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United States Patent Application Publication	20250257866
Kind Code	A1
Publication Date	August 14, 2025
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TRACK LAMP

Abstract

A track lamp is provided, which includes a track and an electrical connection device in electrical contact with the track, in which the electrical connection device includes a substrate, a power supply structure plugged and fixed on the substrate, and an elastic member arranged between the substrate and the power supply structure, the power supply structure is provided with a convex portion, to be in electrical contact with a power transmission bar in the track; and the elastic member is configured to generate elastic deformation in a case that the convex portion and the power transmission bar are pressed against each other, so that the convex portion and the power transmission bar are kept abutting against with each other.

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Appl. No.: **19/193921**

Filed: **April 29, 2025**

Foreign Application Priority Data

CN	202222890594.0	Nov. 01, 2022

Related U.S. Application Data

parent WO continuation PCT/CN2023/129037 20231101 PENDING child US 19193921

Publication Classification

Int. Cl.: **F21V21/005** (20060101); **F21S8/06** (20060101); **F21V23/06** (20060101)

U.S. Cl.:

CPC **F21V21/005** (20130101); **F21S8/066** (20130101); **F21V23/06** (20130101);

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] The present application is based upon and claims the priority of PCT patent application No. PCT/CN2023/129037 filed on Nov. 1, 2023 claims the priority of the Chinese patent application with application No. 202222890594.0, filed on Nov. 1, 2022, the entire contents of which are hereby incorporated by reference herein for all purposes.

TECHNICAL FIELD
[0002] The present disclosure relates to a track lamp, belonging to the technical field of lighting equipment.
BACKGROUND
[0003] In order to meet the needs of quick disassembly and assembly, a track lamp uses a copper sheet to draw electricity from the track. The copper sheet is mostly fixed with a compression spring structure, which supports the copper sheet. When the lamps are installed on the track, the copper sheets and the copper bars of the track have an interference fit, and the springs are always in a compressed state, so that the copper sheets are close to the copper bars to meet the power supply requirements.
SUMMARY
[0004] The present disclosure provides a track lamp.
[0005] Accordingly, the track lamp provided in this disclosure may include a track and an electrical connection device in electrical contact with the track, in which the electrical connection device may include a substrate, a power supply structure plugged and fixed on the substrate, and an elastic member arranged between the substrate and the power supply structure, the power supply structure may be provided with a convex portion, to be in electrical contact with a power transmission bar in the track; and the elastic member may be configured to generate elastic deformation in a case that the convex portion and the power transmission bar are pressed against each other, so that the convex portion and the power transmission bar may be kept abutting against with each other.
[0006] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the present disclosure.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0007] FIG. **1** is a perspective schematic diagram of a track lamp according to an example of the present disclosure.
[0008] FIG. **2** is a cross-sectional view of the track lamp in FIG. **1**.
[0009] FIG. **3** is a perspective schematic diagram of the electrical connection device in FIG. **1**.
[0010] FIG. **4** is an enlarged view of portion A in FIG. **3**.
[0011] FIG. **5** is a schematic three-dimensional view of the substrate in FIG. **3**.

[0012] FIG. **6** is an enlarged view of the portion C in FIG. **5**.
[0013] FIG. **7** is an exploded view of the electrical connection device in FIG. **3**.
[0014] FIG. **8** is an enlarged view of the portion B in FIG. **7**.
[0015] FIG. **9** is a three-dimensional schematic diagram of the power supply structure in FIG. **5**.

