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(54) **SOCKET, PLUG, ELECTRICAL CONNECTOR, CENTER CONSOLE AND VEHICLE**

(57) The present invention relates to a socket (1), a plug (2), an electrical connector (100), a center console and a vehicle. The socket (1) is provided with a plug hole (11). A hole wall of the plug hole (11) is provided with an internal thread (111) and a socket conductive part (112). The internal thread (111) is configured to provide threaded engagement with the plug (2), and the socket conductive part (112) is configured to be electrically connected to the plug (2).

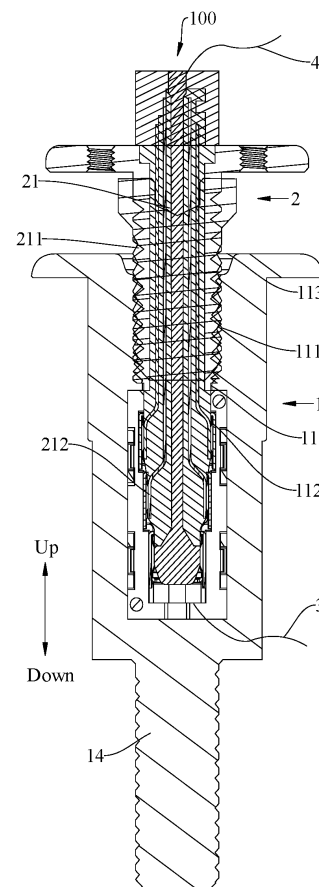


FIG. 8

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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of connectors, and in particular to a socket, a plug, an electrical connector, a center console and a vehicle.

BACKGROUND

[0002] Threaded connections are widely used in the field of connection and fixation. For example, a mobile phone holder is installed on the center console of a vehicle using a threaded connection. In the related art, threaded connections can only achieve mechanical connection. For scenarios where power supply is required for devices, such as power supply for mobile phone holders, it cannot meet the use requirements. Therefore, it is urgent to design a connector that has both mechanical and electrical connection functions.

SUMMARY

[0003] The present invention provides a socket, a plug and an electrical connector having both mechanical connection and electrical connection functions having the features of the independent claims.

[0004] A socket of the present invention is provided with a plug hole, a hole wall of the plug hole is provided with an internal thread and a socket conductive part, the internal thread is configured to provide threaded engagement with a plug, and the socket conductive part is configured to electrically connect with the plug.

[0005] Optionally, the socket conductive part is arranged on a side of the internal thread in an axial direction of the plug hole.

[0006] Optionally, the plug hole has an insertion port, and the socket conductive part is arranged on a side of the internal thread away from the insertion port.

[0007] Optionally, the socket conductive part is annular and arranged circumferentially around the plug hole.

[0008] Optionally, a crown spring is provided in the plug hole, and the crown spring forms the socket conductive part.

[0009] Optionally, a socket terminal is provided in the plug hole, the socket terminal includes a conductive ring and a conductive sheet, the conductive ring is sleeved on the outside of the crown spring and is electrically connected to the crown spring, and the conductive sheet is provided on a side of the conductive ring away from the internal thread and is electrically connected to the conductive ring.

[0010] Optionally, the plug hole has an insertion port, and a plurality of the socket conductive parts are arranged at intervals along an axial direction of the plug hole; of two adjacent socket conductive parts, a minimum inner diameter of the socket conductive part away from the insertion port is smaller than a minimum inner dia-

meter of the socket conductive part close to the insertion port.

[0011] Optionally, the socket comprises an outer shell and an inner shell, the outer shell is provided with the plug hole, a part of the plug hole is provided with the internal thread, the inner shell is arranged in another part of the plug hole, the inner shell is provided with an electrical connection hole, and the socket conductive part is arranged in the electrical connection hole.

[0012] Optionally, the inner shell is an insulating shell.

[0013] Optionally, the plug hole has an insertion port, and the socket further includes a connecting post, and the connecting post is arranged on a side of the plug hole away from the insertion port.

[0014] A plug of the present invention includes a plug rod, the plug rod is provided with an external thread and a plug conductive part, the external thread is configured to provide threaded engagement with the socket, and the plug conductive part is configured to electrically connect with the socket.

[0015] Optionally, the plug conductive part is arranged on a side of the external thread in an axial direction of the plug rod.

[0016] Optionally, the plug rod has a plug end, and the plug conductive part is arranged on a side of the external thread close to the plug end.

[0017] Optionally, the plug conductive part is annular and arranged circumferentially around the plug rod.

[0018] Optionally, the plug rod has a plug end, and a plurality of the plug conductive parts are arranged at intervals along an axial direction of the plug rod; of two adjacent plug conductive parts, a maximum outer diameter of the plug conductive part close to the plug end is smaller than a maximum outer diameter of the plug conductive part away from the plug end.

[0019] Optionally, the plug rod is provided with a plurality of plug terminals. The plurality of plug terminals are arranged at intervals along the axial direction of the plug rod, and the plug terminals correspond to and are electrically connected to the plug conductive parts one by one; of two adjacent plug terminals, the plug terminal electrically connected to the plug conductive part away from the insertion port is sleeved on the plug terminal electrically connected to the plug conductive part close to the insertion port.

[0020] Optionally, the plug terminal extends along the axial direction of the plug rod, the plug terminal is arranged on a side of the plug conductive part close to the external thread and is electrically connected to the plug conductive part.

[0021] Optionally, the plug includes a third conductive part, the third conductive part and the plug conductive part are respectively arranged on opposite sides of the external thread in the axial direction of the plug rod, and the third conductive part is electrically connected to the plug conductive part.

[0022] An electrical connector of the present invention includes the socket according to any one of the above

items and the plug according to any one of the above items. The plug rod is inserted into the plug hole, the external thread and the internal thread are in threaded engagement, and the plug conductive part is electrically connected to the socket conductive part.

[0023] The present invention further provides a center console.

[0024] The center console of the present invention includes the socket, the plug, or the electrical connector according to any one of the above items.

[0025] The present invention further provides a vehicle.

[0026] The vehicle of the present invention includes the socket, the plug, the electrical connector, or the center console according to any one of the above items.

[0027] In the present invention, by providing an internal thread and a socket conductive part in the plug hole of the socket, and utilizing the threaded engagement between the internal thread and the plug, the mechanical connection between the socket and the plug can be realized. By the electrical connection between the socket conductive part and the plug, the electrical connection between the socket and the plug is realized. Thus, the socket can realize the mechanical connection and electrical connection functions with the plug at the same time.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028]

FIG. 1 is a schematic diagram of a structure of a socket according to an embodiment of the present invention.

FIG. 2 is a cross-sectional view of a socket according to an embodiment of the present invention.

