
In-Line Rotary Power Connector and Rail Socket

Technical Field

The present disclosure relates to an in-line rotary power connector and a rail socket, and belongs to the technical field of electric devices.

Background Art

In family houses and commercial buildings, an electric power rail type power distribution device (i.e. a rail socket) which is currently used consists of an electric power rail and an electric connector. The electric power rail is a single-cavity and single-opening power supply slot; the electric power rail is electrically connected to a power supply by a long conductor disposed in a cavity of the electric power rail, and may be extended and disposed at an appropriate power supply point by installation along a wall; and the electric connector may be plugged into the power supply slot, and the electric connector rotates to turn on a circuit after being plugged into the power supply slot at any position along the electric power rail, thereby achieving conductive connection.

An existing electric connector includes an upper socket and a lower substrate, the upper socket is capable of rotating relative to the lower substrate and is provided with conductive connecting pieces electrically connected to conductors in the electric power rail, the conductive connecting pieces are in a state of being separated from the conductors before the upper socket rotates, that is, the circuit keeps in a turned-off state, and the conductive connecting pieces are in a state of being in contact with the conductors after the upper socket rotates, that is, the circuit keeps in a turned-on state.

In the prior art, the invention patent with the Chinese patent publication number CN111786186A discloses an adapter and a rail socket. The adapter includes an adapter main body, a rotating member, a transmission component and an electric conductor component, and the rotating member is rotatably connected to the adapter main body. When the rotating member rotates, the rotation of the rotating member is transferred to the electric conductor component by the transmission component, and thus, the rotation and electric connection of the electric conductor component can be achieved.

However, the electric conductor component on the above-mentioned adapter may be in direct contact with conductors during rotation. Such a way that the electric conductor component is horizontally rotated to be in direct contact with the conductors easily causes potential safety hazards, and even if a protective rubber strip is additionally disposed, it is still difficult to overcome the potential safety hazards caused by direct contact between the electric conductor

component on the power adapter and each of the conductors across the rubber strip. In addition, even if the electric conductor component is not rotated to extend, it may also be powered on by contact with the conductors in the electric power rail due to the entering of a foreign metal material into the adapter or the electric power rail, and thus, the potential safety hazards are caused.

In order to overcome the defects of the above-mentioned adapter, the invention patent with the Chinese patent publication number CN114498140A discloses a novel power connector, including conductive connecting pieces, and each of the conductive connecting piece consists of a driving shaft capable of rotating around an axis and a driving piece disposed on the driving shaft; and further includes a rotation driving mechanism used for driving the driving shaft to rotate around the axis. The driving shafts are capable of driving the driving pieces to overturn, so that the conductive connecting pieces cannot be in contact with the conductors within the first time when entering the power supply slot, the situation that the conductive connecting pieces of the power connector are in direct contact with the conductors after entering the power supply slot is avoided, and then, potential safety hazards in power utilization are avoided.

However, the process that the conductive connecting piece on such a novel electric connector is driven by the upper socket to rotate is relatively complex, and a situation of screwing looseness easily occurs, which causes the slip or looseness of a power connector, and thus, the situation of heating caused by infirm connection is easily caused if the power connector is used for a long time.

Summary of the Invention

Technical Problem

In order to solve the above-mentioned technical problems, the present disclosure aims at providing an in-line rotary power connector by which, on one hand, direct contact between a conductive component and each of conductors in an electric power rail can be avoided to reduce potential safety hazards, and on the other hand, an in-line connecting structure makes the connection between the power connector and the electric power rail more reliable and faster.

Solution to Problem

For solving the technical problems, the present disclosure adopts the following technical solution: provided is an in-line rotary power connector being used to be mounted on an electric power rail, and including a connector main body, a driving member, guide arms and electric conductors connected to the guide arms; the connector main body being fixedly connected to the driving member, and the driving member being connected to the guide arms in a transmission way; and

the electric conductors being connected or disconnected to conductors in the electric power rail while the driving member drives the guide arms to expand or reset.

