ADAPTER AND RAIL SOCKET

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a national stage of international application No. PCT/CN2023/129182, filed on November 1, 2023, which claims priority to Chinese patent application No. 202310635524.7, filed on May 31, 2023, and entitled “ADAPTER AND RAIL SOCKET”, and Chinese utility model patent application No. 202321909550.6, filed on July 19, 2023, and entitled “ADAPTER AND RAIL SOCKET”, the disclosures of which are herein incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] The present disclosure relates to the field of electric apparatus technologies, and more particularly, to an adapter and a rail socket.

BACKGROUND

[0003] A rail socket is a new type of socket, which can effectively improve the flexibility of power supply.

SUMMARY

[0004] The embodiments of the present disclosure provide an adapter and a rail socket. The technical solutions are as follows.

[0005] According to some embodiments of the present disclosure, an adapter is provided. The adapter includes a body, a lock mechanism and a ground pin,

[0006] wherein the lock mechanism includes a lock member, a push rod and a reset member,, the lock member is rotatably connected to the body, the push rod is movably connected to the body, one end of the push rod fits with the lock member, and the other end of the push rod is disposed outside the body, the push rod is configured to drive the lock member from a locked position to an unlocked position, the reset member is connected to the lock member and the body, and the reset member is configured to drive the lock member from the unlocked position to the locked position, and

[0007] the ground pin is plugged into the lock member, and one end portion of the ground pin is disposed outside the body.

[0008] In some embodiments of the present disclosure, an outer wall of the body is provided with a guide plate, and the guide plate is configured to accommodate a first conducive swing arm and a second conductive swing arm;

[0009] the lock member and the ground pin are disposed at a middle of the guide plate; and

[0010] the first conductive swing arm and the second conductive swing arm are disposed on both sides of the ground pin respectively.

[0011] In some embodiments of the present disclosure, a notch is disposed in the middle of the guide plate;

[0012] the lock member includes a lock head, the lock head is disposed at the notch, and in a case where the lock member is in the locked position, the lock head partially protrudes out of the notch.

[0013] In some embodiments of the present disclosure, a through hole is disposed in the lock head, and the through hole extends along an axial direction of the lock head; and

[0014] the ground pin is plugged into the through hole.

[0015] In some embodiments of the present disclosure, the lock member includes a connecting shaft and a bump;

[0016] one end of the connecting shaft is connected to the lock head, the other end of the connecting shaft is connected to the bump, and the through hole passes through the lock head and the connecting shaft;

[0017] an inclined surface is defined on a side surface of the lock head, wherein the inclined surface is inclined to an axis of the connecting shaft, and a locking surface is disposed on a side, facing the connecting shaft, of the lock head; and

[0018] the bump is abutted against the push rod.

[0019] In some embodiments of the present disclosure, the bump is disposed in the body, and the lock head and the connecting shaft are disposed in the guide plate; and

[0020] in a case where the adapter is plugged into the rail, the connecting shaft is disposed at a rail socket of the rail, the lock head is disposed inside the rail socket of the rail, and the bump is disposed outside the rail socket of the rail.

[0021] In some embodiments of the present disclosure, the ground pin is a cylindrical structural member or a quadrangular structural member; and

[0022] an inner contour of the through hole fits with the ground pin.

[0023] In some embodiments of the present disclosure, in a case where the ground pin is a cylindrical structural member, the inner contour of the through hole is cylindrical.

[0024] In some embodiments of the present disclosure, in a case where the grounding pole electrode pin is a quadrangular structural member, two reinforcing ribs are disposed on a hole wall of the through hole, the two reinforcing ribs are spaced oppositely, and the reinforcing ribs have first limiting surfaces and second limiting surfaces which are arranged at angles; and

[0025] in a case where the lock member is in the locked position, the first limiting surfaces of the two reinforcing ribs are abutted against two sides surfaces of the ground pin respectively, and in a case where the lock member is in the unlocked position, the second limiting surfaces of the two reinforcing ribs are abutted against two side surfaces of the ground pin respectively.

