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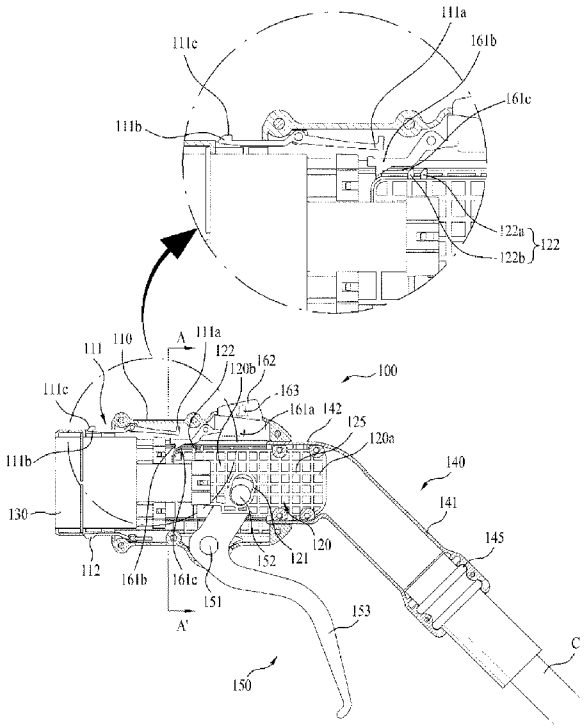
(54) Title: CONNECTOR OF ELECTRIC VEHICLE CHARGER

[Fig. 2]



(57) Abstract: There is disclosed a connector of an electric vehicle charger which has enhanced reliability in mounting, charging and demounting processes, with a simple structure and enhanced user convenience.

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Description

Title of Invention: CONNECTOR OF ELECTRIC VEHICLE CHARGER

Technical Field

[1] Embodiments of the invention may relate to a connector of an electric vehicle charger, more particularly, to a connector of an electric vehicle charger which has enhanced reliability in mounting, charging and demounting processes, with a simple structure and enhanced user convenience.

Background Art

[2] Recently, there have been increasing interests on an electric vehicle because of the recently rising oil price or environmental problems. Such an electric vehicle includes a driving motor and a higher-capacity battery to supply an electric power required to operate various electric devices. To distribute electric vehicles, an electric vehicle charger which charges the electric vehicle is required.

[3] Such an electric vehicle charger may include a charging station for electric power supply and control and a connector detachably mounted to an inlet of an electric vehicle to supply the electric energy provided by the charging station to the inlet provided in the electric vehicle.

[4] Especially, the electric vehicle may be quick-charged to reduce the charging time and an electric vehicle charger for quick-charging may be different from an electric vehicle charger for slow-charging.

[5] In a quick-charger, a connector is necessary that has a simple structure and the reduced number of parts, only to satisfy safety or standard requirements to enhance user convenience simultaneously, and also that can be mounted and demounted in the quick-charger without a user's big strength and that provides reliability of the connector's no unintended separation in the charging process.

Disclosure of Invention

Technical Problem

[6] To solve the problems, an object of the embodiments is to provide a connector of an electric vehicle charger having enhanced reliability in mounting, charging and de-mounting processes, with a simple structure and enhanced user convenience.

Solution to Problem

[7] To achieve these objects and other advantages and in accordance with the purpose of the embodiments,

[8] In an aspect of the invention, a connector of an electric vehicle charger includes an outer housing comprising a first opening and a second opening formed at both opposite

ends thereof; a terminal housing slidably mounted in the outer housing; a communication terminal and an electric power terminal coupled to the terminal housing; a lever hingedly coupled to the outer housing; and a plate-type slider coupled to a rear end of the terminal housing to advance by rotation of the lever to slidingly move a front end of the terminal housing toward the first opening of the outer housing.

[9] The connector may further include a handle coupled to the rear end of the plate-type slider to retreat by the plate-type slider when the lever is rotated, the handle slidably movable from the second opening of the outer housing.

[10] The handle may include a handle part; and a sliding part coupled to a rear end of the plate-type slider, with being extended and bent from the handle part, to be slidingly-movable from the second opening of the outer housing.

[11] A cable protection member formed of a rubber material may be provided below the handle part, with a diameter corresponding to an inner diameter of the handle part.

[12] The plate-type slider may be provided in parallel to a longitudinal direction of the outer housing to partition an inner space of the outer housing into two spaces.

[13] A positive or negative leading wire branched from a cable introduced via the handle may be arranged in each of the spaces of the outer housing partitioned by the plate-type slider.

[14] A guide pin may be provided in an upper end of the lever and a long-hole-shaped guide hole may be provided in the plate-type slider to advance the plate-type slider along a rotation locus of the guide plate according to the rotation of the lever.

[15] A lattice-type rib may be provided in at least one of both surfaces of the plate-type slider.

[16] Two plate-type sliders spaced apart a predetermined distance from each other in parallel may be provided in the outer housing and the upper end of the lever may be arranged in the two plate-type sliders. The guide pin may be extended from the upper end of the lever to pass through guide holes provided in the two plate-type sliders.

[17] The connector may further include a fixing latch fixed to the advanced plate-type slider to fix the slidably moved terminal housing; and a coupling latch to maintain the mounted state of the connector to the inlet. The fixed state unlocking performed by the fixing latch may unlock the coupled state of the coupling latch.

[18] An unlocking button may be provided in the outer housing to unlock the fixing state of the plate-type slider fixed by the fixing latch and the fixing latch and the coupling latch are hingedly coupled to the outer housing. When an end of the fixing latch is pressed by the unlocking button, the other end of the fixing latch moves an end of the coupling latch upward and the other end of the coupling latch may be moved downward accordingly, to unlock the coupling state of the coupling latch with respect to the inlet of an electric vehicle.

[19] The unlocking button may be provided in an upper center region near a second opening of the outer housing.

[20] The unlocking button may be formed of a light-transmissive material and a light source having at least one luminous color is provided in the unlocking button.

[21] A control part of the electric vehicle charger may control the luminous color of the light source to be different according to a charging state of the electric vehicle.

[22] The plate-type slider may be perpendicularly mounted in the outer housing and a hooking part may be formed at an upper end of the plate-type slider to fixedly-hook the fixing latch thereto selectively.

[23] The hooking part may be at least one projection formed in the upper end of the plate-type slider.

[24] Different slopes are formed in lateral surfaces of a projection.

[25] When two projections are provided, two projections may be spaced apart a predetermined distance from each other in parallel to the sliding direction of the plate-type slider.

[26] In another aspect of the invention, a connector of an electric vehicle charger includes a terminal housing comprising a communication terminal and an electric power terminal coupled thereto; an outer housing mounted in the terminal housing; a lever hingedly coupled to the outer housing; an advancing member to advance the terminal housing outside the outer housing by converting a rotation moment of the lever into a predetermined direction advancing force; a handle coupled to the advancing member, the handle retreating by the advancing member when the lever is rotated, and slidingly-movable from an opening of the outer housing; a fixing latch fixed to the advancing member advanced to fix the displaced state of the terminal housing in the outer housing, when the lever is rotated; a coupling latch to maintain the mounted state of the connector with respect to an inlet provided in the electric vehicle; and a unlocking button provided in the outer housing to unlock the fixed state of the advancing member fixed by the fixing latch.