DETAILED DESCRIPTION

[0016] In order to make the purpose, technical solutions and advantages of the present disclosure clearer, the present disclosure will be described in detail below with reference to the accompanying drawings and examples.
[0017] Explanation of the reference numerals in this disclosure may include: [0018] track lamp **100**, track **200**, power transmission bar **201**, conductive groove **202**, lock buckle groove **203**; [0019] lamp **300**, electrical connection device **1**, shell **2**, light-emitting component **3**, substrate **11**, through hole **112**, boss **113**, elastic member **15**, power supply structure **12**, convex portion **121**, support plate **122**, connecting part **123**, abutting surface **124**, circuit board **13**, lock catch **14**.
[0020] Sometimes, the new track lamps on the market have reduced their size to meet the requirements of ultra-thin and ultra-narrow tracks. Due to the limited size, it is impossible to place a compression spring structure in the track lamp to obtain power. Therefore, the demand for obtaining power from the track can only be met through the plastic deformation of the copper sheet itself. However, due to the poor plastic resilience of the copper sheet, it is difficult to rebound or the resilience is insufficient, so the reliability of using the copper sheet's own deformation and rebound to support the track copper bar to obtain power is not high. At the same time, after the copper sheet is installed once, the copper sheet is deformed and the protrusion moves down. When it is installed again, it may cause difficulty in obtaining power, which is not conducive to the repeated installation of the lamp.
[0021] In view of this, it is necessary to improve the track lamps to solve the above problems.
[0022] Referring to FIG. **1** to FIG. **3**, the present disclosure discloses a track lamp **100** for providing movable lighting to the outside world. The track lamp **100** includes a track **200** and a lamp **300** detachably connected to the track **200**. An external power source is connected to the track **200**, and the track **200** is electrically connected to the lamp **300**. The lamp **300** is powered by the track **200**, so that the lamp **300** emits light and illuminates the object.
[0023] Among them, the lamp **300** includes an electrical connection device **1**, a shell **2** and a light-emitting component **3**. A receiving space (not shown) is provided in the shell **2**. The electrical connection device **1** matches the shell **2** and is arranged on the top of the shell **2**, so that a part of the electrical connection device **1** can be accommodated in the receiving space and the receiving space is covered at the same time. A side of the electrical connection device **1** away from the shell **2** is in electrical contact with the track **200**, and the light-emitting component **3** is accommodated in the receiving space and electrically connected to the electrical connection device **1**. This arrangement enables the track **200** to power the light-emitting component **3** through the electrical connection device **1**.
[0024] Specifically, please refer to FIG. **2** and FIG. **3**, the electrical connection device **1** includes a substrate **11**, the substrate **11** is connected to the shell **2** and covers the light-emitting assembly **3** accommodated in the shell **2**, a lock catch **14** is provided on the substrate **11**, and a lock buckle groove **203** is provided on the track **200**. When the substrate **11** is connected to the track **200**, the lock catch **14** is accommodated in the lock buckle groove **203**. Specifically, there are two lock catches **14**, which are arranged at two ends of a long side direction of the lamp **300**, and there is one lock buckle groove **203**, which is arranged in the middle of the track **200** and extends along the track **200**. The substrate **11** is also provided with a power supply structure **12** electrically connected to the track **200**, and the extension direction of the power supply structure **12** is the same as the extension direction of the lock catch **14**. In this way, on the one hand, the lamp **300** is fixedly connected to the track **200** through the lock catch **14**, and on the other hand, the track **200** supplies power to the lamp **300** through the power supply structure **12**.

[0025] Since the specific structure of the track **200**, the specific structure of the lock catch **14**, the specific structure of the light-emitting assembly **3**, the specific structure of the substrate **11**, and the connection relationship between the substrate **11** and the shell **2** can all be designed according to existing technical solutions, which will not be described in detail herein.

[0026] The main improvements of the present disclosure lie in the power supply structure **12**, the connection relationship between the power supply structure **12** and the light-emitting component **3**, and the connection relationship between the power supply structure **12** and the substrate **11**. Therefore, the following specification will describe the specific structure of the power supply structure **12**, and the connection relationship between the power supply structure **12** and the substrate **11**, and the connection relationship between the power supply structure **12** and the light-emitting component **3** respectively in detail.

[0027] Please refer to FIG. **3** to FIG. **6** and in combination with FIG. **9**, the electrical connection device **1** includes a substrate **11**, a power supply structure **12** plugged and fixed on the substrate **11**, and an elastic member **15** arranged between the substrate **11** and the power supply structure **12**. The power supply structure **12** is provided with a convex portion **121** to be in electrical contact with a power transmission bar **201** in the track **200**. The elastic member **15** is configured to generate elastic deformation when the convex portion **121** and the power transmission bar **201** are pressed against each other, so that the convex portion **121** and the power transmission bar **201** are kept abutting against with each other. With this arrangement, the power transmission bar **201** can continuously transmit power to the power supply structure **12**, thereby ensuring the connection stability between the electrical connection device **1** and the track **200**.

