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(54) **LAMP**

(57) A lamp is disclosed in the present disclosure, and includes a lamp tube (1), a light source assembly (2), a drive assembly (3) and a lamp base (4), the lamp tube (1) has tubular structure and has at least two segments (11) arranged in parallel with each other, the light source assembly (2) is arranged extending at least within the segment (11), the light source assembly (2) and the drive assembly (3) are electrically connected to each other, the drive assembly (3) is mounted fixed inside the lamp base (4). The lamp can meet the requirements of fluorescent lamp in terms of structural appearance and can replace fluorescent lamp. The lamp has the advantages of low weight, simple assembly, simple process flow, high production efficiency, high heat dissipation efficiency and low production cost.

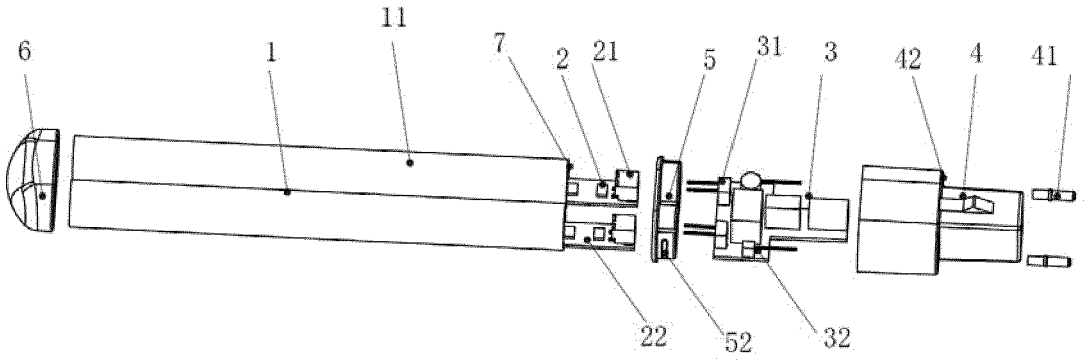


FIG. 1

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## Description

### TECHNICLA FIELD

**[0001]** The present disclosure relates to the field of LED lamp, more specifically, it relates to a lamp.

### BACKGROUND

**[0002]** With the development and popularization of LED light sources, traditional incandescent lamps and fluorescent lamps are gradually replaced by LED lamps due to high energy consumption, complicated processes and environmental pollution. Now incandescent lamps are being replaced by LED filament lamps, LED bulbs and other lamps gradually. However, due to special shape and application environment of fluorescent lamps, only a few LED lamps can replace them. Therefore, it is necessary to develop and design a new type lamp with the shape characteristics and brightness requirements of fluorescent lamps to replace fluorescent lamps.

**[0003]** At present, LED plug-in tube lamp has been researched to replace fluorescent lamp, but the existing plug-in tube lamp has a complicated assembly process and the whole lamp has a large weight. In addition, the complicated assembly process results in high production cost and low efficiency. Therefore, researching and designing a new type of lamp to meet the shape and application requirements of fluorescent lamps is one of the problems that need to be solved.

### SUMMARY

**[0004]** In order to solve the problems of the plug-in tube lamp mentioned above such as complicated assembly process, large weight, high production cost and low efficiency and so on, the present disclosure discloses a new type of lamp.

**[0005]** The lamp of the present disclosure comprises a lamp tube, a light source assembly, a drive assembly and a lamp base, the lamp tube has a tubular structure and has at least two segments arranged in parallel with each other, the light source assembly extends at least within the segments, the light source assembly and the drive assembly are electrically connected to each other, and the drive assembly is fixedly mounted inside the lamp base.

**[0006]** Preferably, a lamp base fixture is further included, one end of the lamp base fixture is fixedly connected with the lamp tube, and the other end of the lamp base fixture is fixedly connected with the lamp base. The lamp base fixture is adopted to fix the lamp tube and make the lamp base connect with the lamp tube, so that the structure and the assembly process are simple and the production cost is reduced.

**[0007]** Preferably, the lamp base fixture has a hole arranged from one end extending to the other end, the hole being configured to mount the lamp tube along an axial direction of the lamp tube. The lamp tube is axially mounted to the hole in the lamp base fixture and the assembly process is simple.

**[0008]** Preferably, a card slot is arranged at the other end of the lamp base fixture, and a buckle to be engaged with the card slot is arranged at one end of the lamp base connected to the lamp base fixture. The lamp base and the lamp base fixture are connected by a card slot for easy assembly.