FIG. 3 is a cross-sectional view of an inner shell in FIG. 2.

FIG. 4 is a schematic diagram of a structure of multiple crown springs in FIG. 2.

FIG. 5 is a schematic diagram of structures of conductive rings in multiple socket terminals in FIG. 2.

FIG. 6 is a schematic diagram of a structure of a plug according to an embodiment of the present invention.

FIG. 7 is a cross-sectional view of a plug according to an embodiment of the present invention.

FIG. 8 is a cross-sectional view of an electrical connector according to an embodiment of the present invention.

FIG. 9 is a cross-sectional view of an electrical connector with an outer shell hidden according to an embodiment of the present invention.

FIG. 10 is a partial enlarged view of FIG. 9.

DETAILED DESCRIPTION

[0029] The embodiments of the present invention are described in detail below, and examples of the embodi-

ments are shown in the accompanying drawings. The embodiments described below with reference to the accompanying drawings are examples and are intended to be used to explain the present invention, and cannot be understood as limiting the present invention.

[0030] As shown in FIG. 1 to FIG. 5, the socket 1 of the embodiment is provided with a plug hole 11, and the hole wall of the plug hole 11 is provided with an internal thread 111 and a socket conductive part 112. The internal thread 111 is configured to provide threaded engagement with the plug 2. The socket conductive part 112 is configured to be electrically connected to the plug 2.

[0031] For example, as shown in FIG. 6 and FIG. 7, the plug 2 includes a plug rod 21, and the plug rod 21 is provided with an external thread 211 and a plug conductive part 212. As shown in FIG. 8 to FIG. 10, the plug rod 21 is inserted into the plug hole 11, the external thread 211 and the internal thread 111 are in threaded engagement, and the plug conductive part 212 is electrically connected to the socket conductive part 112.

[0032] In the socket 1 of the embodiment, by providing an internal thread 111 and a socket conductive part 112 in the plug hole 11 of the socket 1, and utilizing the threaded engagement between the internal thread 111 and the plug 2, the mechanical connection between the socket 1 and the plug 2 can be realized. By the electrical connection between the socket conductive part 112 and the plug 2, the electrical connection between the socket 1 and the plug 2 is realized. Thus, the socket 1 can realize the mechanical connection and electrical connection functions with the plug 2 at the same time.

[0033] In some embodiments, as shown in FIG. 2, the socket conductive part 112 is arranged on one side of the internal thread 111 in the axial direction of the plug hole 11.

[0034] By arranging the socket conductive part 112 on one side of the internal thread 111 in the axial direction of the plug hole 11, the parts of the socket 1 for realizing the electrical connection and mechanical connection functions are not shared. On the one hand, the mechanical connection function and the electrical connection function can be avoided from affecting each other, thereby improving the reliability of the socket 1. On the other hand, it is convenient to design the parts realizing the electrical connection and the mechanical connection functions separately according to the needs, so as to improve the electrical connection reliability and mechanical connection reliability of the socket 1, that is, to improve the reliability of the socket 1. In order to make the technical solution easier to understand, the following further describes the technical solution by taking an example where the axial direction of the plug hole 11 is consistent with the up-down direction. The up-down direction is shown in FIG. 1 to FIG. 10.

[0035] For example, as shown in FIG. 1 to FIG. 3, the socket conductive part 112 is arranged on the lower side of the internal thread 111.

[0036] In some examples, as shown in FIG. 1 to FIG. 3,

the socket 1 includes an outer shell 101 and an inner shell 102. The outer shell 101 is provided with a plug hole 11. A part of the plug hole 11 is provided with an internal thread 111, and the inner shell 102 is arranged in another part of the plug hole 11. The inner shell 102 is provided with an electrical connection hole 1021, and the socket conductive part 112 is arranged in the electrical connection hole 1021.

[0037] For example, as shown in FIG. 2, the inner shell 102 is arranged close to the lower side of the plug hole 11, and the upper part of the plug hole 11 is provided with an internal thread 111.

[0038] By setting the socket 1 to include the outer shell 101 and the inner shell 102, and setting the inner thread 111 and the socket conductive part 112 on the outer shell 101 and the inner shell 102 respectively, it is convenient to select the materials of the outer shell 101 and the inner shell 102 according to the needs to ensure the electrical connection reliability and mechanical connection reliability of the socket 1, that is, to improve the reliability of the socket 1.

[0039] In some examples, the inner shell 102 is an insulating shell. For example, the inner shell 102 is a plastic shell.

[0040] By setting the inner shell 102 as an insulating shell, the insulation between the socket conductive part 112 and the outer shell 101 can be achieved, the risk of electric shock problems can be reduced, and the safety of the electrical connector 100 can be improved.

[0041] In some examples, as shown in FIG. 2, the plug hole 11 has an insertion port 113. The socket 1 further includes a connecting post 14, which is arranged on a side of the plug hole 11 away from the insertion port 113. The connecting post 14 is a threaded post with a thread, and the threaded post is threadedly connected to the external device. For example, the threaded post is threadedly connected to the center console of the vehicle to install the socket 1 on the center console.

[0042] For example, the upper end opening of the plug hole 11 is the insertion port 113, and the connecting post 14 is arranged on the lower side of the plug hole 11.

[0043] By arranging the connecting post 14 on the socket 1, it is convenient to realize the installation and fixation of the socket 1, which is conducive to improving the installation efficiency of the socket 1.

[0044] In some examples, as shown in FIG. 2, the socket conductive part 112 is arranged on the side of the internal thread 111 away from the insertion port 113. The plug conductive part 212 is arranged on the side of the external thread 211 away from the insertion port 113.

[0045] For example, as shown in FIG. 2, the upper end opening of the plug hole 11 is the insertion port 113, and the socket conductive part 112 is arranged on the lower side of the internal thread 111. The plug conductive part 212 is arranged on the lower side of the external thread 211.

[0046] By arranging the socket conductive part 112 on the side of the internal thread 111 away from the insertion

port 113 such that the socket conductive part 112 is arranged away from the insertion port 113, on the one hand, the risk of electric shock can be reduced and the safety of the socket 1 can be improved; on the other hand, the socket conductive part 112 can be well protected to avoid damage to the socket conductive part 112 and cause electrical connection failure, thereby improving the reliability of the socket 1.

[0047] In some examples, the socket conductive part 112 is annular and arranged circumferentially around the plug hole 11.

[0048] By setting the socket conductive part 112 in annular shape, it is beneficial to increase the electrical connection area between the socket conductive part 112 and the plug 2, improve the electrical connection reliability between the socket 1 and the plug 2 under high-intensity impact and vibration conditions, and improve the current carrying capacity of the socket 1.

[0049] In some examples, as shown in FIG. 2, a crown spring 12 is provided in the plug hole 11, and the crown spring 12 forms the socket conductive part 112.