[0028] Specifically, the power supply structure **12** includes a horizontally extending support plate **122** and connecting parts **123** vertically connected to both ends of the support plate **122**, in which the support plate **122** is arranged in parallel with the substrate **11**, and the support plate **122** is arranged on a side of the substrate **11** away from the light-emitting component **3**, and the connecting parts **123** are arranged perpendicular to the support plate **122**. Through holes **112** are provided on the substrate **11** for the connecting parts **123** to pass through, and the through holes **112** pass through the substrate **11**, and a size of each of the through holes **112** is slightly larger than a size of each of the connecting parts **123**, so that the connecting parts **123** can pass through the substrate **11** and move in the through holes **112**. With such a configuration, the power supply structure **12** can move relative to the substrate **11**. When subjected to external force, the power supply structure **12** compresses the elastic member **15** and moves relative to the substrate **11**. When the external force disappears, the elastic member **15** pushes the power supply structure **12** to return to its initial state.

[0029] In this example, two connecting parts **123** are provided, and the two connecting parts **123** are respectively connected to the two ends of the support plate **122**, that is, the power supply structure **12** is arranged in an inverted “U” shape, and two through holes **112** are provided to match the connecting parts **123**, so that the two connecting parts **123** can pass through the through holes **112** to extend into the accommodating space. In other examples, there can be only one connecting part **123** or three connecting parts **123**, as long as the connecting part **123** can connect the two sides of the substrate **11** and can move in the through hole **112**, which is not limited herein.

[0030] The convex portion **121** is arranged on the support plate **122** and extends from the support plate **122** toward the track **200**, so that when the electrical connection device **1** is connected to the track **200**, the convex portion **121** can abut against the power transmission bar **201** to realize the power transmission between the electrical connection device **1** and the track **200**. Specifically, the support plate **122** is arranged in a flat plate shape, and the convex portion **121** is arranged in an elliptical shape. The convex portion **121** is arranged in the middle position of the support plate **122** and its size is much smaller than the size of the support plate **122**. In other examples, the convex portion **121** can be arranged at the edge position on the support plate **122**, and the shape of the convex portion **121** can be a long strip or other shapes, which is not limited herein.

[0031] In a length direction of the track lamp **100**, the elastic member **15** is arranged between the two through holes **112**, and one end of the clastic member **15** abuts against the support plate **122**, and the other end of the elastic member **15** abuts against the substrate **11**. When the electrical connection device **1** is connected to the track **200**, the power transmission bar **201** abuts against the convex portion **121** and applies pressure to the convex portion **121**, so that the support plate **122** moves toward the substrate **11**. At this time, the elastic member **15** is pressed until the force applied by the power transmission bar **201** to the support plate **122** is balanced with the elastic force of the elastic member **15**, thereby improving the connection stability between the convex portion **121** and the power transmission bar **201**; when the electrical connection device **1** is disassembled from the track **200**, the convex portion **121** is separated from the power transmission bar **201**, and the elastic member **15** pushes the support plate **122** to move in the direction away from the substrate **11**, so that the power supply structure **12** is restored to its initial state, so as to facilitate the re-installation of the electrical connection device **1**.

[0032] Specifically, the elastic member **15** is arranged in an arch shape between the support plate **122** and the substrate **11**, and a highest point of the elastic member **15** abuts against a position of the corresponding convex portion **121** on the support plate **122**, that is, the elastic member **15** abuts against the support plate **122** at the position where the distance between the elastic member **15** and the substrate **11** is the largest. The elastic member **15** extends from the substrate **11** toward the support plate **122**, and a side of the elastic member **15** away from the substrate **11** is provided with an abutting surface **124**, which can be in contact with the support plate **122**. In a short side direction of the electrical connection device **1**, a size of the elastic member **15** matches a size of the support plate **122**, so that when the electrical connection device **1** is connected to the track **200**, the elastic member **15** is not in contact with the track **200**.