**[0009]** Preferably, a first terminal is disposed at the end of the drive assembly near the light source assembly, and a first terminal seat into which the first terminal is inserted is disposed at an end of the light source assembly near the drive assembly. The drive assembly and the light source assembly are electrically connected through terminal plug connection. This detachable connection also makes assembly process easier and the production process simplified.

**[0010]** Preferably, a lamp tube fixture is further included, and a first rib for fixing the light source assembly is disposed on the lamp tube, the lamp tube fixture or the lamp base fixture to fix the light source assembly in the lamp tube. At the other end of the lamp tube the lamp tube fixture is used to realize the fixing of the lamp tube, the light source assembly can also be fixed by the first rib on the lamp tube, the lamp tube fixture or the cap holder fixture, therefore the design is more reasonable, and the structure is simple, compact and firm.

**[0011]** Preferably, the lamp tube has a flat bottom structure on one side, and the first ribs are disposed on both sides of the flat bottom structure to fit a surface of the light source assembly without light bead to the flat bottom structure. The fitting of the light source assembly with the flat bottom structure of the lamp tube facilitates to realize the thermal connection between the light source assembly and the lamp tube, which makes the heat dissipation effect of the light source assembly better.

**[0012]** Preferably, a plurality of second ribs are disposed at the outside of the flat bottom structure of the lamp tube. On one hand the second rib can increase the heat dissipation area and improve the heat dissipation effect, on the other hand it can be used as a strengthening rib to increase the strength of the lamp tube along the axial direction, and improve the recognition of the illuminating surface for easy installation.

**[0013]** Preferably, the light source assembly comprises a strip structure LED light source group of strip structure, and the LED light source group is arranged to extend along the axial direction of the lamp tube. The LED light source group has a strip structure and is arranged independently, it is more convenient to install it in the lamp tube.

**[0014]** Preferably, at least two LED light source groups are disposed in the segment of the lamp tube, and the surfaces of the LED light source groups without light bead are opposite to each other to form different light emitting surfaces. A plurality of LED light source groups can be disposed in one segment of the lamp tube. Such combi-

nation can achieve multiple light emitting surfaces to meet different light source requirements.

**[0015]** Preferably, the lamp base further comprises a copper pin, a mounting hole for accommodating the copper pin is disposed on one end surface of the lamp base, and a second terminal is disposed on the drive assembly, passes through the mounting hole and is electrically connected to the copper pin. The lamp is connected to the mains through the copper pin, by riveting or other manners with the second terminal the copper pin realizes electrically connection to the drive assembly, so this makes the structure simple, the assembly convenient and the working efficiency improved.

**[0016]** Preferably, the light source assembly and the lamp tube are fixedly connected by means of gluing. When the lamp tube is a U-shaped glass tube the light source assembly also may be fixed by means of gluing.

**[0017]** Preferably, the lamp tube includes a circular tube, an elliptical tube or a square tube. The various structures of the lamp tubes can satisfy different requirements of the light sources.

**[0018]** Preferably, each pair of the lamp tube fixture and the lamp tube, the lamp tube and the lamp base fixture, and the lamp base fixture and the lamp base are connected to each other by means of ultrasonic welding. The ultrasonic welding can realize a sealed connection of a snap-fitted device , so the reliability of the lamp is enhanced.

**[0019]** The lamp disclosed in the present disclosure meets the requirements of fluorescent lamps in structural appearance, mounting the drive assembly in the lamp base can not only reduce the size of the lamp, but also reduce the weight, fixing the lamp tube and the light source assembly by the lamp base fixture or the lamp tube fixture can make the assembly and the process simple and the production efficiency increase. Using a terminal to electrically connect the light source assembly with the drive assembly and to connect the drive assembly with the copper pin can make the assembly simple and the production cost decrease. In addition, the light source assembly can effectively increase the heat dissipation efficiency by a thermal connection with the lamp tube.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0020]** The appended drawings provide a further understanding of the embodiments and the drawings are incorporated in the specification as a part of the specification. The appended drawings illustrate the embodiments and are used to explain the principle of the present disclosure with the description. It is easy to recognize that there are other embodiments and many expected advantages of the embodiments which can be better understand due to reference the detail description as follows. The elements of the appended drawings are not necessarily in proportion with each other. The same reference numbers refer to corresponding similar components.