[27] The fixed state unlocking of the fixing latch may unlock the coupled state of the coupling latch and the unlocking button may be provided in an upper region near the opening of the outer housing.

Advantageous Effects of Invention

[28] The embodiments have following advantageous effects. According to the connector of the electric vehicle charger, an internal structure of the connector may be simple and the number of parts provided in the connector may be reduced.

[29] Furthermore, according to the connector of the electric vehicle charger, the mounting and demounting of the connector with respect to the inlet of the electric vehicle may be

simple.

[30] Still further, the connector may be prevented from separating from the electric vehicle charger unintentionally and reliability of the connector may be enhanced.

[31] Still further, the inner space of the outer housing is partitioned into two spaces by the plate-type slider and a positive or negative leading wire may be arranged in each of the partitioned spaces, without close to each other. A withstanding voltage capacity may be enhanced accordingly.

Brief Description of Drawings

[32] FIG. 1 is a diagram illustrating an embodiment of a connector provided in an electric vehicle charger according to the invention and a separated state of an inlet where the connector is detachably mounted;

[33] FIG. 2 is a sectional view illustrating the connector of the electric vehicle charger according to the invention;

[34] FIG. 3 is an exploded perspective view of the connector;

[35] FIGS. 4 and 5 are sectional views illustrating the connector of the electric vehicle charger according to the invention;

[36] FIG. 6 illustrates a plate-type slider that advances in a state of pulling a lever provided in the connector of the electric vehicle charger according to the invention; and

[37] FIG. 7 illustrates the plate-type slider that returns to an original position by pushing an unlocking button after retreating again from the advanced state, in the state of pulling the lever provided in the connector of the electric vehicle charger.

Best Mode for Carrying out the Invention

[38] Embodiments of the invention will be described in detail to be embodied by those skilled in the art to which the embodiments pertain to, in reference to the accompanying drawings. Reference may now be made in detail to specific embodiments, examples of which may be illustrated in the accompanying drawings. Wherever possible, same reference numbers may be used throughout the drawings to refer to the same or like parts.

[39] FIG. 1 illustrates an embodiment of a connector 100 of an electric vehicle charger according to the invention and a separated state of an inlet 200 where the connector 100 is detachably mounted.

[40] In the inlet 200 may be provided an inlet housing 210, a female electric power terminal 220 and a communication terminal 230 which are provided in the inlet housing 210. The inlet 200 may be open and closed by a closable cover 240.

[41] The connector 100 of the electric vehicle charger according the embodiment of the invention may include an outer housing 110, a terminal housing 130 provided in the

outer housing 110 and a male electric power terminal 131 and a communication terminal 132 provided in the terminal housing 130.

[42] Accordingly, when charging the electric vehicle, the user may mount the connector 100 to the inlet 200. When link between corresponding terminals is connected, the electric vehicle may supply an electric power to a battery (not shown) provided therein via the connector to charge the battery.

[43] The terminal housing 130 having the electric power terminal 131 and the communication terminal 132 of the connector 100 mounted therein is inserted in the inlet housing 210 provided in the inlet 200, in the charging process. However, it needs not be exposed outside in a no-charging process because of safety or standard requirements.

[44] As a result, the terminal housing 130 where the electric power terminal 131 and the communication terminal 132 provided in the connector 100 are mounted may be exposed outside only when it is coupled for charging.

[45] For the selective exposure or projected structure, the connector 100 may include an outer housing 110 and the terminal housing 130 is able to slide in the outer housing 110. Also, a predetermined force is required in the charging or the process of mounting the terminal housing 130 where the electric power terminal 131 and the communication terminal 132 of the connector 100 are mounted to the inlet housing 210 for charging. A lever 150 may be used for decreasing the user's substantial power required in the mounting process. In other words, the lever 150 is used to allow the user to use a less power in mounting the connector 100 to the inlet 200. Especially, unless using the lever, the elderly and weak or the female can feel physical burden of the connector mounting process.

[46] In addition, a handle 140 may be provided to enable the user to hold the connector 100 easily by the hand and the handle 140 may have a bent profile. A cable (C) may pass through the handle 140 before being linked to the plurality of the terminals.

[47] In reference to FIG. 2, a structure of a connector provided in the electric vehicle charger according to the embodiment will be described in detail.

[48] FIG. 2 is a sectional view of the connector 100 provided in the electric vehicle charger according to the invention and FIG. 3 is an exploded perspective view of the connector 100.

[49] In reference to FIGS. 2 and 3, the connector 100 of the electric vehicle charger according to the embodiment of the invention may include the electric power terminal (131, see FIG. 3) and the communication terminal (132, see FIG. 3), the terminal housing 130 mounted to expose the electric power terminal 131 and the communication terminal 132, the outer housing 110 to mount the terminal housing 130 therein movably, with openings formed in both opposite ends, the lever 150 hingedly coupled

to the outer housing 110, and a plate-type slider 120 provided in parallel to a longitudinal direction of the outer housing 110 to partition an inner space of the outer housing 110 into two spaces, the plate-type slider 120 coupled to a rear end of the terminal housing and advanced by the lever 150 when the lever 150 is rotated, to change a position of a front end 130a of the terminal housing toward one of the openings 111 formed in the outer housing 110.

[50] The outer housing may have a first opening 111 provided in a front part and a second opening 113 provided in a rear part.

[51] As shown in FIG. 2, the terminal housing 130 having the terminals mounted therein may be arranged in one of the openings provided in the outer housing 110, for example, a front opening (111, the first opening). A front part of the plate-type slider 120 may be coupled to a rear end 130b of the terminal housing. A ring part 123 may be formed in the front end 120b of the plate-type slider 120 and an inserting part 138 may be formed in the rear end 130b of the terminal housing to insertedly couple the ring part 123 thereto.

[52] When the connector is assembled in a state of the ring part 123 being inserted in the inserting part 138, auxiliary coupling members can be needless. The rear end 120a of the plate-type slider 120 may be coupled to the handle which will be described later.

[53] As a result, the terminal housing 130 and the handle 150 may be coupled to the front end 120b and the rear end 120a of the plate-type slider 120.

[54] The plate-type slider 120 may be moved by the lever 150 along a predetermined direction, for example, a left horizontal direction (see FIG. 2). The reason why the plate-type slider is moved is that the connector 100 according to the embodiment of the invention has to be slidingly moved forwardly when it is mounted to the inlet 200. In other words, the plate-type slider 120 may be used as an advancing member for advancing the terminal housing 130.

[55] The handle 140 may be coupled to the rear end 120a of the plate-type slider 120 and it may be towed by the plate-type slider 120, to be slidably coupled to the other opening 113 (the second opening) of the outer housing 110.

[56] Specifically, the handle 140 may include a handle part 141 and a sliding part 142 bendingly extended from the handle part 141 to be coupled to the rear end 120a of the plate-type slider 120, with being sliding into the other opening (the second opening) of the outer housing 110.

[57] As shown in FIGS. 2 and 3, the handle 140 may be coupled to the rear end 120a of the plate-type slider 120 within a rear end region of the outer housing 110 and it may be pipe-shaped to pass the cable (C) connected to the terminals 131.