As a preferred example, the driving member is a gear mounted on the connector main body, the guide arms are provided with racks, the gear is engaged with the racks, the connector main body and the gear rotate synchronously, the gear rotates to drive the racks and the guide arms to move synchronously, and the guide arms drive the electric conductors to be connected or disconnected to the conductors in the electric power rail.

As a preferred example, the driving member is a driving plate mounted on the connector main body, the driving plate is provided with eccentric grooves, the guide arms are provided with guide posts, the guide posts are plugged into the eccentric grooves, the connector main body and the driving plate rotate synchronously, the eccentric grooves drive the guide posts and the guide arms to move synchronously, and the guide arms drive the electric conductors to be connected or disconnected to the conductors in the electric power rail.

As a preferred example, the driving member is driving levers mounted on the connector main body, the guide arms are provided with limiting posts, the limiting posts are disposed on two sides of the driving levers, the connector main body and the driving levers rotate synchronously, the driving levers drive the limiting posts and the guide arms to move synchronously, and the guide arms drive the electric conductors to be connected or disconnected to the conductors in the electric power rail.

As a preferred example, the connector main body includes a supporting part and a power supply part, the power supply part is disposed below the supporting part, the power supply part includes a base and a shell, the base is connected to the supporting part, openings are formed in side walls of the shell, the driving member is connected to the base and is located in the shell, the guide arms are partially or wholly disposed inside the shell, guide rails are disposed in the shell, and the guide arms extend or retract along the guide rails and the openings.

As a preferred example, the guide arms are stepped and include extension parts and limiting parts, the extension parts are located above the limiting parts, and the limiting parts are abutted against or separated from the inner wall of the shell while the extension parts of the guide arms extend or retract along the openings in the shell.

As a preferred example, the top of the shell is provided with limiting snap posts, the base is provided with arc-shaped guide slots, the limiting snap posts are plugged and limited in the arc-shaped guide slots, the base is connected to the supporting part, and when the supporting part and the base synchronously rotate relative to the shell, the arc-shaped guide slots rotate relative to the limiting snap posts.

As a preferred example, the supporting part is internally provided with live wire terminals, neutral

wire terminals and ground wire terminals, a connecting shaft is connected below the ground wire terminals, grounding pieces are disposed below the power supply part, the grounding pieces are rotatably connected to the connecting shaft, the power supply part is internally provided with limiting slots for limiting the grounding pieces, the guide arms are provided with grounding electric conductors, the driving member rotates to drive the guide arms to expand or reset, and the guide arms drive the grounding electric conductors to be connected or disconnected to the grounding pieces.

As a preferred example, the guide arms are internally provided with neutral wire electric conductors and/or live wire electric conductors, one part of each of the neutral wire electric conductors and/or the live wire electric conductors extends out of the front ends of the guide arms, and the other parts thereof are disposed to protrude out of outer surfaces of the guide arms.

The present disclosure further provides a rail socket, including an electric power rail, wherein the electric power rail is provided with the above-mentioned in-line rotary power connector.

Advantageous Effects of Invention

The present disclosure has the beneficial effects:

the present disclosure provides the in-line rotary power connector and a rail socket, by rotating a supporting part, the guide arms and the electric conductors in a power supply part are driven to linearly move and are plugged to retract in power supply slots of the electric power rail so as to be in contact with the conductors for power on or separated from the conductors for power off. On one hand, direct contact between a conductive component and each of the conductors in the electric power rail can be avoided to reduce potential safety hazards, and on the other hand, an in-line connecting structure makes the connection between the power connector and the electric power rail more reliable and faster.

Brief Description of the Drawings

Fig. 1 is a schematic diagram of a three-dimensional structure during extension of guide arms of an in-line rotary power connector in the present disclosure;

Fig. 2 is a schematic diagram of a three-dimensional structure during retraction of the guide arms of the in-line rotary power connector in the present disclosure;

Fig. 3 is a first schematic diagram of an exploded structure between a housing of a supporting part and a supporting disc of the in-line rotary power connector in the present disclosure;

Fig. 4 is a second schematic diagram of the exploded structure between the housing of the supporting part and the supporting disc of the in-line rotary power connector in the present disclosure;