Fig. 1 is an exploded view of a lamp according to an embodiment of the present disclosure;

Fig. 2 is a schematic view of the lamp base fixture of a lamp according to an embodiment of the present disclosure;

Fig. 3 is an external view I of the lamp according to an embodiment of the present disclosure;

Fig. 4 is an external view II of the lamp according to an embodiment of the present disclosure;

Fig. 5 is a cross-sectional view showing two LED light source groups of the lamp according to an embodiment of the present disclosure disposed in a segment;

Fig. 6 is a cross-sectional view showing three LED light source groups of the lamp according to an embodiment of the present disclosure disposed in a segment.

## DETALED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0021]** In order to make the objects, technical solutions and advantages of the present disclosure more clear, this disclosure will be further described in detail with combining the appended drawings, obviously, the described embodiments are only part of embodiments of the present disclosure rather than all embodiments. Based on the embodiments in this disclosure, all other embodiments obtained by those of ordinary skill in the art without creative efforts are intended to fall within the spirit and scope of this disclosure.

**[0022]** In the following detailed description, with referring to the appended drawings, the drawings form part of the detailed description and can be illustrated by practicing illustrative specific embodiments of this disclosure. In this regard, the direction terms can be used by referring to the orientation of the depicted drawing, such as "Top", "Bottom", "Left", "Right", "Up", "Down", etc. Because the components of the embodiments can be positioned in several different orientations, directional terms are used for illustrative purposes and the terms are not limiting. It is appreciated that other embodiments may be utilized or logical changes may be made without departing from the scope of this disclosure. Therefore the following detailed description should not be adopted in a limiting sense and the scope of this disclosure is defined by the appended claims.

**[0023]** Fig. 1 is an exploded view of a lamp according to an embodiment of this disclosure, comprising a lamp tube 1, a light source assembly 2 and a lamp base 4, the lamp tube 1 has tubular structure and has at least two segments 11 arranged in parallel with each other, the light source assembly 2 is arranged extending at least within the segments 11, therefore it is similar in appearance to fluorescent lamps and can meet the requirements of fluorescent lamps. The light source assembly 2 and

the drive assembly 3 are electrically connected to each other, the electrically connected manners are various including wire connection, terminal connection and so on. The drive assembly 3 is mounted fixed inside the lamp base 4. The wiring of the drive assembly 3 makes full use of the space inside the lamp base 4 to decrease the cap size and to reduce the weight of the whole lamp and to make the lamp lighter.

**[0024]** In a specific embodiment 1, in order to make assembly more simple, a lamp base fixture 5 is further included in the lamp, one end of the lamp base fixture 5 is fixedly connected with the lamp tube 1, and the other end of the lamp base fixture 5 is fixedly connected with the lamp base 4. In a preferred embodiment, as shown in Fig. 2, a hole 51 used to mount the lamp tube 1 along the axial direction of the lamp tube 1 is arranged from one end extending to the other end in the lamp base fixture 5. Therefore, the lamp tube 1 is axially mounted to the hole 51 in the lamp base fixture 5 and the assembly process is simple. In other alternative embodiments, the other manners such as boss, card slot and so on may be adopted to fix the lamp tube 1. In the preferred embodiments, a card slot 52 is arranged at the other end of the lamp base fixture 5, a buckle engaged with the card slot is arranged at one end of the lamp base 4 which is connected to with the lamp base fixture 5. The lamp base 4 and the lamp base fixture 5 are connected with the snap by a card slot 52 for easy assembly. In other alternative embodiments, the other manners such as gluing, screw thread and so on may be adopted to make the lamp base fixture 5 connect fixedly with the lamp base 4. The lamp base fixture 5 is adopted to fix the lamp tube 1 and make the lamp base 4 connect with the lamp tube 1, so it leads that the structure and the assembly process are simple and the production cost is reduced. It can be adopted other manners to make the lamp base 4 connect directly with the lamp tube 1.

**[0025]** In a specific embodiment 2, a first terminal 31 is disposed at the end of the drive assembly 3 near the light source assembly 2, a first terminal seat 21 for receiving the first terminal 31 is disposed at the end of the light source assembly 2 near the drive assembly 3. The drive assembly 3 and the light source assembly 2 are electrically connected through terminals, this detachable connection also makes assembly process easier and the production process simplified. After the drive assembly 3 is mounted into the lamp base 4 and the lamp base fixture 5 is connected to the lamp base 4, by docking the light source assembly 2 to the drive assembly 3 it can realize very simple and high reliable assembly, make the whole assembly structure and assembly process simple, improve the yield and productivity effectively, decrease the production cost.