[58] Specifically, as shown in FIGS. 2 and 3, the sliding part 142 of the handle 140 fixed to the plate-type slider 120 may be slidably coupled to the rear part of the outer

housing 110 and an inner path having the cable (C) pass there through and the handle part 141 that can be held by the user may be provided behind the sliding part 142. A cable protection member 145 having a corresponding size to an inner diameter of the inner path may be insertedly coupled to a rear part of the handle part 141.

[59] The handle part 141 and the sliding part 142 may be bending to be held by the user easily.

[60] The sliding part 142 may be in parallel to a longitudinal direction of the outer housing 110 or the displacement direction of the plate-type slider 120. Compared with the handle part 141 and the sliding part 142 which are gently curved without divided definitely, the sliding part may be horizontal and the handle part may be bent from the end of the sliding part. In this instance, the pulling of the lever 150 may be performed smoothly and durability may be enhanced.

[61] The plate-type slider 120 may be installed in the outer housing 110, in parallel to the longitudinal direction of the outer housing 110, to partition the inner space of the outer housing 110. Accordingly, a positive or negative leading wire (not shown) branched from the cable inserted via the handle 140 may be arranged in each of the spaces of the outer housing 110 partitioned by the plate-type slider 120. The arrangement of the leading wire will be described in reference to FIGS. 4 and 5 as follows.

[62] As shown in FIG. 3, the outer housing 110 and the handle 140 may be two divided housings and they may be coupled by an auxiliary coupling member (not shown).

[63] The cable protection member 145 may be formed of rubber and it may protect the cable (C) introduced into the connector 100. The size of the cable protection member 145 may be corresponding to the inner diameter of the handle 140. Variable sized cable may be applicable to the connector 100 and airtight closure can be enabled to prevent an accident such as waterlogging.

[64] The plate-type slider 120 may be configured of a plate. It may be configured of a single plate or a plurality of plates. According to the embodiment shown in FIGS. 1 and 2, a single plate-shaped slider 120 is provided.

[65] A lattice-type rib 125 may be provided in one of both surfaces of the plate-type slider 120. As mentioned above, the plate-type slider 120 may move the terminal housing 130 and tow the handle 140 by the lever 150 selectively. Accordingly, the rib 125 may be formed to prevent twisting and to reinforce strength and rigidity.

[66] Advancing force converting means are required to convert a torque of the lever 150 into an advancing force toward a predetermined direction to advance the plate-type slider when the lever 150 is rotated.

[67] In the embodiment shown in FIGS. 2 and 3, a guide pin 152 may be provided at an upper end of the lever 150 and a guide hole 121 having a long-hole shape may be formed in the plate-type slider 120 to advance the plate-type slider 120 along a ro-

tational locus of the guide pin 152 according to the rotation of the lever 150.

[68] The guide hole 121 may be a long hole to convert the rotational force of the lever 150 into a horizontal direction advancing force according to the rotational locus of the guide pin 152. The detailed operation and the operation process thereof will be described later.

[69] As mentioned above, the lever 150 may be rotatably coupled to the outer housing 110 by a hinge 151. A spring 158 may be provided in the hinge 151 to provide a restitution force to the lever 150 when the lever 150 is rotated.

[70] Accordingly, when the user rotates the lever 150 toward the handle 150, with holding the handle part 153 corresponding to the lower region of the handle 140, the guide pin 152 may be slidingly displaced while pressing an inner wall surface of the guide hole 121 and the plate-type slider 120 may be advanced toward a predetermined direction.

[71] Under such the structure, the terminal housing 130, the plate-type slider 120 and the handle 140 are coupled sequentially and the plate-type slider 120 is displaced to simultaneously advance or retreat the terminal housing 130 and the handle 140 coupled in front and behind the plate-type slider 120 within the outer housing 110.

[72] Alternatively, the coupling positions of the guide pin and the guide hole may be reversed. The long-shaped guide hole may be provided at the upper end of the lever and the guide pin may be provided in a lateral surface of the plate-type slider to be inserted in the guide hole of the lever.

[73] The structure of making the plate-type slider 120 advances the terminal housing 130 as mentioned above may be provided to mount the connector of the electric vehicle charger to the inlet 200 of the electric vehicle for charging. A structure of maintaining the mounting state during the charging will be described as follows.

[74] The connector 100 of the electric vehicle charger according to the embodiment of the invention may further include a fixing latch 161 hooked to the advanced plate-type slider 120 to fix the displaced state (the sliding-moved state) of the terminal housing 130 within the outer housing 110 and a coupling latch 111 to maintain the mounted state of the connector of the electric vehicle charger to the inlet 200 of the electric vehicle.

[75] The fixing latch 161 is provided to fix the state of the plate-type slider 120 advanced by the lever 150. In other words, it is provided to maintain the projected or displaced state of the terminal housing 130 during the charging of the electric vehicle.

[76] The coupling latch 111 is provided to prevent the outer housing 110 from separating from the inlet 200 while the the outer housing 110 is mounted to the inlet 200.

[77] Namely, the coupling latch 111 is provided to prevent the connector 100 from separating from the inlet 200 of the electric vehicle while the advanced state of the terminal housing 130 is maintained by the fixing latch 161.

[78] As shown in FIG. 2, the fixing latch 161 and the coupling latch 111 may be hingedly connected to a center of an inner top surface of the outer housing 110.

[79] An end 161a of the fixing latch 161 may be selectively pressed by a unlocking button 162 and the other end 161b of the fixing latch 161 may include a fixing projection 161c hooked to a hooking part 122 of the plate-type slider 120.

[80] An end 111a of the coupling latch 111 may be positioned beyond the other end 161b of the fixing latch 161 and a coupling projection 111c may be formed at the other end 111b of the coupling latch 111b. The reason why the end 111a of the coupling latch 111 is arranged beyond the other end 161b of the fixing latch 161 is to release the mounted state of the connector and the fixed state of the plate-type slider simultaneously, which will be described later.

[81] In this instance, the fixing projection 161c and the coupling projection 111c are projected from ends of the fixing latch 161 and of the coupling latch 111, respectively. The fixing projection 161c and the coupling projection 111c may have inclined surfaces different from each other, respectively, to reduce physical resistance during the mounting process of the connector 100 and to maintain the mounted state of the connector and the fixed state of the plate-type slider 120.

[82] The plate-type slider 120 may include the hooking part 122 selectively hooked by the fixing projection 161c.

[83] The hooking part 122 may be at least one projection formed in an upper end of the plate-type slider 120. A lateral surface slope of one projection may be different from a lateral surface slope of another projection. This is for the hooking operation for the fixing latch 161.

[84] For convenience of description, FIG. 2 shows that two projections are provided. Also, when it is two projections, the hooking part 122 may include two hooking projections 122a and 122b formed at the upper end of the plate-type slider 120, spaced apart a predetermined distance from each other along a parallel direction with respect to the displacement direction (the sliding direction) of the plate-type slider 120.

[85] A seating recess may be formed between the hooking projections 122a and 122b to seat the fixing projection therein.