Fig. 5 is a schematic diagram of a three-dimensional structure of a wiring terminal in the

supporting part of the in-line rotary power connector in the present disclosure;

Fig. 6 is a schematic diagram of a three-dimensional structure of terminal slots in the supporting part of the in-line rotary power connector in the present disclosure;

Fig. 7 is a schematic diagram of an internal structure of a shell of a power supply part in embodiment 1 of the present disclosure;

Fig. 8 is a schematic structural diagram of the shell of the power supply part in embodiment 1 of the present disclosure;

Fig. 9 is a schematic diagram of a three-dimensional structure of a driving member and guide arms in embodiment 1 of the present disclosure;

Fig. 10 is a schematic diagram of a structure viewed from the bottom when the driving member drives the guide arms to extend in embodiment 1 of the present disclosure;

Fig. 11 is a schematic diagram of a structure viewed from the bottom when the driving member drives the guide arms to retract in embodiment 1 of the present disclosure;

Fig. 12 is a schematic diagram of a three-dimensional structure of a driving member and guide arms in embodiment 2 of the present disclosure;

Fig. 13 is a schematic diagram of a three-dimensional structure of the driving member in embodiment 2 of the present disclosure;

Fig. 14 is a schematic diagram of a structure viewed from the bottoms of the driving member and the guide arms in embodiment 2 of the present disclosure;

Fig. 15 is a first schematic diagram of a three-dimensional structure of a driving member, guide arms and conductive connecting pieces in embodiment 2 of the present disclosure;

Fig. 16 is a second schematic diagram of the three-dimensional structure of the driving member, the guide arms and the conductive connecting pieces in embodiment 2 of the present disclosure;

Fig. 17 is a second schematic diagram of a three-dimensional structure of the driving member, the guide arms, the conductive connecting pieces and a protective limiting housing in embodiment 2 of the present disclosure;

Fig. 18 is a schematic diagram of a three-dimensional structure of a driving member and guide arms in embodiment 3 of the present disclosure;

Fig. 19 is a schematic diagram of a structure viewed from the bottoms of the driving member and the guide arms in embodiment 3 of the present disclosure;

Fig. 20 is a schematic diagram of a structure viewed from the bottoms of the driving member in embodiment 3 of the present disclosure; and

Fig. 21 is a schematic diagram of a structure viewed from the top of a rail socket with an in-line rotary power connector in the present disclosure.

Description of Reference Numerals

In the drawings:

000, rail socket; 001, power connector; 002, electric power rail;
10, supporting part;
101, housing; 102, jack; 103, buckle; 104, supporting disc; 105, snap slot; 106, terminal slot; 107, live wire terminal; 108, neutral wire terminal; 109, ground wire terminal; 110, connecting shaft; 111, grounding shrapnel;
20, power supply part;
201, base; 202, shell; 203, opening; 201, guide arm; 2041, extension part; 2042, limiting part; 205, limiting snap post; 206, guide rod; 207, arc-shaped guide slot;
208, gear; 209, rack; 210, guide rail; 211, limiting slot; 212, live wire electric conductor; 213, neutral wire electric conductor; 214, grounding electric conductor; 215, driving lever; 216, limiting post; 217, switch; 218, rotating shaft; 219, electric connection arm; 220, electric connection contact;
221, driving slot; 222, driving block; 223, protective limiting housing; 224, conductive connecting piece;
225, eccentric groove; and 226, guide post.

Detailed Description of the Invention

In order to easily understand the technical means, creation features as well as achieved objectives and effects in the present disclosure, the present disclosure will be further described below in conjunction with specific illustrations and embodiments.

In order to overcome defects of an existing electric connector in the above-mentioned background art, the present disclosure aims at providing an in-line rotary power connector 001, by which direct contact between a conductive component and each of conductors in an electric power rail 002 can be avoided to reduce potential safety hazards, and the connection between the power connector 001 and the electric power rail 002 can be more reliable and faster. In addition, the present disclosure further claims a rail socket 000, as shown in Fig. 21, including the electric power rail 002 and the in-line rotary power connector 001 mounted on the electric power rail 002.