[0026] In some embodiments of the present disclosure, one end of each of the two reinforcing ribs protrudes from the through hole and extends along an axial direction of the through hole.

[0027] In some embodiments of the present disclosure, a guide rail is disposed on the inner wall of the body, the guide rail extends along a movement direction of the push rod, and one end of the guide rail is opposite to the lock member; and

[0028] the push rod is movably disposed in the guide rail.

[0029] In some embodiments of the present disclosure, the push rod includes a button and a rod body;

[0030] wherein the button is connected to one end of the rod body, and the button is disposed outside the body; and

[0031] the rod body is movably plugged into the body, and the other end of the rod body fits with the lock member.

[0032] According to some embodiments of the present disclosure, a rail socket is provided. The rail socket includes a rail, and the adapter as described above.

BRIEF DESCRIPTION OF DRAWINGS

[0033] To describe the technical solutions in the embodiments of the present disclosure more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show merely

some embodiments of the present disclosure, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

[0034] FIG. 1 is a schematic structural diagram of a rail socket according to some embodiments of the present disclosure;

[0035] FIG. 2 is a schematic structural diagram of an adapter according to some embodiments of the present disclosure;

[0036] FIG. 3 is a schematic structural diagram of a lock mechanism according to some embodiments of the present disclosure;

[0037] FIG. 4 is a schematic diagram of a lock member in a locked position according to some embodiments of the present disclosure;

[0038] FIG. 5 is a schematic structural diagram of a lock mechanism according to some embodiments of the present disclosure;

[0039] FIG. 6 is a schematic diagram of the lock member in an unlocked position according to some embodiments of the present disclosure;

[0040] FIG. 7 is a schematic assembly diagram of a lock member and a ground pin according to some embodiments of the present disclosure;

[0041] FIG. 8 is a schematic assembly diagram of a lock member and a ground pin according to some embodiments of the present disclosure; and

[0042] FIG. 9 is a view of FIG. 8 in an A direction according to some embodiments of the present disclosure.

DETAILED DESCRIPTION

[0043] In order to make the objectives, technical schemes and advantages of the present disclosure clearer, a further detailed description will be made to the embodiments of the present disclosure below with reference to the accompanying drawings.

[0044] In related art, the rail socket includes an adapter and a rail. The rail has conductive slide rails extending along a length direction of the rail. The conductive slide rails are electrified, and a lock mechanism that can be unfolded or folded is disposed on a side of the adapter. The adapter can be plugged into the rail. By unfolding the lock mechanism, the adapter and the rail are locked to each other. Because the adapter can be plugged into any positon on the rail, the adapter supplies

power to electric appliances in a plurality of positions, thereby improving the flexibility of power supply.

[0045] However, a ground pin is also provided on one side of the adapter, and the ground pin and the lock member are arranged side by side, resulting in relatively tight installation space on the adapter side.

[0046] Embodiments of the present disclosure provide a rail socket. FIG. 1 is a schematic structural diagram of the rail socket. Referring to FIG. 1, in the present embodiment, the rail socket includes a rail 100 and an adapter 200.

[0047] The adapter 200 is plugged into the rail 100. Through the electrical connection between the adapter 200 and the rail 100, the adapter 200 can be energized. In addition, because the adapter 200 can be plugged into any position on the rail 100, the adapter 200 supplies power to electric appliances in a plurality of positions, thereby improving the flexibility of power supply.

[0048] FIG. 2 is a schematic structural diagram of the adapter. In conjunction with FIG. 2, the adapter in the present embodiment includes a body 10, a lock mechanism 40 and a ground pin 50 (see FIG. 3).

[0049] FIG. 3 is a schematic structural diagram of the lock mechanism 40. In conjunction with FIG. 3, in the present embodiment, the lock mechanism 40 includes a lock member 410, a push rod 420 and a reset member 430. The lock member 410 is rotatably connected to the body 10. The push rod 420 is movably connected to the body 10. One end of the push rod 420 fits with the lock member 410, and the other end of the push rod 420 is disposed outside the body 10. The push rod 420 is configured to drive the lock member 410 from a locked position to an unlocked position. The reset member 430 is connected to the lock member 410 and the body 10. The reset member 430 is configured to drive the lock member 410 from the unlocked position to the locked position. The ground pin 50 is plugged into the lock member 410, and one end portion of the ground pin 50 is disposed outside the body 10.