**[0026]** In a specific embodiment 3, the lamp comprises a lamp tube fixture 6 further, one end of the lamp tube 1 connects to the lamp base through the lamp base fixture 5 and the other end of the lamp tube 1 is fixed through the lamp tube fixture 6, so the structure is more stable. In a preferred embodiment, two first ribs for fixing the light source assemblies are disposed on the lamp tube 1, the lamp tube fixture 6 or the lamp base fixture 5 to fix the light source assembly 2 in the lamp tube 1. This method is adopted to fix the light source assembly 2 which makes more reasonable, simple, firm and stable in structure. In addition to other alternative embodiments, other manners such as gluing can be adopted to fix the light source assembly 2 to avoid changes in the luminous surface. When the lamp tube 1 is a U-shaped glass tube, the lamp may not comprise the lamp tube fixture 6 and then gluing manner is selected to fix the light source assembly 2. The material of the lamp tube 1 can be glass or plastic and the shape of the lamp tube 1 can be U-shaped, H-shaped or $\pi$-shaped, according to the different material and shape of the lamp tube 1, different manners can be selected to fix the light source assembly 2.

**[0027]** In a specific embodiment 4, as shown in Fig.3 and Fig.4, the lamp tube 1 has a flat bottom structure 12 on one side, the first ribs 7 are disposed on both sides of the flat bottom structure 12 to fit the no light beads side of the light source assembly 2 to the flat bottom structure 12. The fitting of the light source assembly 2 with the flat bottom structure 12 of the lamp tube 1 is facilitated to realize the thermal connection between the light source assembly 2 and the lamp tube 1, it makes the heat dissipation effect of the light source assembly better by dissipating through the structure of the lamp tube 1. In a preferred embodiment, a plurality of second ribs 8 are disposed at the outside of the flat bottom structure 12 of the lamp tube 1. On one hand the second ribs 8 can increase the heat dissipation area and improve the heat dissipation effect, on the other hand the ribs 8 can be used as a strengthening rib to increase the strength of the lamp tube 1 along the axial direction then make the lamp tube 1 not bend with the length change and improve the recognition of the illuminating surface for easy installation. In the design of the light source assembly 2, a substrate with high heat dissipation efficiency such as an aluminum substrate may be selected to improve the heat dissipation effect, or some manners such as adding heat sinks may be adopted to improve the heat dissipation efficiency. In addition, because the LED light source group 22 includes the packaged lamp beads, it is not necessary to fill the lamp tube 1 with an inert gas for heat dissipation.

**[0028]** In a specific embodiment 5, the light source assembly 2 comprises a strip structure LED light source group 22, the LED light source group 22 is arranged to extend along the axial direction of the lamp tube 1. The LED light source group 22 has a strip structure and is arranged independently, it is more convenient to install it in the lamp tube 1 and if one of the LED light source groups 22 has problems the other LED light source groups 22 will not be affected. One end of the LED light source group 22 can be set as the same entirety and the first terminal seat 21 connected to the drive assembly 3 is mounted on the entirety substrate, so it makes the

structure optimized and the assembly simple. One LED light source group 22 may be disposed in each segment 11 of the lamp tube 1 and the LED light source group 22 is deposed to fit with the flat bottom structure 12 of the lamp tube 1. In a preferred embodiment, in order to meet the needs of a larger light-emitting area, at least two LED light source groups 22 are disposed in the segment 11 of the lamp tube 1, and the no light beads sides of the LED light source groups 22 are disposed opposite to each other to form different light emitting surface and meet different light source requirements. For example, two or more LED light source groups 22 are disposed in one segment 11, the two LED light source groups 22 can be connected in parallel to form a certain angle and the no light beads sides are disposed opposite to each other, this can greatly enhance the light-emitting area of the lamp and even can obtain 360 degrees of the light-emitting angle. Fig. 5 is a cross-sectional view of two LED light sources 22 disposed in the segment 11 and Fig. 6 is a cross-sectional view of three LED light sources 22 disposed in the segment 11.