As shown in Fig. 1 to Fig. 2, the in-line rotary power connector 001 includes a supporting part 10 and a power supply part 20, the supporting part 10 is supported on a U-shaped electric power rail 002 and is provided with a jack 102 of a socket, the power supply part 20 is sunken between power supply slots of the U-shaped electric power rail 002 and is used to be connected or disconnected to conductors in the electric power rail 002, and then, connection and disconnection between the electric power rail 002 and an electric connector are achieved.

Openings 203 are formed in side walls of the power supply part 20, the power supply part 204 is

internally provided with guide arms 204, and the guide arms 204 are provided with electric conductors.

The power supply part 20 is internally provided with a driving member for driving the guide arms 204 to linearly move, the driving member and the power supply part 20 rotate synchronously, the driving member drives the guide arms 204 to expand or reset along the openings 203, and the guide arms 204 drive the electric conductors to be connected or disconnected to conductors in the electric power rail 002. As shown in Fig. 1, a state obtained after the guide arms 204 expand (extend) along the openings 203 is shown, at the moment, the electric conductors on the guide arms 204 are connected to the conductors in the power supply slots of the electric power rail 002. As shown in Fig. 2, a state obtained after the guide arms 204 reset (retract) along the openings 203 is shown, at the moment, the electric conductors on the guide arms 204 are disconnected to the conductors in the power supply slots of the electric power rail 002.

First Embodiment

As shown in Fig. 3 to Fig. 4, the supporting part 10 of the power connector 001 includes a housing 101, a wiring terminal and a supporting disc 104. Fig. 3 is a first schematic diagram of a separation state between the housing 101 and the supporting disc 104 of the supporting part 10. The housing 101 is used for protecting the wiring terminal therein to avoiding the entering of foreign matters, a plurality of buckles 103 are disposed in the circumferential direction of the bottom of the inner wall of the housing 101, a plurality of snap slots 105 are disposed in the circumferential direction of the top of the supporting disc 104, the housing 101 is connected to the supporting disc 104 by snap connection between the buckles 103 and the snap slots 105, and the housing 101 and the supporting disc 104 are relatively fixed and rotate synchronously during rotation.

As shown in Fig. 2 to Fig. 4, Fig. 4 is a second schematic diagram of a separation state between the housing 101 and the supporting disc 104 of the supporting part 10. The power supply part 20 of the power connector 001 includes a base 201, a shell 202 and guide arms 204, the base 201 of the power supply part 20 is in snap connection to the supporting disc 104 of the supporting part 10. As shown in Fig. 4 and Fig. 5, each of the front and rear sides of the top of the shell 202 is fixedly connected to two limiting snap posts 205, each of two sides of the two limiting snap posts 205 is fixedly provided with a guide rod 206, and the limiting snap posts 205 and the guide rods 206 are distributed according to an arc-shaped trajectory. Correspondingly, the inner side of the top edge of the base 201 is provided with two sections of arc-shaped guide slots 207, respectively, each group of limiting snap posts 205 and the guide rods 206 are correspondingly plugged into the arc-shaped guide slots 207, and snap connection parts on tops of the limiting snap posts 205 are limited on edges of the arc-shaped guide slots 207. When the supporting part 10 rotates, that is,

when the housing 101 and the supporting disc 104 rotate, the base 201 of the power supply part 20 is driven to rotate synchronously. Since the shell 202 is sunken into the U-shaped electric power rail 002 and is limited by a rail slot, when the base 201 rotates relative to the shell 202, the arc-shaped guide slots 207 rotate relative to the limiting snap posts 205 and the guide rods 206.