[0033] In the present example, since the side of the elastic member **15** away from the substrate **11** is provided with the abutting surface **124**, when the power supply structure **12** abuts against the clastic member **15**, the abutting surface **124** can fit with the support plate **122**, that is, the clastic member **15** and the power supply structure **12** are in surface contact, so as to increase the abutting stability between the elastic member **15** and the power supply structure **12**, so that a force-bearing area between the clastic member **15** and the power supply structure **12** is increased. In other examples, the abutting surface **124** may not be provided on the clastic member **15**, that is, the elastic member **15** and the support plate **122** are in line contact, which is not limited herein.

[0034] In the present example, in a projection direction, the elastic member **15** and the support plate **122** are both arranged in a long strip shape, a conductive groove **202** is provided on the track **200**, and the power transmission bar **201** is accommodated in the conductive groove **202**. The elastic member **15** and the support plate **122** at least partially extend into the conductive groove **202**, and the convex portion **121** abuts against the power transmission bar **201**. In other examples, the conductive groove **202** may not be provided on the track **200**. When the electrical connection device **1** is assembled with the track **200**, the convex portion **121** directly abuts against the power transmission bar **201**, which is not limited herein.

[0035] A boss **113** is further provided on the substrate, and the boss **113** extends from the substrate **11** toward the track **200**. The clastic member **15** extends from the boss **113** in a direction away from the substrate **11**. The power transmission bar **201** is provided at the bottom of the conductive groove **202**. When the electrical connection device **1** is connected to the track **200**, the boss **113**, the elastic member **15** and part of the power supply structure **12** can all extend into the conductive groove **202** and make the convex portion **121** of the power supply structure **12** abut against the power transmission bar **201**. On the one hand, it prevents the operator from touching the power transmission bar **201** during installation, and on the other hand, it realizes the limiting and electrical connection between the electrical connection device **1** and the track **200**.

[0036] In the present example, two power supply structures **12** are provided, and the two power supply structures **12** are provided on the side of the substrate **11** away from the light-emitting

component **3** and are located at the same end of the substrate **11** to transmit positive current and negative current respectively. Two conductive grooves **202** and two power transmission bars **201** are provided correspondingly, and the conductive grooves **202** are recessed from the track **200** toward the direction away from the substrate **11**, and the power transmission bar **201** is provided at the bottom of the conductive grooves **202** to realize power supply to the light-emitting component **3**. In other examples, the number of the power supply structures **12** can be set to other numbers, and the position of the power supply structures **12** can be provided at the middle position of the substrate **11**, or at the side of the shell **2**, that is, the power supply structure **12** extends from the electrical connection device **1** toward the shell **2** and extends outward through the shell **2**. At this time, at least part of the shell **2** is accommodated in the track **200**, and the power transmission bar **201** in the track **200** is correspondingly provided on the inner side surface of the track **200**, so that the power supply structure **12** can be in contact with the power transmission bar **201**, which is not limited herein.

[0037] In the present example, the elastic member **15** is a plastic member with plastic deformation, for example, a plastic member made of polycarbonate material. In other examples, the elastic member **15** can be a rubber product with elasticity. The elastic member **15** can also be other elastic parts, such as a torsion spring or a spring with a small size and good elasticity. As long as the power supply structure **12** can compress the elastic member **15** during assembly, and the clastic member **15** can push the power supply structure **12** to move when the external force disappears, which is not limited herein.

[0038] In the present example, the elastic member **15** is integrally formed with the substrate **11** to reduce the production cost of the electrical connection device **1** and improve the stability of the electrical connection device **1**. In other examples, the elastic member **15** can be fixed to the substrate **11** by connecting glue or other components. For example, the elastic member **15** is fixed to the substrate **11** by screws, which is not limited herein.