[86] A lateral surface (a right lateral surface of a numeral reference“122a”shown in FIG. 2) of a first hooking projection 122b out of the hooking projections 122a and 122b may have a slope perpendicular to a slope of a lateral surface (a left lateral surface of a numeral reference“161c”shown in FIG. 2) of the fixing projection 161c, to prevent the fixing state from being unlocked easily.

[87] When the fixing projection 161c is seated between the hooking projections 122a and 122b, the plate-type slider 120 may be prevented from being retreated by the restitution of the spring mounted in the lever 150.

[88] The other lateral surface (a left lateral surface of the numeral reference“122b”shown in FIG. 2) of the first hooking projection out of the hooking projections 122a and 122b and a lateral surface (a right lateral surface of the numeral reference“161c”shown in FIG. 2) may have gentle slopes toward corresponding directions, respectively, to minimize physical resistance during the inserting process of the connector.

[89] As a result, the connector 100 may be mounted to the inlet 20 smoothly without requiring a large force. The fixing latch 161 is also coupled to the outer housing 110 by a hinge and a spring is provided in the hinge. This is because a sectional surface of the coupling projection 111c has the gentle slope. The second hooking projection 122a of the hooking projections 122a and 122b may stop additional movement of the plate-type slider 120 and form a fixing space for fixing the fixing projection simultaneously.

[90] As mentioned above, the hooking part 122 may be a single hooking projection. Accordingly, the second hooking projection 122a may be selectively provided.

[91] The coupling projection 111c formed in the coupling latch 111 may have different slopes formed in both lateral surfaces with respect to a cross section. In other words, a slope of a left lateral surface may be gentle and a slope of a right lateral surface may be steep. When mounting the connector to the inlet 200, physical resistance can be reduced as much as possible smoothly and the coupled state of the right lateral surface of the connector to the inlet cannot be released easily.

[92] For the charging process, the connector 100 may be mounted. Once the charging is complete, a structure for detaching the connector from the inlet is required.

[93] As a result, an unlocking button 162 may be provided to unlock the fixing state of the plate-type slider 120 to the outer housing 110 by the fixing latch 161 (or the fixing projection 161c). When the end 161a of the fixing latch 161 is pressed by the unlocking button 162, the fixing projection 161c provided at the other end 161b of the fixing latch 161 is moved upwardly and the end 111a of the coupling latch is moved simultaneously. Accordingly, the other end 111b of the coupling latch is moved downwardly.

[94] In other words, the unlocking button 162 is pressed and the fixing state of the fixing projection 161c provided in the fixing latch 161 with respect to the hooking part 122 of the plate-type slider 120 may be unlocked. At the same time, the other end 111b of the coupling latch 111 may be moved downwardly and the coupled state of the coupling latch 111 with respect to the inlet 200 of the electric vehicle may be unlocked.

[95] The unlocking of the fixing state of the fixing latch 161 may have a function unlocking the coupled state of the coupling latch 111. A dummy latch 112 in no relation with the unlocking of the coupled state may be provided in a position that is symmetric with respect to the coupling latch 111.

[96] The dummy latch 112 may be provided to keep pace with the coupling latch 111 in

the mounding or demounting process of the connector 100, not to maintain or release the mounted state of the connector 100 according to conditions. Different from the coupling latch 111, all of slopes formed in a projection of the dummy latch 112 may be gentle. Similar to the coupling latch 111, the dummy latch 112 may be hingedly coupled to the outer housing 110.

[97] The dummy latch 112 may be thin to provide a predetermined elasticity. Accordingly, the dummy latch 112 may guide the connector 100 to be mounted to the inlet 100 gently, with providing a predetermined supporting force to the connector 100.

[98] The unlocking button 162 may be provided in an upper center region near the other opening (the second opening) of the outer housing 110.

[99] It is irrelevant if the user is left-handed or right-handed. The unlocking button 162 may be provided in a rear center of an upper region in the outer housing 110 to enable the user to perform the demounting of the connector by the hand holding the handle.

[100] The unlocking button 162 may be formed of a light-transmissive material and it may include a light source 163 having at least one luminous color.

[101] When the light source has a single luminous color, the light source may be on and off to display a charging state, a charging completion state or an error state separately.

[102] When the light source has two luminous colors, the light source 163 may be a light emitting diode (LED) device having two or more different colors.

[103] Using the LED device having different colors, the control part of the electric vehicle charger may control luminous colors of the LED device based on the charging state of the electric vehicle. For example, a red Led is on in the charging and a green LED device is on when the charging is complete. Accordingly, the user can determine the charging state easily.

[104] As shown in FIG. 3, the terminal housing 130 may include an electric power coupling hole 137 and a communication terminal coupling hole 139 which are cylindrical structures to insertedly couple the electric terminal 131 and the communication terminal 132 thereto, respectively.

[105] The communication terminal coupling hole 139 may include a sealing material 133 to seal rear parts of the terminals 131 and 132 thereto, a supporting material 134 to provided in front of the sealing material 134 to prevent the sealing material 133 from moving toward a front end of the terminal 131, with a larger outer diameter than an inner diameter of the sealing material 133, and a rear holder 135 coupled to means of the sealing material 133 in close contact, with a cable introduction hole formed therein to introduce a positive or negative leading wire (W) branched from the cable (C) corresponding to the terminal 131.

[106] In the embodiment shown in FIG. 3, it is shown that the sealing material, the supporting material and the rear holder are provided only in the electric power

terminal. However, they may be additionally provided for sealing the communication terminal.

[107] In this configuration, the connector 100 and the inlet 200 may be supported by the sealing material 133 and the supporting material 134 positioned in the rear part of the terminal 131 stably, even when an excessive force is applied in the mounting process between the connector 100 and the inlet 200. Accordingly, regular positions of the connector 100 and the inlet 200 may be kept during the mounting process and the sealing of the cable bonding part may be stably maintained by the sealing material 133.

[108] FIGS. 4 and 5 are sectional views illustrating the connector of the electric vehicle charger according to the embodiment of the invention. FIG. 4 shows an embodiment of the plate-type slider 120 configured of a single plate and FIG. 5 shows another embodiment of the plate-type slider 120'configured of two plates.

[109] First of all, the embodiment shown in FIG. 4 will be described. As mentioned above, the plate-type slider 120 is a plate-type and the rotation moment generated by the rotation of the lever 150 is converted into the momentum used for moving the terminal housing 130 forward and the handle 140 backward simultaneously.

[110] Also, the plate-type slider 120 may partition the inner space of the outer housing 110 along a longitudinal direction. Accordingly, the positive or negative leasing wire (W) branched from the cable (C) introduced via the handle 140 may be arranged in both sides with respect to the plate-type slider 120.

[111] As a result, the moving path of the positive or negative leading wire (W) may be divided into both sides with respect to the plate-type slider 120 and the plate-type slider 120 may be used as an insulation wall between the two leading wires (W). Accordingly, a withstanding voltage capacity of the connector 100 may be enhanced and the risk of short circuit may be reduced. Also, waste of an outer housing inner space may be minimized.

[112] A guide fin 151 may be provided at an upper end of the lever 150. The upper end of the lever 150 may be extended to allow the guide pin 151 to pass through the guide hole 121 after bypassing the plate-type slider 120 and near the guide hole 121 of the plate-type slider 120.