As shown in Fig. 5 to Fig. 6, the power connector 001 in the present disclosure is a five-hole power connector 001. A plurality of terminal slots 106 are disposed above the base 201 and are located inside the housing 101 of the supporting part 10, the terminal slots 106 are internally provided with live wire terminals 107, neutral wire terminals 108 and ground wire terminals 109, respectively, a connecting shaft 110 is connected below the ground wire terminals 109, the connecting shaft 110 passes through the base 201 of the power supply part 20, grounding pieces are disposed below the base 201 of the power supply part 20, the grounding pieces adopt grounding shrapnels 111, as shown in Fig. 7, the grounding pieces are rotatably connected to the connecting shaft 110, as shown in Fig. 8, the shell 202 of the power supply part 20 is internally provided with limiting slots 211 for limiting the grounding pieces, the grounding shrapnels 111 are embedded and limited in the limiting slots 211 and are located below the guide arms 204 so as not to be driven to rotate, the bottoms of the guide arms 204 are provided with grounding electric conductors 214 disposed to protrude out of lower surfaces of the guide arms 204, and when driving member rotates to drive the guide arms 204 to expand or reset, the guide arms 204 drive the grounding electric conductors 214 to be connected or disconnected to the grounding pieces.

As shown in Fig. 10, in the present embodiment, the guide arms 204 are designed to be stepped and include extension parts 2041 and limiting parts 2042, and the extension parts 2041 and the limiting parts 2042 are of integrated connection structures. Viewing angles shown in Fig. 9 and Fig. 10 are obtained from a bottom view, and are opposite to actual viewing angles in the vertical direction. In fact, rear ends of the extension parts 2041 are located above the limiting parts 2042, as shown in Fig. 7, the limiting parts 2042 are abutted against or separated from the inner wall of the shell 202 while the extension parts 2041 of the guide arms 204 extend or retract along the openings 203 in the shell 202.

As shown in Fig. 10, a gear 208 is mounted in the center below the base 201, each of front and rear sides of the gear 208 is provided with one of the guide arms 204, the two guide arms 204 are parallel to each other, a rack 209 is disposed on an inner side surface of the limiting part 2042 of each of the guide arms 204, the racks 209 are integrated with the limiting parts 2042, and the gear 208 is engaged with the two guide arms 204.

One of the guide arms 204 is internally provided with a neutral wire electric conductor 213 and a grounding electric conductor 214, respectively, the front end of the neutral wire electric conductor 213 extends out of the front end of the extension part 2041 and is used to be connected to the

conductors in the electric power rail 002, the rear end of the neutral wire electric conductor 213 extends out of the rear end of the extension part 2041 and protrudes out of the surface of the extension part 2041, the rear end of the neutral wire electric conductor 213 may be connected to the above neutral wire terminal 108 by a conductive connecting piece 224 (unshown) disposed on the base 201, the grounding electric conductor 214 is also disposed in the guide arm 204 and is separated from the neutral wire electric conductor 213, the grounding electric conductor 214 is also stepped, the front end of the grounding electric conductor 214 protrudes out of the lower surface of the extension part 2041 of the guide arm 204, the rear end thereof protrudes out of the lower surface of the limiting part 2042, the rear end of the grounding electric conductor 214 is used to be connected to the grounding shrapnel 111 and then connected to the ground wire terminal 109, and the front end of the grounding electric conductor 214 is used to be connected to the housing 101 of the power supply part 20 so that grounding is ensured.

Correspondingly, the other guide arm 204 is internally provided with a live wire electric conductor 212 and a grounding electric conductor 214, respectively, the front end of the live wire electric conductor 212 extends out of the front end of the extension part 2041 and is used to be connected to the conductors in the electric power rail 002, the rear end of the live wire electric conductor 212 extends out of the rear end of the extension part 2041 and protrudes out of the surface of the extension part 2041, the rear end of the live wire electric conductor 212 may be connected to the above live wire terminal 107 by a conductive connecting piece 224 (unshown) disposed on the base 201, the grounding electric conductor 214 is also disposed in the guide arm 204 and is separated from the live wire electric conductor 212, the grounding electric conductor 214 is also stepped, the front end of the grounding electric conductor 214 protrudes out of the lower surface of the extension part 2041 of the guide arm 204, the rear end thereof protrudes out of the lower surface of the limiting part 2042, the rear end of the grounding electric conductor 214 is used to be connected to the grounding shrapnel 111 and then connected to the ground wire terminal 109, and the front end of the grounding electric conductor 214 is used to be connected to the housing 101 of the power supply part 20 so that grounding is ensured.

