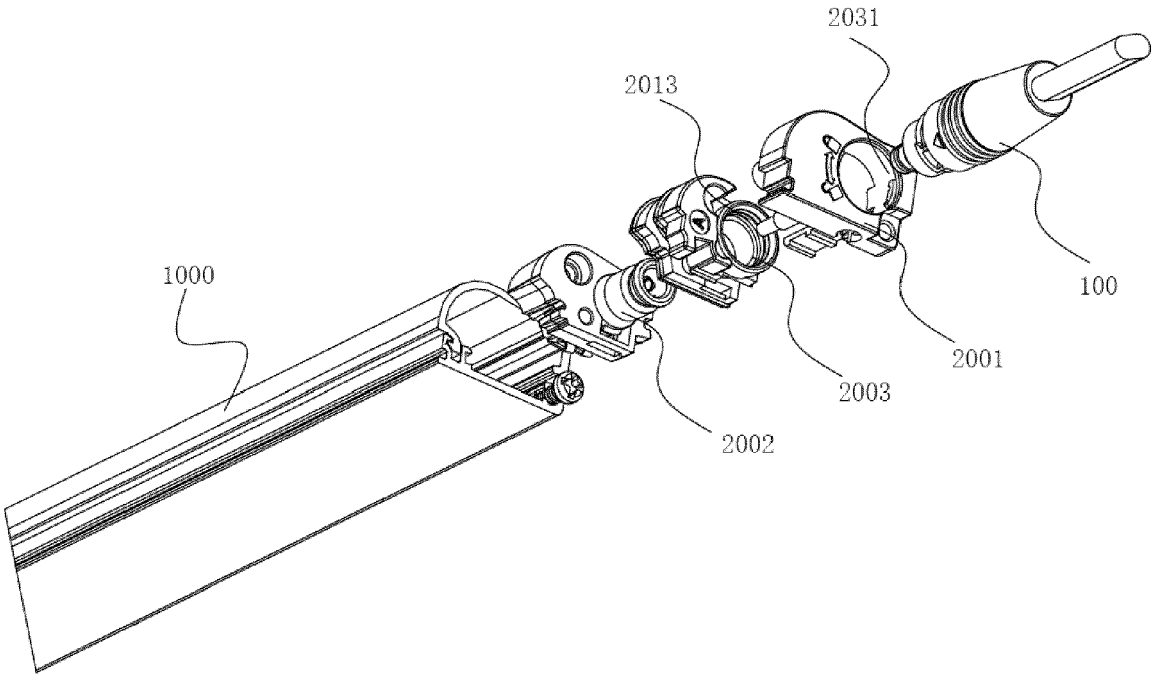

FIG.8

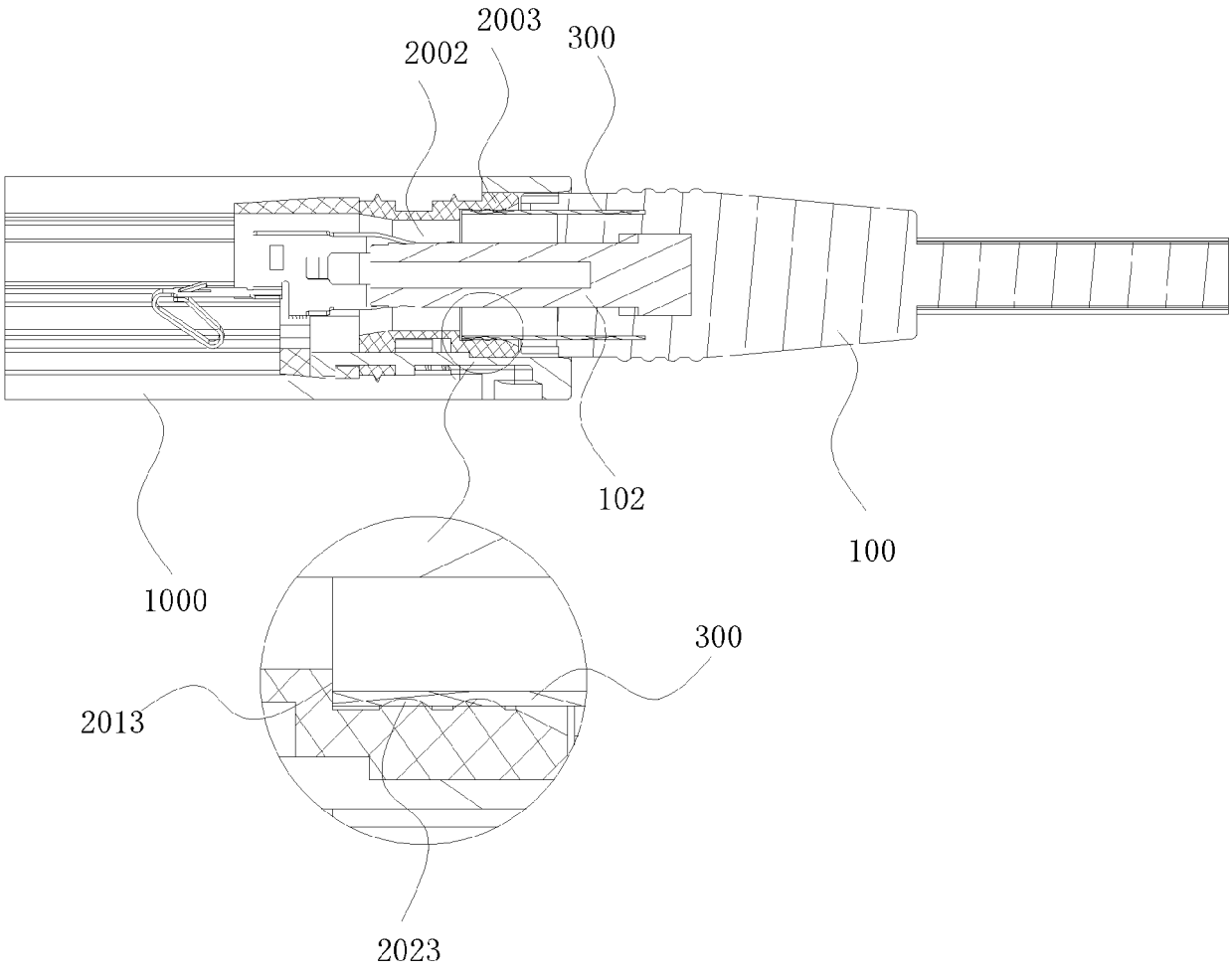

FIG.9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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