[0050] The crown spring 12 has a large number of contacts, which can increase the electrical connection area between the socket 1 and the plug 2, improve the electrical connection reliability between the socket 1 and the plug 2 under high-intensity impact and vibration conditions, and improve the current carrying capacity of the socket 1.

[0051] In some examples, as shown in FIG. 2, a socket terminal 13 is provided in the plug hole 11. The socket terminal 13 includes a conductive ring 1301 and a conductive sheet (not shown in the figure). The conductive ring 1301 is sleeved on the outside of the crown spring 12 and is electrically connected to the crown spring 12, and the conductive sheet is arranged on the side of the conductive ring 1301 away from the internal thread 111 and is electrically connected to the conductive ring 1301. The conductive ring 1301 can be clamped with the hole wall of the plug hole 11, and the crown spring 12 and the conductive ring 1301 can be riveted or welded.

[0052] For example, the conductive sheet is arranged on the lower side of the conductive ring 1301, the upper end of the conductive sheet is electrically connected to the conductive ring 1301, and the lower end of the conductive sheet extends downward and is electrically connected to the first wire 3.

[0053] By setting the socket terminal 13 to include a conductive ring 1301 and a conductive sheet, the conductive ring 1301 is used to facilitate the installation and fixation of the crown spring 12, and the conductive sheet is used to facilitate the electrical connection between the socket conductive part 112 and the external device. As a result, the assembly and installation of the socket 1 are further facilitated, and the assembly and installation efficiency of the socket 1 is improved.

[0054] In some examples, as shown in FIG. 4, there are multiple socket conductive parts 112, and the multiple socket conductive parts 112 are arranged at intervals

along the axial direction of the plug hole 11. Of two adjacent socket conductive parts 112, the minimum inner diameter of the socket conductive part 112 away from the insertion port 113 is smaller than the minimum inner diameter of the socket conductive part 112 close to the insertion port 113. The minimum inner diameter of the socket conductive part 112 can be understood as the inner diameter of the socket conductive part 112 at the smallest inner diameter.

[0055] For example, the number of the socket conductive part 112 is three and the number of the plug conductive part 212 is three. As shown in FIG. 4, the three socket conductive parts 112 are respectively the first socket conductive part 1121, the second socket conductive part 1122 and the third socket conductive part 1123. As shown in FIG. 7, the three plug conductive parts 212 are respectively the first plug conductive part 2121, the second plug conductive part 2122 and the third plug conductive part 2123. The first socket conductive part 1121 is electrically connected to the first plug conductive part 2121, the second socket conductive part 1122 is electrically connected to the second plug conductive part 2122, and the third socket conductive part 1123 is electrically connected to the third plug conductive part 2123.

[0056] The first socket conductive part 1121, the second socket conductive part 1122 and the third socket conductive part 1123 are arranged in sequence from top to bottom, and the minimum inner diameter of the first socket conductive part 1121 is greater than the minimum inner diameter of the second socket conductive part 1122, and the minimum inner diameter of the second socket conductive part 1122 is greater than the minimum inner diameter of the third socket conductive part 1123. The first socket conductive part 1121, the first plug conductive part 2121, the second socket conductive part 1122 and the second plug conductive part 2122 can be configured to realize the charging function. The third socket conductive part 1123 and the third plug conductive part 2123 can be configured to realize the charging detection and protocol communication functions.

[0057] By designing multiple socket conductive parts 112 as above, it is possible to effectively avoid the interference between the socket conductive part 112 and the plug conductive part 212 when the socket 1 is connected to the plug 2, thereby improving the connection efficiency between the socket 1 and the plug 2.

[0058] For example, the number of socket terminals 13 is three. As shown in FIG. 5, the three socket terminals 13 are respectively the first socket terminal 131, the second socket terminal 132 and the third socket terminal 133. The first socket terminal 131, the second socket terminal 132 and the third socket terminal 133 are respectively electrically connected to the first socket conductive part 1121, the second socket conductive part 1122 and the third socket conductive part 1123.

[0059] The minimum inner diameter of the conductive ring 1301 of the first socket terminal 131 is greater than the minimum inner diameter of the conductive ring 1301

of the second socket terminal 132, and the minimum inner diameter of the conductive ring 1301 of the second socket terminal 132 is greater than the minimum inner diameter of the conductive ring 1301 of the third socket terminal 133. The first socket conductive part 1121, the second socket conductive part 1122 and the third socket conductive part 1123 are respectively interference fit with the conductive ring 1301 of the first socket terminal 131, the conductive ring 1301 of the second socket terminal 132 and the conductive ring 1301 of the third socket terminal 133.

[0060] In some examples, multiple socket conductive parts 112 are coaxially arranged, multiple plug conductive parts 212 are coaxially arranged, and multiple socket terminals 13 are coaxially arranged.

[0061] In some examples, as shown in FIG. 2, a plurality of steps 1022 are provided in the plug hole 11, and the plurality of steps 1022 are arranged at intervals along the extension direction of the plug hole 11. The plurality of steps 1022 correspond to the plurality of socket terminals 13 one by one, and the socket terminals 13 abuts against the corresponding steps 1022, so as to limit the position of the socket terminals 13 in the extension direction of the plug hole 11.

[0062] By providing a plurality of steps 1022 in the plug hole 11, it is convenient to limit the position of the socket terminals 13 in the extension direction of the plug hole 11, which is conducive to further improving the assembly efficiency of the electrical connector 100.

[0063] The plug terminal 22 can be manufactured by the drawing process.

[0064] For example, as shown in FIG. 9 and FIG. 10,

[0065] In some examples, the plug hole 11 is a quarter threaded hole.

[0066] By rotating the plug 2, the mechanical connection between the plug 2 and the socket 1 is achieved.

[0067] The plug 2 of the embodiment is assembled with the socket 1 described in any of the above embodiments. As shown in FIG. 6 and FIG. 7, the plug 2 of the embodiment includes a plug rod 21, and the plug rod 21 is provided with an external thread 211 and a plug conductive part 212. The external thread 211 is configured to thread with the socket 1, and the plug conductive part 212 is configured to electrically connect with the socket 1.

[0068] For example, as shown in FIG. 1 to FIG. 5, the socket 1 is provided with a plug hole 11, and the hole wall of the plug hole 11 is provided with an internal thread 111 and a socket conductive part 112. As shown in FIG. 8 to FIG. 10, the plug rod 21 is inserted into the plug hole 11, and the external thread 211 is threaded with the internal thread 111, and the plug conductive part 212 is electrically connected with the socket conductive part 112.