In addition, as shown in Fig. 8, the shell 202 of the power supply part 20 is also internally provided with guide rails 210, the guide rails 210 are located on the side walls of the shell 202, are parallel to the guide arms 204 and are disposed to be opposite to the racks 209 on the guide arms 204, the inner sides of the limiting parts 2042 of the guide arms 204 are engaged with the gear 208 by the racks 209, and the other sides thereof are abutted against the insides of the guide rails 210, so that the guide arms 204 can be limited and can linearly extend or retract along the guide rails 210 and the openings 203, thereby ensuring the running stability of the guide arms 204.

Operating principle:

With reference to Fig. 1 to Fig. 2, Fig. 10 to Fig. 11 and Fig. 24, the in-line rotary power connector 001 in the present disclosure is mounted on the U-shaped electric power rail 002, the electric connector is limited above the U-shaped electric power rail 002 by the supporting disc of the supporting part 10, and the shell 202 of the power supply part 20 of the electric connector is limited in the rail slot of the U-shaped electric power rail 002, which ensures that the shell 202 of the power supply part 20 cannot rotate therewith when the supporting part 10 drives the base 201 and the gear 208 of the power supply part 20 to rotate.

When a power supply needs to be turned on, the supporting part 10 of the power connector 001 is rotated, the supporting part 10 drives the base 201 and the gear 208 of the power supply part 20 to rotate synchronously, and the gear 208 drives the guide arms 204 with the racks 209 to stably extend outwards along the guide rails 210 and the openings 203 until the neutral wire electric conductor 213 and the live wire electric conductor 212 on each of the guide arms 204 are respectively plugged into the power supply slots in two sides of the U-shaped electric power rail 002 and are in stable contact with the conductors in the power supply slots, at the moment, outer ends of the limiting parts 2042 of the guide arms 204 are abutted against the inner side wall of the shell 202, as shown in Fig. 7, at the moment, one end of the neutral wire electric conductor 213 is connected to the conductor on one side of the electric power rail 002, the other end thereof is connected to each of the neutral wire terminals 108 by the conductive connecting piece 224, one end of the live wire electric conductor 212 is connected to the conductor on the other side of the electric power rail 002, the other end thereof is connected to each of the live wire terminals 107 by the conductive connecting piece 224, one end of the grounding electric conductor 214 is in contact with the shell 202, and the other end thereof is connected to each of the ground wire terminals 109 by each of the grounding shrapnels 111, as shown in Fig. 10.

Similarly, when the power supply needs to be turned off, the supporting part 10 of the power connector 001 is reversely rotated, the supporting part 10 drives the base 201 and the gear 208 of the power supply part 20 to rotate synchronously, and the gear 208 drives the guide arms 204 with the racks 209 to stably retract towards the openings 203 along the guide rails 210 until the neutral wire electric conductor 213 and the live wire electric conductor 212 on each of the guide arms 204 are separated from the conductors, as shown in Fig. 11, at the moment, the neutral wire electric conductor 213 is disconnected to the conductive connecting piece 224, the neutral wire electric conductor 213, the conductive connecting piece 224, the conductor and each of the neutral wire terminals 108 are disconnected, the live wire electric conductor 212 is disconnected to the conductive connecting piece 224, and the live wire electric conductor 212, the conductive connecting piece 224, the conductor and each of the live wire terminals 107 are disconnected.

Second Embodiment

As shown in Fig. 12 to Fig. 14, in embodiment 2, another driving member different from that in embodiment 1 is adopted to drive the guide arms 204 to linearly move. Specifically, the driving member is driving levers 215 fixed below the base 201, and the driving levers 215 may be integrated or not integrated with the base 201. Correspondingly, each of the guide arms 204 is provided with two limiting posts 216, every two limiting posts 216 are disposed on two sides of each of the driving levers 215, respectively, the base 201 of the power supply part 20 and the driving levers 215 rotate synchronously, the driving levers 215 drive the limiting posts 216 and the guide arms 204 to move synchronously, so that the guide arms 204 can extend or retract along the openings 203, and then drive the electric conductors to be connected or disconnected to the conductors in the electric power rail 002.