[0050] The lock mechanism 40 achieves mutual locking between the adapter 200 and the rail 100, which prevents the adapter 200 from loosening from the rail 100, resulting in circuit breakage between the adapter 200 and the rail 100. In the case that the adapter 200 is plugged into the rail 100, the lock member 410 is always kept in the locked position under the action of the reset member 430, that is, the continuous locking between the lock member 410 and the rail 100 is ensured (see FIG. 3 and FIG. 4). In the case that the adapter 200 needs to be detached from the rail

100, the lock member 410 is rotated from the locked position to the unlocked position by operating the push rod 420, such that the lock member 410 is unlocked from the rail 100 (see FIG. 5 and FIG. 6).

[0051] One end of the ground pin 50 protrudes out of the body 10 and is contact with the rail 100 to achieve the grounding of the adapter 200, and the other end of the ground pin 50 is in contact with a grounding pole socket 130 in the body 10. Because the ground pin 50 is plugged into the lock member 410, an internal space of the lock member 410 is used as an installation space, thereby achieving a more compact the structure of the adapter 200.

[0052] In the present embodiment, the body 10 includes a housing 120 and a plug bush set. The plug bush set includes a live line plug bush (not shown), a null line plug bush (not shown) and a grounding pole plug bush 130. The plug bush set is disposed in the housing 120. The grounding pole plug bush 130 is connected to the ground pin 50.

[0053] In the present embodiment, an outer wall of the body 10 is provided with a guide plate 121, and the guide plate 121 is configured to accommodate a first conducive swing arm 140 and a second conductive swing arm 150. The lock member 410 and the ground pin 50 are both disposed in the middle of the guide plate 121. The first conductive swing arm 140 and the second conductive swing arm 150 are disposed on both sides of the ground pin 50 respectively.

[0054] The guide plate 121 can be plugged into the rail socket of the rail 100 and is configured to play a guiding role in the case that the adapter 200 slides relative to the rail 100. Both the first conductive swing arm 140 and the second conductive swing arm 150 are rotatably connected to the housing 120 and extend out of the guide plate 121 or retract into the guide plate 121 under the user's operation. The first conductive swing arm 140 is electrically connected to the live line plug bush, and the second conductive swing arm 150 is electrically connected to the null line plug bush. The first conductive swing arm 140 and the second conductive swing arm 150 are in contact with the rail 100 upon extending out the guide plate 121, and the adapter 200 is energized.

[0055] In the present embodiment, a notch 122 is disposed in the middle of the guide plate 121. The lock member 410 includes a lock head 411. The lock head 411 is disposed at the notch 122. In the case that the lock member 410 is in the locked position, the lock head 411 partially protrudes out of the notch 122.

[0056] The lock member 410 is always kept in the locked position under the action of the reset member 430. In this case, the lock head 411 partially protrudes out of the notch 122, and the

continuous locking between the lock member 410 and the rail 100 is ensured (see FIG. 3 and FIG. 4). However, in the case that the lock member 410 is in the unlocked position, the lock head 411 is fully retracted into the notch 122, such that the lock member 410 is unlocked from the rail 100 (see FIG. 5 and FIG. 6).

[0057] FIG. 7 is a schematic assembly diagram of the lock member 410 and the ground pin 50. In conjunction with FIG. 7, in the present embodiment, a through hole 414 is disposed in the lock head 411. The through hole 414 extends along an axial direction of the lock head 411. The ground pin 50 is plugged into the through hole 414.

[0058] In the above embodiments, the lock head 411 achieves the locking or unlocking between the lock member 410 and the rail 100 in cooperation with the rail 100. The through hole 414 provides an installation space for the ground pin 50, such that the ground pin 50 and the lock head 411 can rotate relative to each other, preventing the ground pin 50 from affecting the movement of the lock head 411 between the locked position and the unlocked position.