[0069] In the plug 2 of the embodiment, by providing the external thread 211 and the plug conductive part 212 on the plug rod 21 of the plug 2, and utilizing the threaded engagement between the external thread 211 and the socket 1, the mechanical connection between the plug 2 and the socket 1 is realized. By electrically connecting the

plug conductive part 212 to the socket 1, the electrical connection between the plug 2 and the socket 1 is realized. Thus, the plug 2 can realize the mechanical connection and electrical connection functions with the socket 1 at the same time.

[0070] In some examples, as shown in FIG. 6 and FIG. 7, the plug conductive part 212 is arranged on one side of the external thread 211 in the axial direction of the plug rod 21.

[0071] For example, the plug conductive part 212 is arranged on the lower side of the external thread 211.

[0072] By arranging the plug conductive part 212 on one side of the external thread 211 in the axial direction of the plug rod 21, the parts of the plug 2 configured to realize the electrical connection and mechanical connection functions are not shared. On the one hand, the mechanical connection function and the electrical connection function can be avoided from affecting each other, thereby improving the reliability of the plug 2. On the other hand, it is convenient to design the parts realizing the electrical connection and mechanical connection functions separately as needed, so as to improve the electrical connection reliability and mechanical connection reliability of the plug 2, that is, to improve the reliability of the plug 2.

[0073] In some examples, as shown in FIG. 7, the plug rod 21 has a plug end 211, and the plug conductive part 212 is arranged on the side of the external thread 211 close to the plug end 211.

[0074] For example, the lower end of the plug rod 21 is the plug end 211, and the plug conductive part 212 is arranged on the lower side of the external thread 211.

[0075] By arranging the plug conductive part 212 on the side of the external thread 211 close to the plug end 211, the plug conductive part 212 is arranged away from the plug end 211, and the plug conductive part 212 is arranged away from the insertion port 113 of the socket 1. On the one hand, the risk of electric shock can be reduced and the safety of the plug 2 can be improved. On the other hand, the plug conductive part 212 can be better protected to avoid damage to the plug conductive part 212 and cause electrical connection failure, thereby improving the reliability of the plug 2.

[0076] In some examples, the plug conductive part 212 is annular and arranged circumferentially around the plug rod 21.

[0077] By setting the plug conductive part 212 in an annular shape, it is beneficial to increase the electrical connection area between the plug conductive part 212 and the socket 1, improve the electrical connection reliability between the socket 1 and the plug 2 under high-intensity impact and vibration conditions, and improve the current carrying capacity of the plug 2.

[0078] In some examples, a plurality of plug conductive parts 212 are arranged at intervals along the axial direction of the plug rod 21. Of two adjacent plug conductive parts 212, the maximum outer diameter of the plug conductive part 212 close to the plug end 211 is smaller than

the maximum outer diameter of the plug conductive part 212 away from the plug end 211. The maximum outer diameter of the plug conductive part 212 can be understood as the outer diameter of the plug conductive part 212 at the maximum outer diameter.

[0079] For example, the number of plug conductive parts 212 is three. As shown in FIG. 7, the three plug conductive parts 212 are respectively the first plug conductive part 2121, the second plug conductive part 2122 and the third plug conductive part 2123. The first socket conductive part 1121 is electrically connected to the first plug conductive part 2121, the second socket conductive part 1122 is electrically connected to the second plug conductive part 2122, and the third socket conductive part 1123 is electrically connected to the third plug conductive part 2123. The first plug conductive part 2121, the second plug conductive part 2122 and the third plug conductive part 2123 are arranged in sequence from top to bottom. The maximum outer diameter of the first plug conductive part 2121 is greater than the maximum outer diameter of the second plug conductive part 2122, and the maximum outer diameter of the second plug conductive part 2122 is greater than the maximum outer diameter of the third plug conductive part 2123.

[0080] By designing the plurality of plug conductive parts 212 as above, it is possible to effectively avoid interference between the socket conductive part 112 and the plug conductive part 212 when the socket 1 is connected to the plug 2, thereby improving the connection efficiency between the socket 1 and the plug 2.

[0081] In some examples, as shown in FIG. 7, the plug rod 21 is provided with a plurality of plug terminals 22, and the plurality of plug terminals 22 are arranged at intervals along the axial direction of the plug hole 11. The plug terminals 22 correspond to and are electrically connected to the plug conductive parts 212 one by one. Of the two adjacent plug terminals 22, the plug terminal 22 electrically connected to the plug conductive part 212 away from the insertion port 113 is sleeved on the plug terminal 22 electrically connected to the plug conductive part 212 close to the insertion port 113. The plug terminal 22 can be manufactured by the drawing process.

[0082] For example, as shown in FIG. 7, the number of plug terminals 22 is three, and the three plug terminals 22 are respectively the first plug terminal 221, the second plug terminal 222 and the third plug terminal 223. The first plug terminal 221, the second plug terminal 222 and the third plug terminal 223 are respectively electrically connected to the first plug conductive part 2121, the second plug conductive part 2122 and the third plug conductive part 2123.

[0083] By setting one of the two adjacent plug terminals 22 to be sleeved on the other, it is convenient to achieve the insulation performance between the two adjacent plug terminals 22, thereby facilitating the processing and manufacturing of the plug 2 and reducing the manufacturing cost of the electrical connector 100.

[0084] In some examples, as shown in FIG. 7, a plur-

ality of plug terminals 22 are coaxially arranged.

[0085] In some examples, as shown in FIG. 7, the plug terminal 22 extends along the axial direction of the plug hole 11, and the plug terminal 22 is arranged on the side of the plug conductive part 212 close to the external thread 212 and is electrically connected to the plug conductive part 212.

[0086] For example, the lower end of the plug terminal 22 is electrically connected to the corresponding plug conductive part 212, and the upper end of the plug terminal 22 extends upward.

[0087] By setting the plug terminal 22 to extend along the axial direction of the plug rod 21, it is convenient to pass the plug terminal 22 through the external thread 211 and electrically connect the plug terminal 22 to the second wire 4, so as to realize the electrical connection between the plug conductive part 212 and the external device. Thus, the plug terminal 22 is prevented from affecting the mechanical connection between the plug 2 and the socket 1, which is conducive to improving the reliability of the electrical connector 100.

[0088] In some embodiments, as shown in FIG. 7, the plug 2 includes a third conductive part 23. The third conductive part 23 and the plug conductive part 212 are respectively arranged on opposite sides of the external thread 211 in the axial direction of the plug rod 21, and the third conductive part 23 is electrically connected to the plug conductive part 212.

[0089] For example, as shown in FIG. 2 and FIG. 10, the portion of the plug terminal 22 located on the upper side of the external thread 211 forms the third conductive part 23.

[0090] By setting the third conductive part 23, it is convenient to realize the electrical connection between the plug conductive part 212 and the external device. Thus, it is conducive to improving the installation efficiency of the electrical connector 100.