Operating principle:

As shown in Fig. 15 and Fig. 16, the in-line rotary power connector 001 in the present disclosure is mounted on the U-shaped electric power rail 002, the electric connector is limited above the U-shaped electric power rail 002 by the supporting disc of the supporting part 10, and the shell 202 of the power supply part 20 of the electric connector is limited in the rail slot of the U-shaped electric power rail 002, which ensures that the shell 202 of the power supply part 20 cannot rotate therewith when the supporting part 10 drives the base 201 and the gear 208 of the power supply part 20 to rotate.

When a power supply needs to be turned on, the supporting part 10 of the power connector 001 is rotated, the supporting part 10 drives the base 201 and the driving levers 215 of the power supply part 20 to rotate synchronously, and the driving levers 215 drive the guide arms 204 with the limiting posts 216 to stably extend outwards along the guide rails 210 and the openings 203 until the neutral wire electric conductor 213 and the live wire electric conductor 212 on each of the guide arms 204 are respectively plugged into the power supply slots in two sides of the U-shaped electric power rail 002 and are in stable contact with the conductors in the power supply slots, at the moment, outer ends of the limiting parts 2042 of the guide arms 204 are abutted against the inner side wall of the shell 202, at the moment, one end of the neutral wire electric conductor 213 is connected to the conductor on one side of the electric power rail 002, the other end thereof is connected to each of the neutral wire terminals 108 by the conductive connecting piece 224, one end of the live wire electric conductor 212 is connected to the conductor on the other side of the electric power rail 002, the other end thereof is connected to each of the live wire terminals 107 by the conductive connecting piece 224, one end of the grounding electric conductor 214 is in contact with the shell 202, and the other end thereof is connected to each of the ground wire terminals 109 by each of the grounding shrapnels 111.

In addition, in the present embodiment, as shown in Fig. 15 and Fig. 16, a conductive connecting

piece 224 on one side of a live wire is further connected to a switch 217, the switch 217 is connected to the base 201 by a rotating shaft 218, one end of the switch 217 is connected to an electric connection arm 219, the electric connection arm 219 is connected to the conductive connecting piece 224 on one side of the live wire and is provided with an electric connection contact 220, the other end of the switch 217 is provided with a driving slot 221, the side of the guide arm 204 corresponding to the driving slot 221 is provided with a driving block 222, the driving block 222 is located in the driving slot 221, when the guide arm 204 moves back and forth, the driving block 222 in the groove may drive the switch 217 to rotate left and right, then, the electric connection arm 219 is driven to overturn, and then, the connection or disconnection between the electric connection contact 220 and each of the live wire terminal 107, the conductive connecting piece 224 and the live wire electric conductor 212 is controlled.

As shown in Fig. 17, a protective limiting housing 223 is further disposed between each of the grounding shrapnels 111 and the base 201 and is used for protecting and limiting the conductive connecting piece 224, two sides of the protective limiting housing 223 are provided with guide rails 210, and the guide rails 210 on the protective limiting housing 223 are matched with the guide rails on the shell 202 of the power supply part 20 to jointly play roles in limiting and guiding the guide arms 204, with reference to the guide rails 210 in Fig. 17 and the guide rails 210 in Fig. 7.

Third Embodiment

As shown in Fig. 18 to Fig. 20, in embodiment , another driving member different from that in embodiment 1 and embodiment 2 is adopted to drive the guide arms 204 to linearly move. Specifically, the driving member is eccentric grooves 225 formed in the base 201, and “eccentric” in the eccentric grooves 225 means that groove bodies are eccentric relative to the supporting disc 104 and/or a disc where the groove bodies are located. Correspondingly, each of the guide arms 204 is provided with a guide post 226, the guide posts 226 are correspondingly plugged into the eccentric grooves 225, respectively, the base 201 of the power supply part 20 and the eccentric grooves 225 rotate synchronously, and two ends of the eccentric grooves 225 drive the guide posts 226 and the guide arms 204 to move synchronously, so that the guide arms 204 can extend or retract along the openings 203, and then drive the electric conductors to be connected or disconnected to the conductors in the electric power rail 002.

The operating principle of embodiment 3 is basically consistent with that of each of embodiment 2 and embodiment 1 except that the different driving member and the guide arms 204 driven by the driving member are changed.