[113] In the embodiment shown in FIG. 4, the plate-type slider 120 is configured of a single plate and the guide pin is inserted in the guide hole after bypassing the guide hole. In the embodiment shown in FIG. 5, the plate-type slider 120'may include two plate-type sliders spaced apart a predetermined distance from each other in parallel.

[114] In the embodiment shown in FIG. 5, guide holes 121'having the same shape are provided in corresponding positions of the plate-type sliders 120' , respectively. A pair of guide pins 152'may be extended from an upper end of the lever 150'toward the guide holes 121'along reverse directions, to pass through the guide holes 121', re-

spectively.

[115] As a result, the upper end of the lever may not be bent to plate-type slider in the embodiment shown in FIG. 5.

[116] FIG. 6 shows that the plate-type slider advances in the state of pulling the lever of the connector provided in the electric vehicle charger. FIG. 7 shows that the plate-type slider retreats to the original position from the advanced position by pushing the unlocking button, in the state of the lever being pulled.

[117] In reference to FIG. 6, the lever 150 is pulled to mount the connector 100 to the inlet 200. In this instance, the plate-type slider 120 is moved forward after sliding by the rotation of the lever 150. The terminal housing 130 and the handle 140 coupled to the plate-type slider 120 are moved forward and backward in communication. The terminal housing 130 and the handle 140 are displaced together as the plate-type slider is displaced.

[118] In this instance, the latch161 is fixed to the fixing part 122 formed in the top of the plate-type slider 120, to fix the moved state of the plate-type slider 120. The terminal housing 130 and the handle 140 coupled to the plate-type slider 120 may maintain the displaced state. In this instance, the terminal housing 130 is moved forward to be projected or displaced outside the outer housing 110. Accordingly, the terminals coupled to the terminal housing 130 can be connected with the corresponding terminals (not shown) of the inlet 200, respectively.

[119] When the charging starts after the terminals of the connector 100 are linked to the terminals of the inlet 200, the charging lamp (the light source) 163 provided in the unlocking button 162 displays the charging (for example, the LED is luminous red). Once the electric vehicle finishes charging via the connector 100, the charging the charging lamp 163 displays the charging completion (for example, the LED is luminous green) to notify the charging completion to the user.

[120] In reference to FIG. 7, when the unlocking button 162 is pushed to demount the connector 100 from the inlet 200, the fixing latch 161 fixed to the fixing part 122 of the plate-type slider 120 and the coupling latch 111 coupled to the inlet 200 are unlocked. After that, the coupling of the plate-type slider 120 is unlocked by the restitution provided by the spring (see FIG. 3) coupled to the hinge 151 of the handle and it slidably retreats. The terminal housing 130 and the handle 140 coupled to the plate-type slider 120 retreats in communication with the plate-type slider 120.

[121] After that, the terminal housing 130 is accommodated in the outer housing 110 again and the terminal 131 of the terminal housing 130 and the terminal of the inlet 200 can be disconnected from each other.

[122] In this instance, the coupled state of the coupling latch 111 provided in the outer housing 110 may be released simultaneously in communication when the fixing state

of the fixing latch 161 is released from the plate-type slider 120.

[123] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

[Claim 1] A connector of an electric vehicle charger comprising:
an outer housing comprising a first opening and a second opening formed at both opposite ends thereof;
a terminal housing slidably mounted in the outer housing;
a communication terminal and an electric power terminal coupled to the terminal housing;
a lever hingedly coupled to the outer housing; and
a plate-type slider coupled to a rear end of the terminal housing to advance by rotation of the lever to slidably move a front end of the terminal housing toward the first opening of the outer housing.

[Claim 2] The connector according to claim 1, further comprising:
a handle coupled to the rear end of the plate-type slider to retreat by the plate-type slider when the lever is rotated, the handle slidably movable from the second opening of the outer housing.

[Claim 3] The connector according to claim 2, wherein the handle comprises,
a handle part; and
a sliding part coupled to a rear end of the plate-type slider, with being extended and bent from the handle part, to be slidingly movable from the second opening of the outer housing.

[Claim 4] The connector according to claim 3, wherein a cable protection member formed of a rubber material is provided below the handle part, with a diameter corresponding to an inner diameter of the handle part.

[Claim 5] The connector according to claim 1, wherein the plate-type slider is provided in parallel to a longitudinal direction of the outer housing to partition an inner space of the outer housing into two spaces.

[Claim 6] The connector according to claim 5, wherein a positive or negative leading wire branched from a cable introduced via the handle is arranged in each of the spaces of the outer housing partitioned by the plate-type slider.

[Claim 7] The connector according to claim 1, wherein a guide pin is provided in an upper end of the lever and a long-hole-shaped guide hole is provided in the plate-type slider to advance the plate-type slider along a rotation locus of the guide plate according to the rotation of the lever.

[Claim 8] The connector according to claim 7, wherein a lattice-type rib is provided in at least one of both surfaces of the plate-type slider.

[Claim 9] The connector according to claim 7, wherein two plate-type sliders

spaced apart a predetermined distance from each other in parallel are provided in the outer housing, and

the upper end of the lever is arranged in the two plate-type sliders, and the guide pin is extended from the upper end of the lever to pass through guide holes provided in the two plate-type sliders.

[Claim 10] The connector according to claim 1, further comprising:

a fixing latch fixed to the advanced plate-type slider to fix the slidingly moved terminal housing; and

a coupling latch to maintain the mounted state of the connector to the inlet,

wherein the fixed state unlocking performed by the fixing latch unlocks the coupled state of the coupling latch.

[Claim 11] The connector according to claim 10, wherein a unlocking button is provided in the outer housing to unlock the fixing state of the plate-type slider fixed by the fixing latch, and

the fixing latch and the coupling latch are hingedly coupled to the outer housing, and

when an end of the fixing latch is pressed by the unlocking button, the other end of the fixing latch moves an end of the coupling latch upward and the other end of the coupling latch is moved downward accordingly, to unlock the coupling state of the coupling latch with respect to the inlet of an electric vehicle.

[Claim 12] The connector according to claim 11, wherein the unlocking button is provided in an upper center region near a second opening of the outer housing.

[Claim 13] The connector according to claim 11, wherein the unlocking button is formed of a light-transmissive material and a light source having at least one luminous color is provided in the unlocking button.

[Claim 14] The connector according to claim 13, wherein a control part of the electric vehicle charger controls the luminous color of the light source to be different according to a charging state of the electric vehicle.

[Claim 15] The connector according to claim 10, wherein the plate-type slider is perpendicularly mounted in the outer housing, and

a hooking part is formed at an upper end of the plate-type slider to fixedly-hook the fixing latch thereto selectively.

[Claim 16] The connector according to claim 15, wherein the hooking part is at least one projection formed in the upper end of the plate-type slider.