[0091] The electrical connector 100 of the embodiment includes a socket 1 and a plug 2, where the socket 1 is the socket 1 described in any of the above embodiments, and the plug 2 is the plug 2 described in any of the above embodiments. The plug rod 21 is inserted into the plug hole 11. The external thread 211 is threaded with the internal thread 111, and the plug conductive part 212 is electrically connected to the socket conductive part 112.

[0092] As shown in FIG. 9, the electrical connector 100 further includes a first wire 3 and a second wire 4. The first wire 3 is electrically connected to the socket conductive part 112, and the second wire 4 is electrically connected to the plug conductive part 212. The first wire 3 and the second wire 4 are electrically connected to external devices, respectively. The first wire 3 can be welded to the socket 1, and the second wire 4 can be welded to the plug 4.

[0093] For example, the first wire 3 and the second wire 4 are electrically connected to different wire-to-board connectors, respectively. The wire-to-board connector electrically connected to the first wire 3 is configured to

realize the electrical connection between the socket 1 and the interface on the vehicle; the wire-to-board connector electrically connected to the second wire 4 is configured to realize the electrical connection between the plug 2 and the device to be charged. The device to be charged can be a mobile phone holder, etc.

[0094] In the electric connector 100 of the embodiment, while the plug 2 is threadedly connected to the socket 1, the plug 2 is made to be electrically connected to the socket 1 to realize the power supply function. And the plug 2 and the socket 1 are electrically connected by a crown spring 12 with a large number of contacts, which improves the reliability of the contact between the plug 2 and the socket 1 under vibration and impact conditions, and at the same time improves the current carrying capacity of the electric connector 100.

[0095] The center console of the embodiment includes the socket 1, the plug 2 or the electric connector 100 described in any of the above embodiments.

[0096] For example, the center console includes a mounting frame. The socket 1 is fixedly connected to the mounting frame, and the plug 2 is threadedly connected to the socket 1.

[0097] The vehicle of the embodiment includes the socket 1, plug 2, the electric connector 100 or the center console described in any of the above embodiments. The vehicle can be a pure electric vehicle or a hybrid electric vehicle.

[0098] Although the embodiments of the present invention have been shown and described above, it can be understood that the above embodiments are examples and cannot be understood as limitations of the present invention. Changes, modifications, substitutions and modifications made by ordinary technicians in the field to the above embodiments are all within the scope of protection of the present invention.

[0099] Reference numerals:

[0100] 100, electrical connector;

[0101] 1, socket; 11, plug hole; 111, internal thread; 112, socket conductive part; 1121, first socket conductive part; 1122, second socket conductive part; 1123, third socket conductive part; 113, insertion port; 12, crown spring; 13, socket terminal; 1301, conductive ring; 131, first socket terminal; 132, second socket terminal; 133, third socket terminal; 14, connecting post; 101, outer shell; 102, inner shell; 1021, electrical connection hole; 1022, step;

[0102] 2, plug; 21, plug rod; 211, external thread; 212, plug conductive part; 2121, first plug conductive part; 2122, second plug conductive part; 2123, third plug conductive part; 213, plug end; 22, plug terminal; 221, first plug terminal; 222, second plug terminal; 223, third plug terminal; 23, third conductive part;

[0103] 3, first wire;

[0104] 4, second wire.

Claims

1. A socket (1), wherein the socket (1) is provided with a plug hole (11), a hole wall of the plug hole (11) is provided with an internal thread (111) and a socket conductive part (112), the internal thread (111) is configured to provide threaded engagement with a plug (2), and the socket conductive part (112) is configured to electrically connect with the plug (2).
 2. The socket (1) according to claim 1, wherein the socket conductive part (112) is arranged on a side of the internal thread (111) in an axial direction of the plug hole (11), optionally, wherein the plug hole (11) has an insertion port (113), and the socket conductive part (112) is arranged on a side of the internal thread (111) away from the insertion port (113).
 3. The socket (1) according to any one of the preceding claims, wherein the socket conductive part (112) is annular and arranged circumferentially around the plug hole (11).
 4. The socket (1) according to claim 3, wherein a crown spring (12) is provided in the plug hole (11), and the crown spring (12) forms the socket conductive part (112), optionally, wherein a socket terminal (13) is provided in the plug hole (11), the socket terminal (13) comprises a conductive ring (1301) and a conductive sheet, the conductive ring (1301) is sleeved on the outside of the crown spring (12) and is electrically connected to the crown spring (12), and the conductive sheet is provided on a side of the conductive ring (1301) away from the internal thread (111) and is electrically connected to the conductive ring (1301).
 5. The socket (1) according to any one of the preceding claims, wherein the plug hole (11) has an insertion port (113), and a plurality of the socket conductive parts (112) are arranged at intervals along an axial direction of the plug hole (11); of two adjacent socket conductive parts (112), a minimum inner diameter of the socket conductive part (112) away from the insertion port (113) is smaller than a minimum inner diameter of the socket conductive part (112) close to the insertion port (113).
 6. The socket (1) according to any one of the preceding claims, wherein the socket (1) comprises an outer shell (101) and an inner shell (102), the outer shell (101) is provided with the plug hole (11), a part of the plug hole (11) is provided with the internal thread (111), the inner shell (102) is arranged in another part of the plug hole (11), the inner shell (102) is provided with an electrical connection hole (1021), and the socket conductive part (112) is arranged in the elec-
- trical connection hole (1021), optionally, wherein the inner shell (102) is an insulating shell.
7. The socket (1) according to any one of the preceding claims, wherein the plug hole (11) has an insertion port (113), and the socket (1) further comprises a connecting post (14), and the connecting post (14) is arranged on a side of the plug hole (11) away from the insertion port (113).
 8. A plug (2) assembled with the socket (1) according to any one of claims 1 to 7, comprising a plug rod (21), the plug rod (21) is provided with an external thread (211) and a plug conductive part (212), the external thread (211) is configured to provide threaded engagement with the socket (1), and the plug conductive part (212) is configured to electrically connect with the socket (1).
 9. The plug according to claim 8, wherein the plug conductive part (212) is arranged on a side of the external thread (211) in an axial direction of the plug rod (21), optionally, wherein the plug rod (21) has a plug end (213), and the plug conductive part (212) is arranged on a side of the external thread (211) close to the plug end (213), optionally, the plug (2) comprises a third conductive part (23), the third conductive part (23) and the plug conductive part (212) are respectively arranged on opposite sides of the external thread (211) in the axial direction of the plug rod (21), and the third conductive part (23) is electrically connected to the plug conductive part (212).
 10. The plug according to claim 8 or 9, wherein the plug conductive part (212) is annular and arranged circumferentially around the plug rod (21).
 11. The plug according to any one of claims 8 to 10, wherein the plug rod (21) has a plug end (213), and a plurality of the plug conductive parts (212) are arranged at intervals along an axial direction of the plug rod (21); of two adjacent plug conductive parts (212), a maximum outer diameter of the plug conductive part (212) close to the plug end is smaller than a maximum outer diameter of the plug conductive part (212) away from the plug end (21).
 12. The plug according to claim 11, wherein the plug rod (21) is provided with a plurality of plug terminals (22), the plurality of plug terminals (22) are arranged at intervals along the axial direction of the plug rod (21), and the plug terminals (22) correspond to and are electrically connected to the plug conductive parts (212) one by one;