As above, preferred specific embodiments of the present disclosure have been described in detail. It should be understood that various modifications and variations can be made by those of

ordinary skill in the art without creative work according to the conception of the present disclosure. Therefore, technical solutions which can be obtained by the skilled in the art by logical analysis, reasoning or finite experiments on the basis of the prior art according to the conception of the present disclosure shall fall within the protective scope determined by the claims.

Claims

1. An in-line rotary power connector being used to be mounted on an electric power rail, and comprising a connector main body, a driving member, guide arms and electric conductors connected to the guide arms;

the connector main body being fixedly connected to the driving member, and the driving member being connected to the guide arms in a transmission way; and

the electric conductors being connected or disconnected to conductors in the electric power rail while the driving member drives the guide arms to expand or reset.

2. The in-line rotary power connector according to claim 1, wherein the driving member is a gear mounted on the connector main body, the guide arms are provided with racks, the gear is engaged with the racks, the connector main body and the gear rotate synchronously, the gear is used for driving the racks and the guide arms to do stretching motion, and the guide arms are used for driving the electric conductors to be connected or disconnected to the conductors in the electric power rail.

3. The in-line rotary power connector according to claim 1, wherein the driving member is a driving plate mounted on the connector main body, the driving plate is provided with eccentric grooves, the guide arms are provided with guide posts, the guide posts are plugged into the eccentric grooves, the connector main body and the driving plate rotate synchronously, the eccentric grooves drive the guide posts and the guide arms to move synchronously, and the guide arms drive the electric conductors to be connected or disconnected to the conductors in the electric power rail.

4. The in-line rotary power connector according to claim 1, wherein the driving member is driving levers mounted on the connector main body, the guide arms are provided with limiting posts, the limiting posts are disposed on two sides of the driving levers, the connector main body and the driving levers rotate synchronously, the driving levers drive the limiting posts and the guide arms to move synchronously, and the guide arms drive the electric conductors to be connected or disconnected to the conductors in the electric power rail.

5. The in-line rotary power connector according to claim 1, wherein the connector main body comprises a supporting part and a power supply part, the power supply part is disposed below the supporting part, the power supply part comprises a base and a shell, the base is connected to the supporting part, openings are formed in side walls of the shell, the driving member is connected to the base and is located in the shell, the guide arms are partially or wholly disposed inside the shell, guide rails are disposed in the shell, and the guide arms extend or retract along the guide rails and

the openings.

6. The in-line rotary power connector according to claim 5, wherein the guide arms are stepped and comprise extension parts and limiting parts, the extension parts are located above the limiting parts, and the limiting parts are abutted against or separated from the inner wall of the shell while the extension parts of the guide arms extend or retract along the openings in the shell.

7. The in-line rotary power connector according to claim 5, wherein the top of the shell is provided with limiting snap posts, the base is provided with arc-shaped guide slots, the limiting snap posts are plugged and limited in the arc-shaped guide slots, the base is connected to the supporting part, and when the supporting part and the base synchronously rotate relative to the shell, the arc-shaped guide slots rotate relative to the limiting snap posts.

8. The in-line rotary power connector according to claim 1, wherein the supporting part is internally provided with live wire terminals, neutral wire terminals and ground wire terminals, a connecting shaft is connected below the ground wire terminals, grounding pieces are disposed below the power supply part, the grounding pieces are rotatably connected to the connecting shaft, the power supply part is internally provided with limiting slots for limiting the grounding pieces, the guide arms are provided with grounding electric conductors, the driving member rotates to drive the guide arms to expand or reset, and the guide arms drive the grounding electric conductors to be connected or disconnected to the grounding pieces.

9. The in-line rotary power connector according to claim 8, wherein the guide arms are internally provided with neutral wire electric conductors and/or live wire electric conductors, one part of each of the neutral wire electric conductors and/or the live wire electric conductors extends out of the front ends of the guide arms, and the other parts thereof are disposed to protrude out of outer surfaces of the guide arms.

10. A rail socket, comprising an electric power rail, wherein the electric power rail is provided with the in-line rotary power connector according to any one of claims 1 to 9.