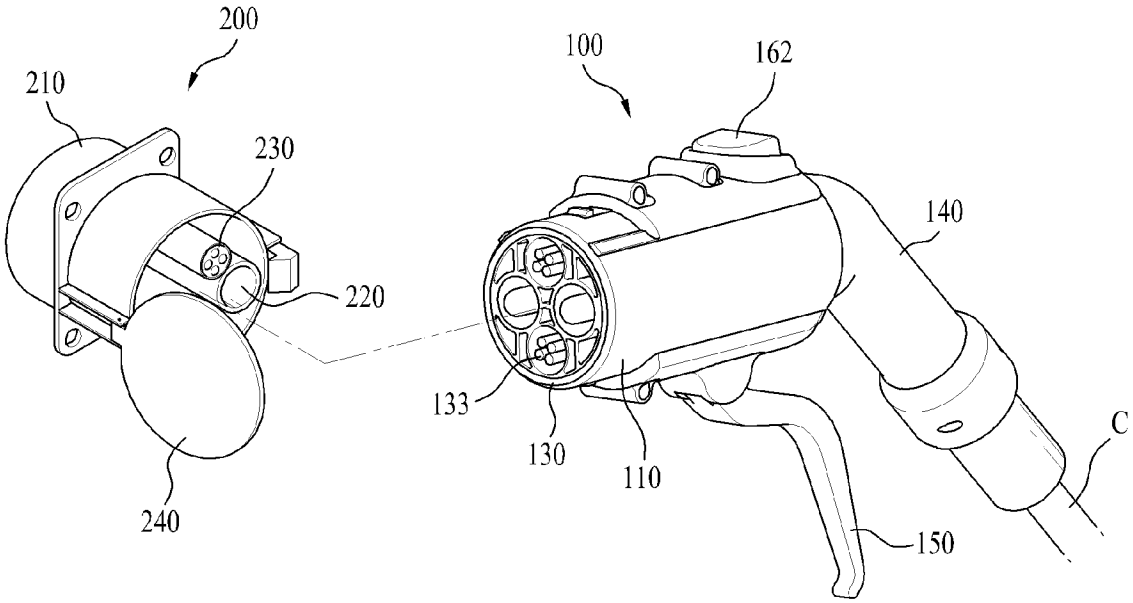
[Claim 17] The connector according to claim 16, wherein different slopes are

formed in lateral surfaces of a projection.

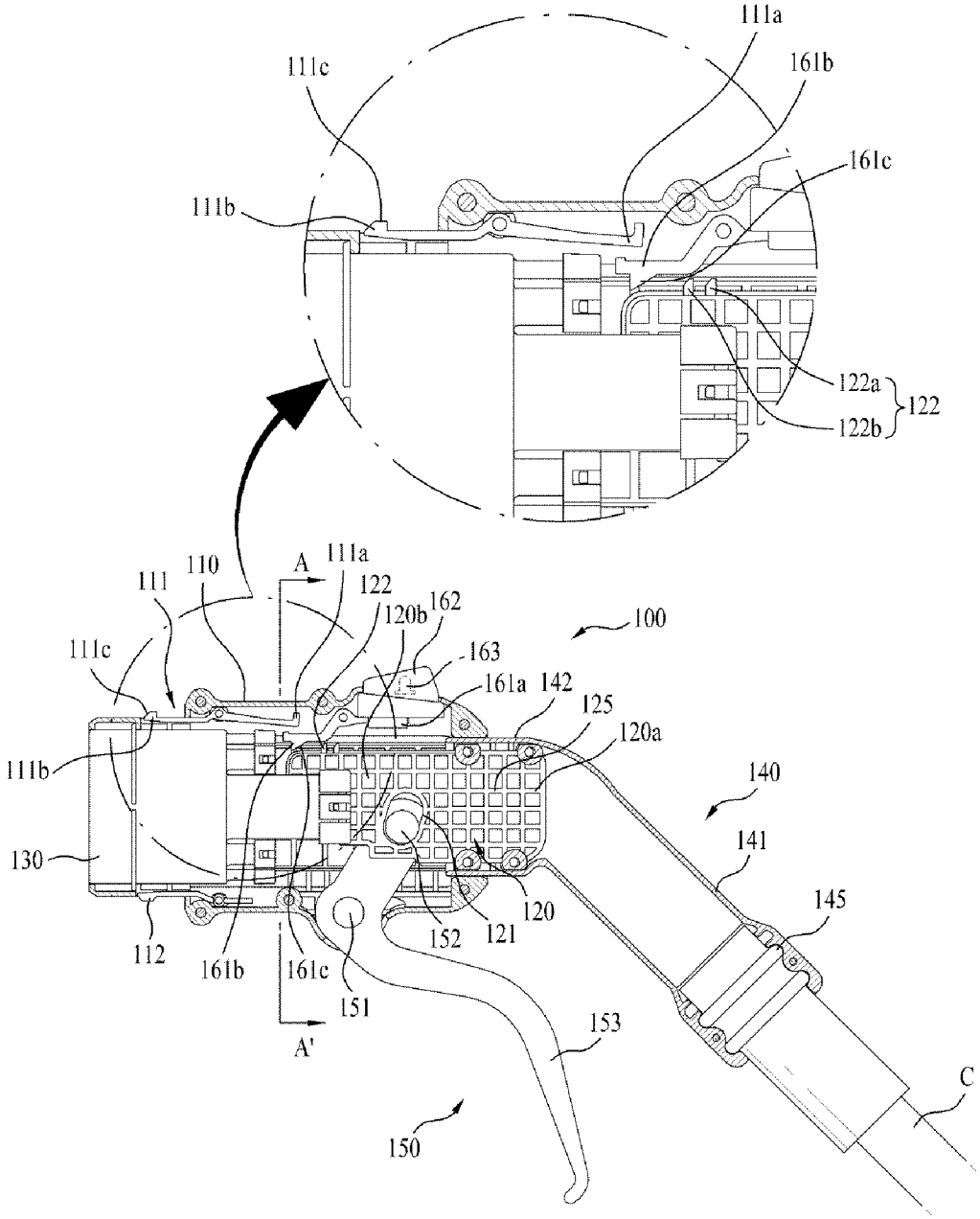
[Claim 18] The connector according to claim 17, wherein when two projections are provided, two projections are spaced apart a predetermined distance from each other in parallel to the sliding direction of the plate-type slider.

[Claim 19] A connector of an electric vehicle charger comprising:
a terminal housing comprising a communication terminal and an electric power terminal coupled thereto;
an outer housing mounted in the terminal housing;
a lever hingedly coupled to the outer housing;
an advancing member to advance the terminal housing outside the outer housing by converting a rotation moment of the lever into a predetermined direction advancing force;
a handle coupled to the advancing member, the handle retreating by the advancing member when the lever is rotated, and slidingly-movable from an opening of the outer housing;
a fixing latch fixed to the advancing member advanced to fix the displaced state of the terminal housing in the outer housing, when the lever is rotated;
a coupling latch to maintain the mounted state of the connector with respect to an inlet provided in an electric vehicle; and
an unlocking button provided in the outer housing to unlock the fixed state of the advancing member fixed by the fixing latch,
wherein the fixed state unlocking of the fixing latch unlocks the coupled state of the coupling latch and the unlocking button is provided in an upper region near the opening of the outer housing.