[0059] In the present embodiment, the lock member 410 includes a connecting shaft 412 and a bump 413. One end of the connecting shaft 412 is connected to the lock head 411, the other end of the connecting shaft 412 is connected to the bump 413, and the through hole 414 passes through the lock head 411 and the connecting shaft 412. A side surface of the lock head 411 has an inclined surface 415. The inclined surface 415 is inclined to an axis of the connecting shaft 412. A locking surface 416 is disposed on a side, facing the connecting shaft 412, of the lock head 411. The locking surface 416 is perpendicular to an axis of the connecting shaft 412. The bump 413 protrudes out of the connecting shaft 412 along a radial direction of the connecting shaft 412, and the bump 413 is abutted against the push rod 420. The ground pin 50 is plugged into the through hole 414.

[0060] In the above embodiments, in the process of plugging the adapter 200 into the rail 100, the inclined surface 415 of the lock head 411 first comes into contact with the rail 100, and the inclined surface 415 is subjected to a vertical (along an axial direction of the connecting shaft 412) force exerted by the rail 100. Under the guidance of the inclined surface 415, the vertical (along the axial direction of the connecting shaft 412) force subjected to the inclined surface 415 transforms a portion of the vertical force to drive the lock head 411 to rotate, such that the lock head 411 is retracted into the body 10, and the lock member 410 transforms from the locked position to the unlocked position, thereby facilitating the plugging of the lock member 410 into the adapter 200.

In the case that the adapter 200 has been plugged in place, the inclined surface 415 of the lock head 411 is no longer subjected to the force exerted by the rail 100. In this case, the lock member 410 extends out of the body 10 under the action of the reset member 430, so as to change from the unlocked position to the locked position and hold in this locked position, and the locking surface 416 of the lock head 411 is mutually clamped with the rail 100, thereby preventing the adapter 200 from escaping from the rail 100.

[0061] The unlocking process between the adapter 200 and the rail 100 is opposite to the locking process described above, which is not repeated herein.

[0062] In the present embodiment, the bump 413 is disposed in the body 10, and the lock head 411 and the connecting shaft 412 are disposed in the guide plate 121. In the case that the adapter 200 is plugged into the rail 100, the connecting shaft 412 is disposed at a rail socket of the rail 100, the lock head 411 is disposed inside the rail socket of the rail 100, and the bump 413 is disposed outside the rail socket of the rail 100.

[0063] In the above embodiments, the edge of the rail socket of the rail 100 can be clamped by means of the lock head 411 and bump 413, such that the adapter 200 can be locked on the rail 100.

[0064] Continuing to FIG. 7, in the present embodiment, the ground pin 50 is a cylindrical structural member or a quadrangular structural member, and an inner contour of the through hole 414 fits with the ground pin 50.

[0065] Because the inner contour of the through hole 414 fits with the ground pin 50, the lock member 410 and the ground pin 50 can rotate relative to each other, such that the ground pin 50 remains stationary in the process of rotating the lock member 410.

[0066] In other examples, in the case that the ground pin 50 is a cylindrical structural member, the inner contour of the through hole 414 is cylindrical.

[0067] Because the size of the ground pin 50 is relatively large, the size of the through hole 414 also increases accordingly. In order to ensure that the structural strength of the lock member 410 is reduced due to excessively large size of the through hole 414, in conjunction with FIG. 8, in other examples, in the case that the ground pin 50 is a quadrangular structural member, two reinforcing ribs 417 are disposed on a hole wall of the through hole 414, the two reinforcing ribs 417 are spaced oppositely, and the reinforcing ribs 417 have first limiting surfaces 418 and second limiting surfaces 419 which are arranged at angles.

[0068] FIG. 9 is a view of FIG. 8 in an A direction. In conjunction with FIG. 9, in the present embodiment, in the case that the lock member 410 is in the locked position, the first limiting surfaces 418 of the two reinforcing ribs 417 are abutted against two sides surfaces of the ground pin 50 respectively, and in the case that the lock member 410 is in the unlocked position, the second limiting surfaces 419 of the two reinforcing ribs 417 are abutted against two side surfaces of the ground pin 50 respectively.