of two adjacent plug terminals (22), the plug terminal (22) electrically connected to the plug conductive part (212) away from the insertion port (113) is sleeved on the plug terminal (22) electrically connected to the plug conductive part (212) close to the insertion port (113). optionally, wherein the plug terminal (22) extends along the axial direction of the plug rod (21), the plug terminal (22) is arranged on a side of the plug conductive part (212) close to the external thread (211) and is electrically connected to the plug conductive part (212).

13. An electrical connector (100), comprising:

the socket (1) according to any one of claims 1 to 7;
the plug (2) according to any one of claims 8 to 12;
wherein the plug rod (21) is inserted into the plug hole (11), the external thread (211) and the internal thread (111) are in threaded engagement, and the plug conductive part (212) is electrically connected to the socket conductive part (112).

14. A center console, comprising the socket (1) according to any one of claims 1 to 7, the plug (2) according to any one of claims 8 to 12, or the electrical connector (100) according to claim 13.

15. A vehicle, comprising the socket (1) according to any one of claims 1 to 7, the plug (2) according to any one of claims 8 to 12, the electrical connector (100) according to claim 13, or the center console according to claim 14.

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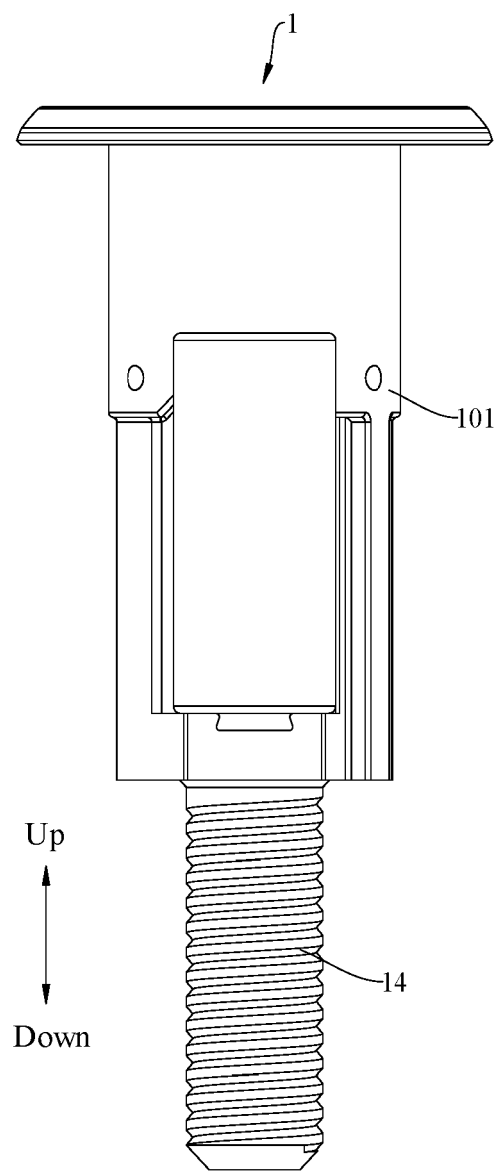