[Fig. 1]



[Fig. 2]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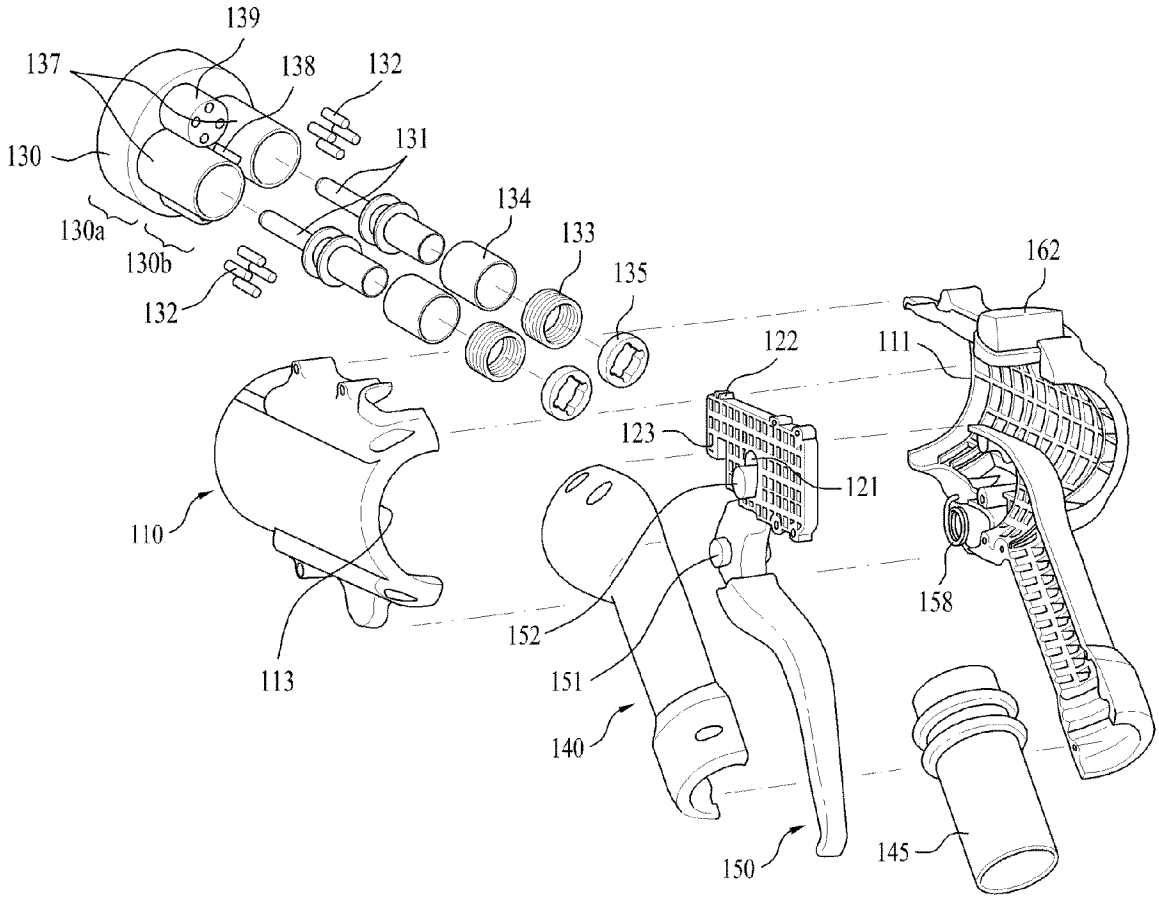
[Fig. 3]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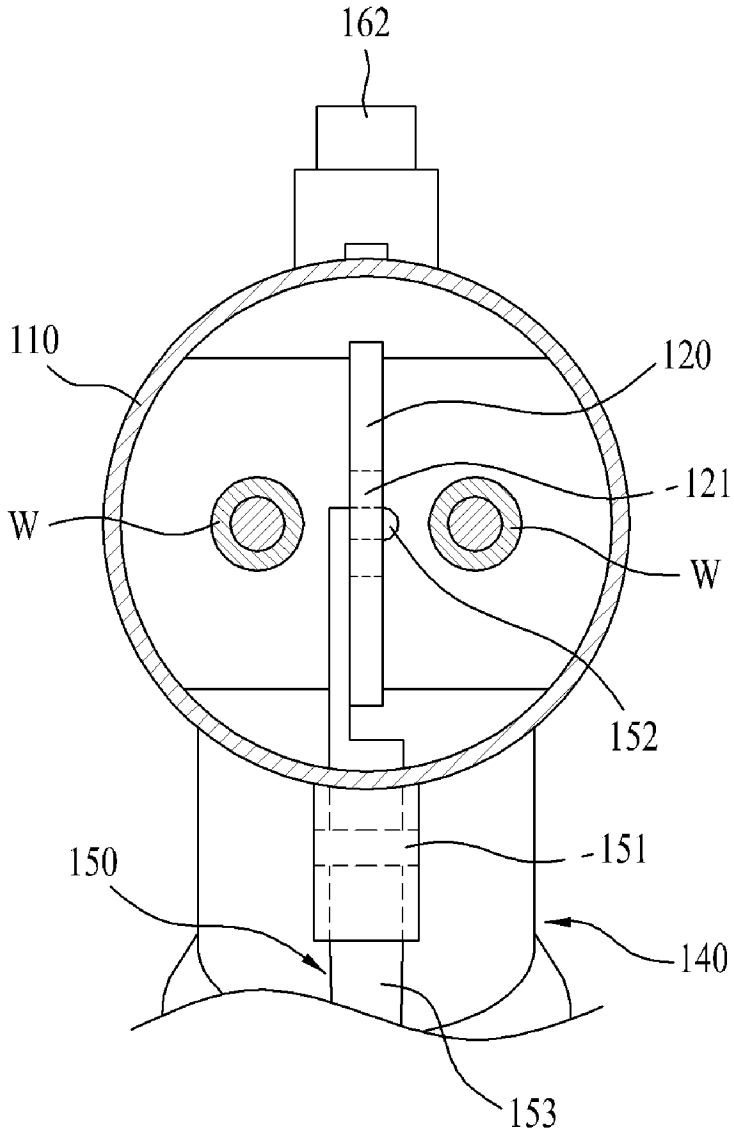
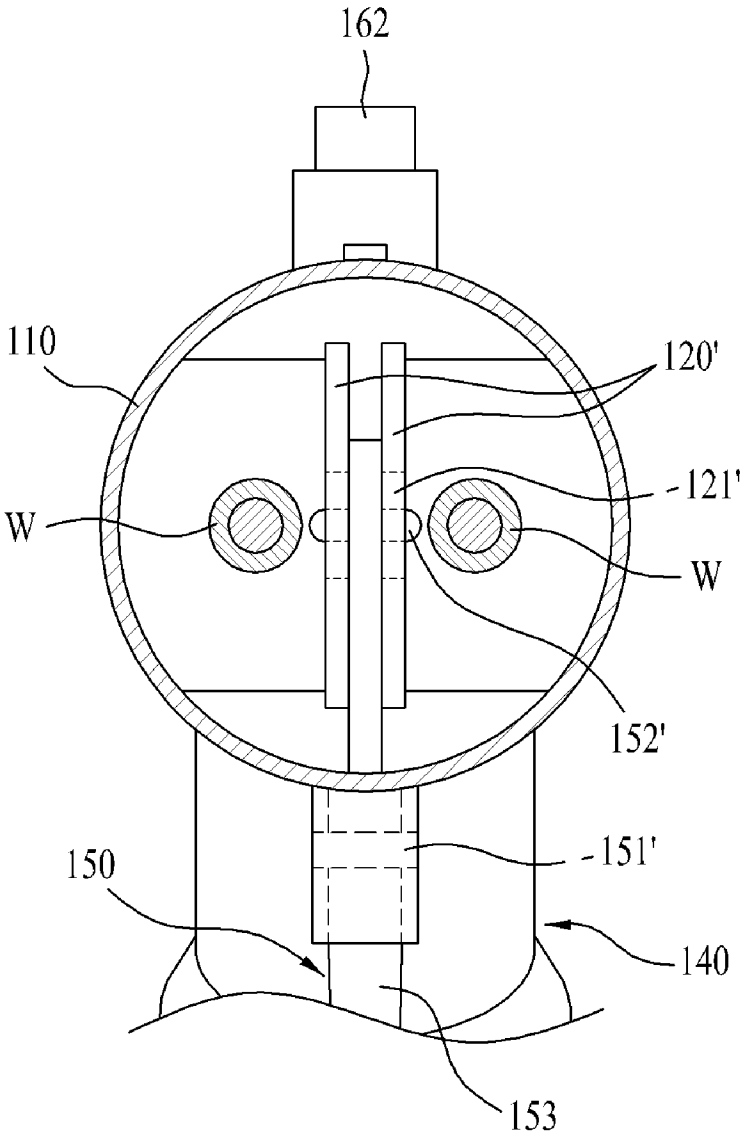
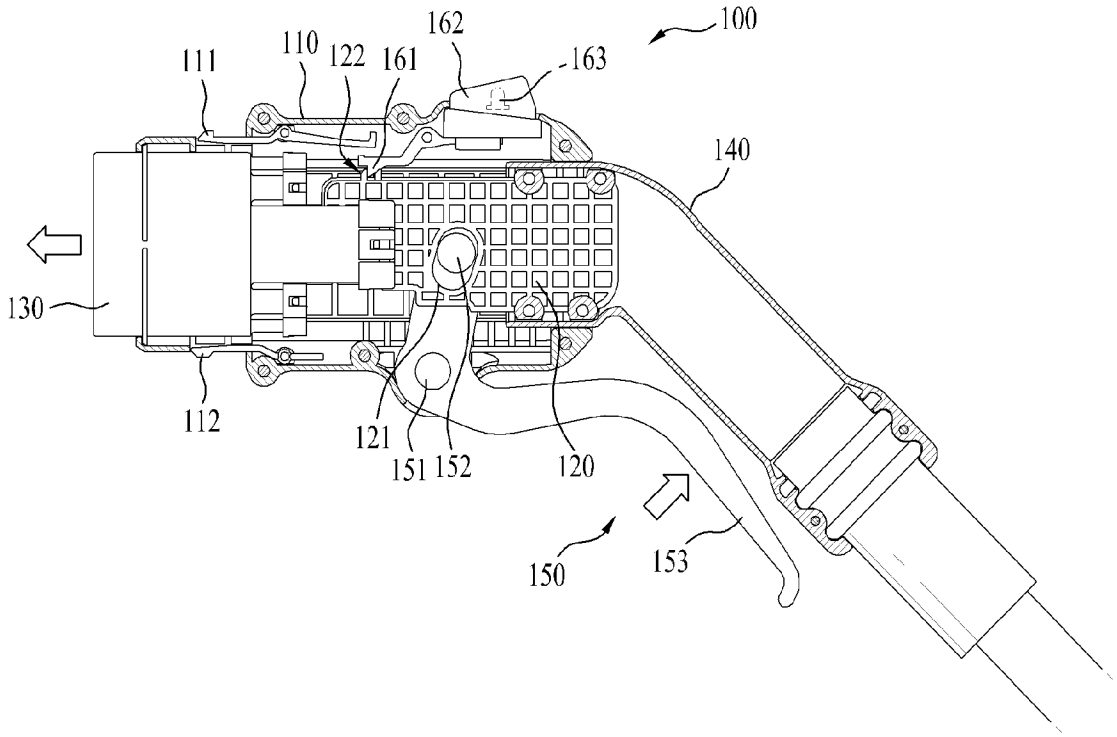
[Fig. 4]