[0039] Referring to FIG. **3** and FIG. **4** and in combination with FIG. **7** and FIG. **8**, the electrical connection device **1** further includes a circuit board **13**, which is accommodated in the accommodation space of the shell **2**, and one end of the circuit board **13** is connected to one end of the connecting part **123** away from the support plate **122**, and the other end is connected to the light-emitting component **3**, so as to realize the electrical connection between the power supply structure **12** and the light-emitting component **3**. Specifically, the circuit board **13** is welded to the connecting part **123** and is not connected to the shell **2** or the substrate **11**, so that the power supply structure **12** can drive the circuit board **13** to move synchronously in the track **200**, on the one hand, the stable connection between the power supply structure **12** and the circuit board **13** is realized, and on the other hand, preventing the connecting parts **123** from falling off from the through holes **112**. The circuit board **13** and the light-emitting component **3** are connected by a flexible wire (not shown), so that the circuit board **13** can move relative to the light-emitting component **3** while being electrically connected to the light-emitting component **3**, in which the flexible wire is a soft wire that can conduct electricity and deform.

[0040] During assembly, first, the connecting parts **123** are passed through the through holes **112**, and the other ends of the connecting parts **123** away from the supporting plate **122** are welded to the circuit board **13**, and then the circuit board **13** and the light-emitting component **3** are connected through a flexible wire, and then the substrate **11** and the shell **2** are assembled, and then the supporting plate **122** and the elastic member **15** are correspond to the conductive groove **202** on the track **200**, and pressure is applied to the lamp **300**, so that the supporting plate **122** extends into the conductive groove **202** and the convex portion **121** abuts against the power transmission bar **201**, and at the same time, the elastic member **15** is stressed until the lock catch **14** can be accommodated in the lock buckle groove **203** and the lock catch **14** is rotated to realize the locking of the electrical connection device **1** and the track **200**, and realize the electrical connection between the lamp **300** and the track **200**; during disassembly, the lock catch **14** is rotated so that the

lock catch **14** falls off from the lock buckle groove **203**. At this time, the power supply structure **12** extends outward to the initial position under the push of the elastic member **15**, which is convenient for the lamp **300** to be assembled again.

[0041] In summary, the electrical connection device **1** of the present disclosure sets an clastic member **15** between the power supply structure **12** and the substrate **11**, so that the power supply structure **12** can move toward the substrate **11** when subjected to the external pressure. When the external pressure disappears, the power supply structure **12** can move in the direction away from the substrate **11** under the action of the elastic member **15**, thereby avoiding deformation of the power supply structure **12** and realizing repeated installation and use of the electrical connection structure; by setting the through holes **112** on the substrate **11**, the power supply structure **12** is movably connected to the substrate **11**, further avoiding deformation of the power supply structure **12** after being subjected to external force; by setting the circuit board **13** to be welded to the connecting part **123**, a stable connection between the circuit board **13** and the power supply structure **12** is achieved; by connecting the circuit board **13** and the light-emitting component **3** through a flexible wire, the circuit board **13** can be moved relative to the light-emitting component **3**; by setting the power supply structure **12** to be U-shaped, the connection between the power supply structure **12** and the substrate **11** is more stable.

[0042] The purpose of the present disclosure is to provide a track lamp to at least solve one of the problems of poor plastic resilience of copper sheets, difficulty in obtaining electricity, and inconvenience in repeated installation of the lamp.

[0043] To achieve the above-mentioned purpose, the present disclosure provides a track lamp, which comprises a track and an electrical connection device in electrical contact with the track, in which the electrical connection device comprises a substrate, a power supply structure plugged and fixed on the substrate, and an elastic member arranged between the substrate and the power supply structure, the power supply structure is provided with a convex portion, to be in electrical contact with a power transmission bar in the track; and the clastic member is configured to generate elastic deformation in a case that the convex portion and the power transmission bar are pressed against each other, so that the convex portion and the power transmission bar are kept abutting against with each other.

[0044] Optionally, the elastic member and the substrate are integrally formed.

[0045] Optionally, the power supply structure is arranged in an inverted U shape, the power supply structure comprises a horizontally extending support plate and connecting parts respectively vertically connected to two ends of the support plate, and the convex portion is arranged on a side of the support plate facing the power transmission bar.

[0046] Optionally, the clastic member is arranged in an arch shape between the substrate and the support plate, and a highest point of the elastic member abuts against a position of a corresponding convex portion on the support plate.

[0047] Optionally, the substrate is provided with through holes for the connecting parts to pass through, and the through holes are provided with two matching the connecting parts respectively.