FIG. 1

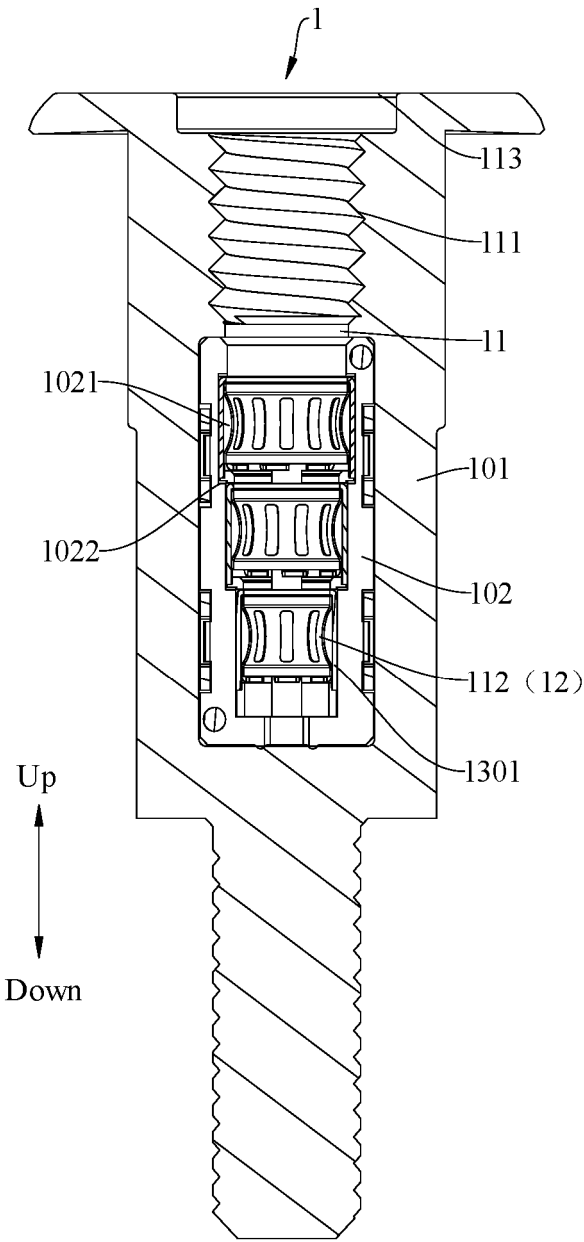


FIG. 2

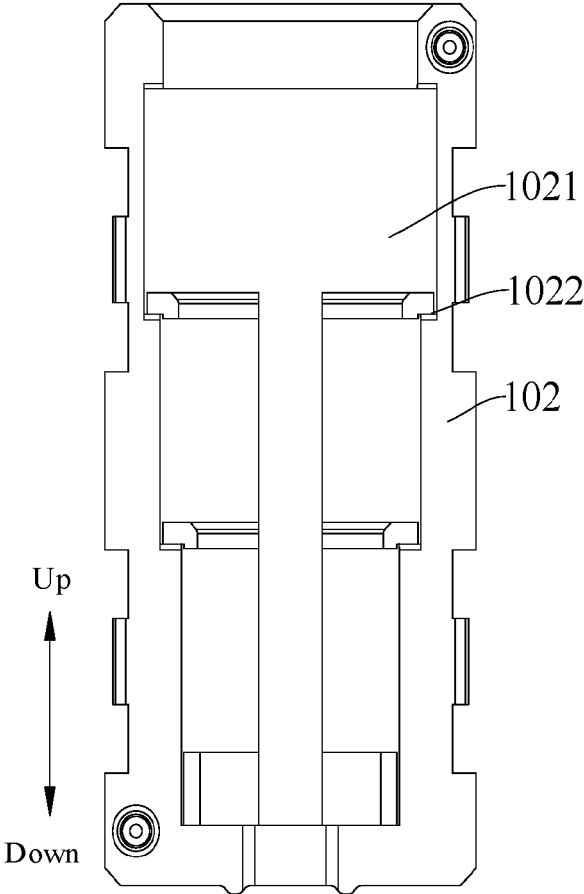


FIG. 3

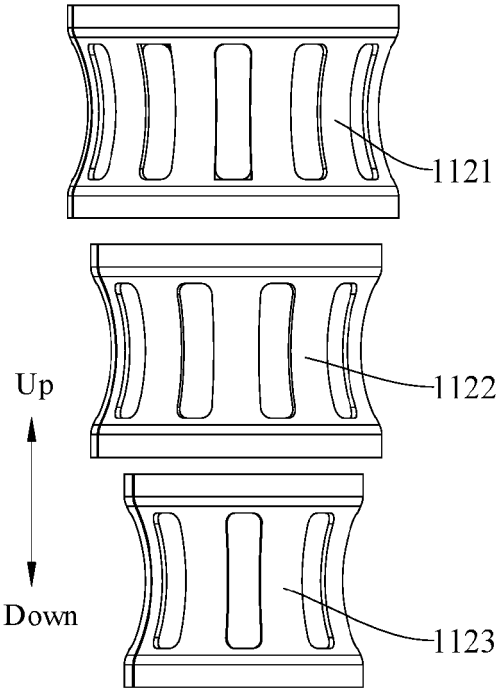


FIG. 4

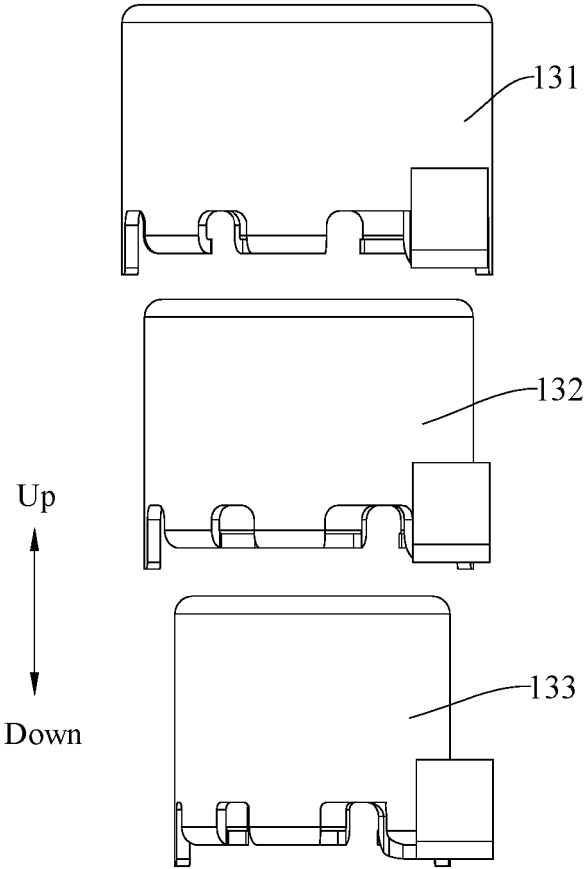


FIG. 5

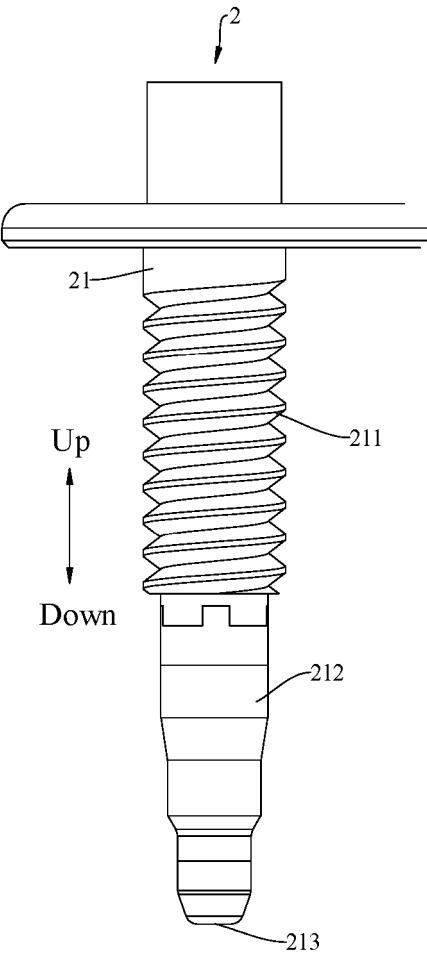


FIG. 6

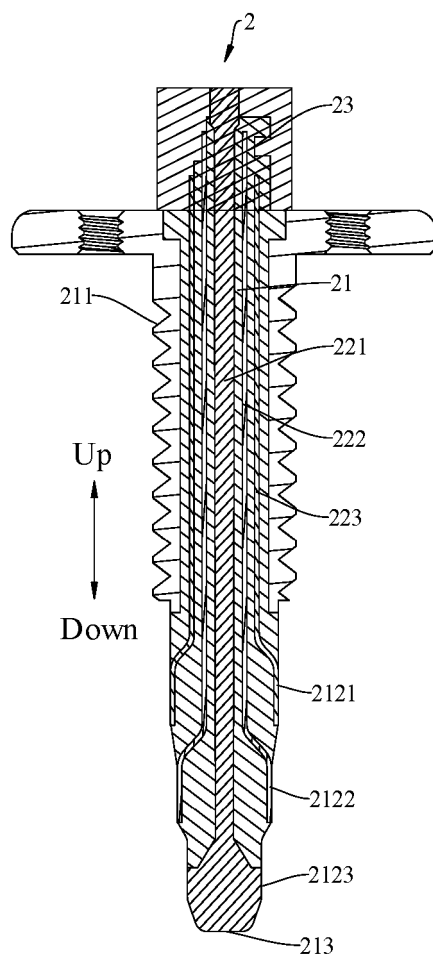


FIG. 7

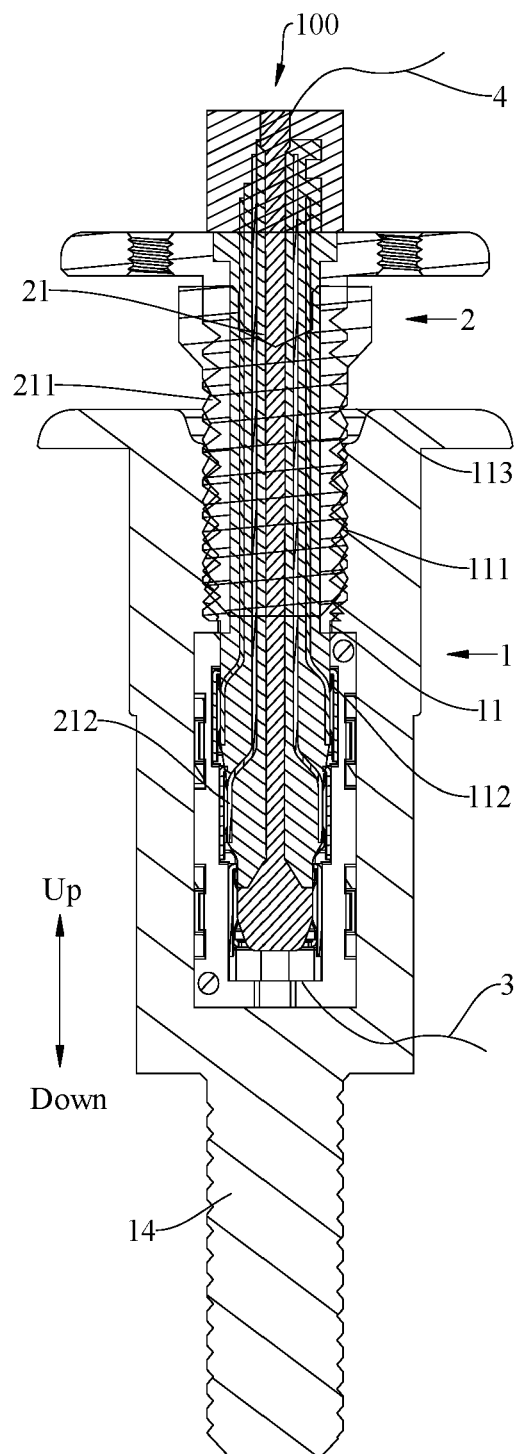


FIG. 8

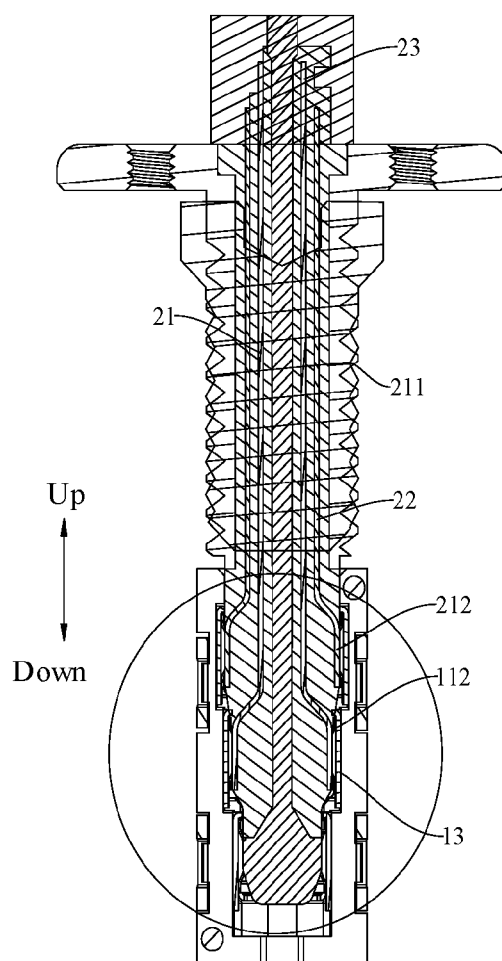


FIG. 9

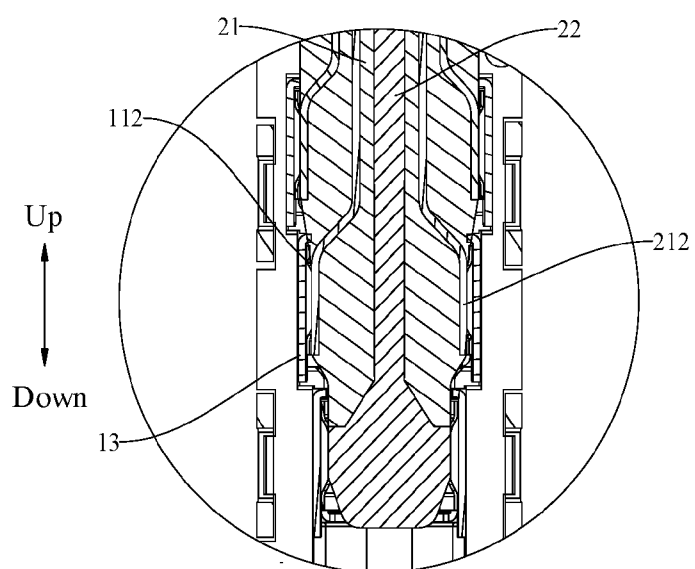


FIG. 10



EUROPEAN SEARCH REPORT

Application Number

EP 25 18 9685

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	DE 42 22 206 A1 (GAERTNER KARL TELEGAERTNER [DE]) 13 January 1994 (1994-01-13) * column 2, line 21 to column 4, line 34 , figures 1-7 *	1-15	INV. H01R13/622 H01R24/58
X	DE 32 06 275 A1 (BEKHET FAUZI) 8 September 1983 (1983-09-08) * pages 10 to 13, figure 1 *	1-15	
X	US 5 277 628 A (LIN JIH-BIN [TW] ET AL) 11 January 1994 (1994-01-11) * column 2, line 38 to column 3, line 31, figures 1 and 2 *	1,2,4, 8-15 3,5-7	
X	DE 10 2018 208111 A1 (TE CONNECTIVITY GERMANY GMBH [DE]) 28 November 2019 (2019-11-28) * paragraph [0049]; figure 5 *	1-4, 7-10, 13-15 5,6,11, 12	
X	JP 3 155031 U (UNKNOWN) 5 November 2009 (2009-11-05) * the whole document *	1,2,5, 8-15 3,4,6,7	TECHNICAL FIELDS SEARCHED (IPC) H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 November 2025	Examiner López García, Raquel
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			

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14-11-2025

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JP 3155031	U	05-11-2009	NONE

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