[0069] In this way, the reinforcing ribs 417 can not only improve the structural strength of the lock member 410, but also play a certain limiting role on the ground pin 50, such that the ground pin 50 can be stably accommodated in the through hole 414.

[0070] Exemplarily, one end of each of the two reinforcing ribs 417 protrudes out of the through hole 414 and extends along an axial direction of the through hole 414.

[0071] In the above embodiments, a contact area between the reinforcing ribs 417 and the ground pin 50 is further increased, such that the plug-in installation of the ground pin 50 in the lock member 410 is more stable.

[0072] Exemplarily, the reset member 430 is a torsion spring. The reset member 430 sleeves the lock member. One end of the reset member 430 is connected to the lock member, and the other end of the reset member 430 is connected to the body 10. The elasticity of the reset member 430 allows the lock member to remain in a locked state under normal conditions.

[0073] Referring to FIG. 3 again, in the present embodiment, a guide rail 110 is disposed on the inner wall of the body 10, the guide rail 110 extends along a movement direction of the push rod 420, and one end of the guide rail 110 is opposite to the lock member 410. The push rod 420 is movably disposed in the guide rail 110.

[0074] In the above embodiments, the guide rail 110 is disposed on the inner wall of the body 10 and can act as a guide limit for the movement of the push rod 420. In addition, because one end of the guide rail 110 is opposite to the lock member 410, under the guidance of the guide rail 110, it can be ensured that the push rod 420 accurately touches the lock member 410, such that the lock member 410 moves from the locked position to the unlocked position.

[0075] Continuing to FIG. 5, in the present embodiment, the push rod includes a button 421 and a rod body 422. The button 421 is connected to one end of the rod body 422. The button 421 is disposed outside the body 10. The rod body 422 is movably plugged into the body 10, and the other end of the rod body 422 fits with the lock member 410.

[0076] In the above embodiments, the button 421 is disposed outside the body 10 for easy press by an operator. Because the button 421 is connected to the rod body 422, in the case that the button 421 is pressed, the rod body 422 can be driven to move together, such that the rod body 422 pushes the lock member from the locked position to the unlocked position.

[0077] The shape of the rod body 422 can be designed according to the arrangement of internal parts of the body 10. For example, the rod body 422 is a structural member similar to a Z-shape, which can avoid some internal parts of the body 10.

[0078] Exemplarily, the push rod 420 further includes a reinforcement member 423, which is disposed at an included angle between the button 421 and the rod body 422. In addition, the reinforcement member 423 is connected to the button 421 and the rod body 422.

[0079] In the above embodiments, through the reinforcement member 423, the connection strength between the button 421 and the rod body 422 can be effectively improved, such that the overall structural strength of the push rod 420 is improved, thereby ensuring the reliability of the operator when pressing the push rod 420.

[0080] The technical or scientific terms as used in the present disclosure should have the meanings as commonly understood by a person of ordinary skill in the art of the present disclosure, unless otherwise defined. The words "first", "second", “third” and similar terms used in the description and claims of the present disclosure do not denote any order, quantity, or importance, and are merely used to distinguish different components. Similarly, words such as "a" or "one" do not denote a quantitative limit, but rather the existence of at least one. The word "include", “comprise” or similar terms mean that elements or objects appearing before the term "include” or “comprise” cover the listed elements or objects and its equivalents appearing after the term "include” or “comprise”, while other elements or objects are not excluded. The word "connected to" or "connected with" and similar terms are not limited to physical or mechanical connections, and may include electrical connection and the connection may be direct or indirect. "Upper", "lower", “left”, “right” and the like are only used to indicate the relative positional relationship, and when the absolute position of a described object changes, the relative positional relationship may also change accordingly.

[0081] The foregoing descriptions are merely optional embodiments of the present disclosure, and are not intended to limit the present disclosure. Within the spirit and principles of the present

disclosure, any modifications, equivalent substitutions, improvements, etc., should be within the protection scope of the present disclosure.