[Fig. 5]



[Fig. 6]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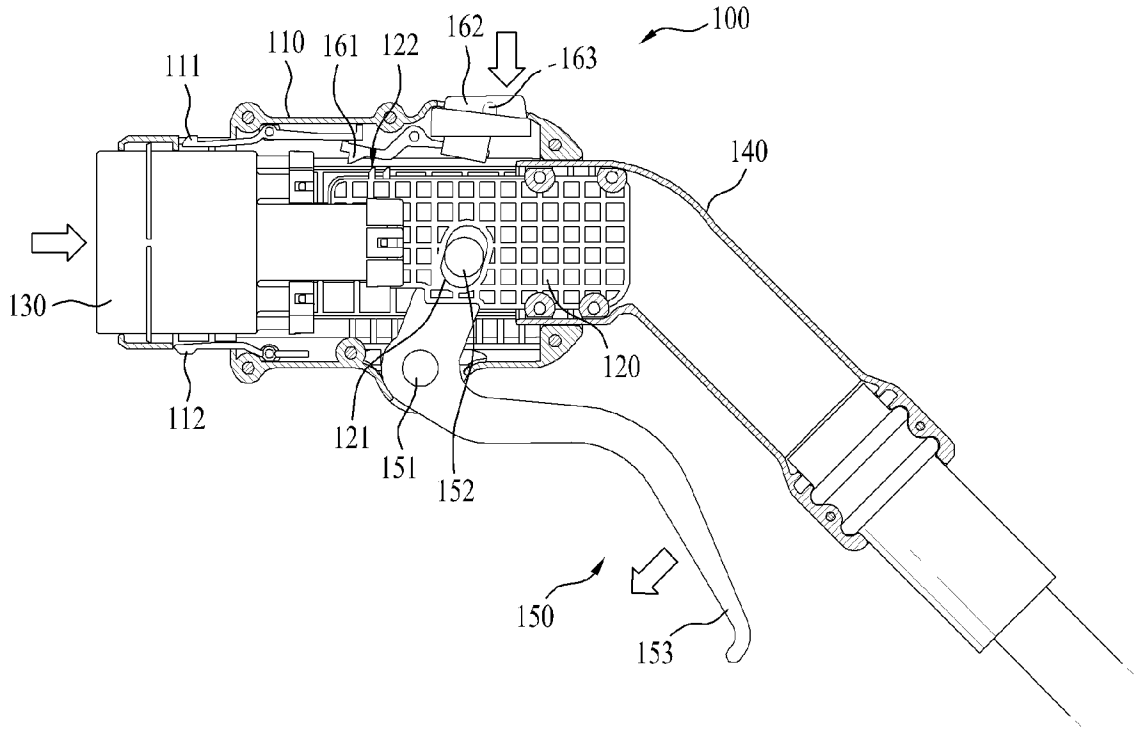
[Fig. 7]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