[0048] Optionally, in a length direction of the track lamp, the elastic member is located between the two through holes.

[0049] Optionally, an abutting surface is provided on a side of the elastic member away from the substrate, and the abutting surface is in contact with the support plate.

[0050] Optionally, the substrate is further provided with a boss, the clastic member extends from the boss in a direction away from the substrate, the track is provided with a conductive groove, the power transmission bar is arranged at a bottom of the conductive groove, the boss and the elastic member can extend into the conductive groove and make the convex portion abut against the power transmission bar.

[0051] Optionally, the track lamp further comprises a shell and a light-emitting component accommodated in the shell, the electrical connection device is arranged on the top of the shell and

comprises a circuit board electrically connected to the light-emitting component, the convex portion of the power supply structure is electrically abutted against the power transmission bar, and an end of the power supply structure away from the convex portion passes through the substrate and is electrically connected to the circuit board.
[0052] Optionally, the circuit board and the light-emitting component are connected via a flexible wire, and the power supply structure and the circuit board are welded, so that the power supply structure can drive the circuit board to move in the track.
[0053] The beneficial effects of the present disclosure are as follows: the track lamp of the present disclosure arranges an elastic member between the power supply structure and the substrate so that the power supply structure can move toward the substrate when subjected to external pressure; when the external pressure disappears, the power supply structure can move in a direction away from the substrate under the action of the elastic member, thereby avoiding deformation of the power supply structure and realizing repeated installation and use of the electrical connection device.
[0054] The above examples are only used to illustrate the technical solutions of the present disclosure and are not to limited to these. Although the present disclosure has been described in detail with reference to the examples, those skilled in the art should understand that the technical solutions of the present disclosure can be modified or equivalently replaced without departing from the spirit and scope of the technical solution of the present disclosure.

Claims

1. A track lamp, comprising: a track and an electrical connection device in electrical contact with the track, and wherein: the electrical connection device comprises a substrate, a power supply structure plugged and fixed on the substrate, and an elastic member arranged between the substrate and the power supply structure, the power supply structure is provided with a convex portion, to be in electrical contact with a power transmission bar in the track; and the elastic member is configured to generate elastic deformation in a case that the convex portion and the power transmission bar are pressed against each other, so that the convex portion and the power transmission bar are kept abutting against with each other.
2. The track lamp according to claim 1, wherein the elastic member and the substrate are integrally formed.
3. The track lamp according to claim 1, wherein: the power supply structure is arranged in an inverted U shape, the power supply structure comprises a horizontally extending support plate and connecting parts respectively vertically connected to two ends of the support plate, and the convex portion is arranged on a side of the support plate facing the power transmission bar.
4. The track lamp according to claim 3, wherein the elastic member is arranged in an arch shape between the substrate and the support plate, and a highest point of the elastic member abuts against a position of a corresponding convex portion on the support plate.
5. The track lamp according to claim 3, wherein the substrate is provided with through holes for the connecting parts to pass through, and the through holes are provided with two matching the connecting parts.
6. The track lamp according to claim 5, wherein in a length direction of the track lamp, the elastic member is located between the two through holes.
7. The track lamp according to claim 3, wherein an abutting surface is provided on a side of the elastic member away from the substrate, and the abutting surface is in contact with the support plate.
8. The track lamp according to claim 1, wherein the substrate is further provided with a boss, the elastic member extends from the boss in a direction away from the substrate, the track is provided with a conductive groove, the power transmission bar is arranged at a bottom of the conductive

groove, the boss and the elastic member extend into the conductive groove and make the convex portion abut against the power transmission bar.

9. The track lamp according to claim 1, wherein: the track lamp further comprises a shell and a light-emitting component accommodated in the shell, the electrical connection device is arranged on the top of the shell and comprises a circuit board electrically connected to the light-emitting component, the convex portion of the power supply structure is electrically abutted against the power transmission bar, and an end of the power supply structure away from the convex portion passes through the substrate and is electrically connected to the circuit board.

10. The track lamp according to claim 9, wherein the circuit board and the light-emitting component are connected via a flexible wire, and the power supply structure and the circuit board are welded, so that the power supply structure can drive the circuit board to move in the track.