**[0029]** In a specific embodiment 6, the lamp base 4 further comprises a copper pin 41, a mounting hole 42 for accommodating a copper pin 41 is disposed on one end surface of the lamp base 4, and the second terminal 32 disposed on the drive assembly 3 is through the mounting hole 42 and electrically connected to the copper pin 41. The lamp is connected to the mains through the copper pin 41, by riveting or other manners with the second terminal 32 the copper pin 41 realizes electrically connection to the drive assembly 3, so this makes the structure simple, the assembly convenient and the working efficiency improved. Therefore, at first the copper pin 41 is placed into the mounting hole 42 of the lamp base 4, then the second terminal 32 of the drive assembly 3 is loaded into the mounting hole 42 and the riveting can be finished, so the lamp base 4 is assembled. In a preferred embodiment, a driving fixing slot may be disposed inside the lamp base 4 to fix the drive assembly 3. In addition, the driving fixing slot also can make the second terminal 32 accurately be inserted into the mounting hole 42, then this makes the assembly convenient and the productivity increased. In the preferred embodiment, the number of copper pins 41 is even and in the present embodiment the number of copper pins 41 is selected to be two.

**[0030]** In addition, the light source assembly 2 and the lamp tube 1 may be fixedly connected by means of gluing. When the lamp tube 1 is a U-shaped glass tube it also may be fixed the light source assembly 2 by means of gluing.

**[0031]** Moreover, the lamp tube 1 may include a circular tube, an elliptical tube or a square tube. So the structures of the lamp tube 1 are various and can satisfy different requirements of the light sources in different occasions.

**[0032]** In a specific embodiment 7, the fixedly connections between the lamp tube fixture 6 and the lamp tube 1, the lamp tube 1 and the lamp base fixture 5, the lamp base fixture 5 and the lamp base 4 all can be realized by means of Ultrasonic welding. The connections between the lamp tube fixture 6 and the lamp tube 1, the lamp tube 1 and the lamp base fixture 5, the lamp base fixture 5 and the lamp base 4 are only snap-fit connections before, so they need to adopt means such as Ultrasonic welding to realize sealed connection, then the reliability and stability of the lamp are enhanced. In other alternative embodiments, the sealed connections between the lamp tube fixture 6 and the lamp tube 1, the lamp tube 1 and the lamp base fixture 5, the lamp base fixture 5 and the lamp base 4 also can adopt the means of gluing.

**[0033]** A lamp is disclosed in the present disclosure, comprising the lamp tube 1, the light source assembly 2, the drive assembly 3 and the lamp base 4, the lamp tube 1 has tubular structure and has at least two segments 11 arranged in parallel with each other, the light source assembly 2 is arranged extending at least within the segment 11, the light source assembly 2 and the drive assembly 3 are electrically connected to each other, the drive assembly 3 is mounted fixed inside the lamp base 4. The lamp can meet the requirements of fluorescent lamp in terms of structural appearance and can replace fluorescent lamp as new lamp. And then the drive assembly 3 is mounted in the lamp base 4 that can decrease the cap size and reduce the weight. In addition, the lamp base fixture 5 or the lamp tube fixture 6 is used to fix the lamp tube 1 and the light source assembly, the connection manners such as card-slot and gluing make the assembly and the process simple and the productivity enhanced. The light source assembly 2 can effectively increase the heat dissipation efficiency by a thermal connection with the lamp tube 1. The light source assembly and the drive assembly, the drive assembly 3 and the copper pin 41 are electrically connected through a terminal riveting manner, it can make the assembly simple and the production cost decrease. It can be seen that the lamp proposed by the present disclosure is advantageous for mass production and promotion.

**[0034]** The specific embodiment of the present application is described above, but the protection scope of the application is not limited to this, any changes or alterations within the scope of the present disclosure proposed by anyone skilled in the art should be covered by the protection scope of this application. Therefore, the protection scope of the present application should be determined by the scope of the claims.

**[0035]** In the description of the present application, although the steps are listed in a certain order in the claims the steps are not necessarily performed with the steps listed, rather it can be performed in the opposite or parallel manner without departing from the spirit and scope of Rather, it can be performed in the opposite or parallel manner without departing from the spirit and scope of the invention. The term "comprise" does not exclude the presence of the components or steps that are not listed in the claims. The terms in front of the component "a" or

"one" does not exclude the existing of multiple such components. In different mutual dependent claims simple facts which document certain measures does not indicate that the combination of these measures cannot be used to improve. Any reference signs in the claims should not be construed as limiting scope.

**Claims**

**1.** A lamp, comprising:

a lamp tube (1);
a light source assembly (2);
a drive assembly (3); and
a lamp base (4);
wherein the lamp tube (1) has a tubular structure and has at least two segments (11) arranged in parallel with each other, the light source assembly (2) extends at least within the segment (11), the light source assembly (2) and the drive assembly (3) are configured to be electrically connected to each other, and the drive assembly (3) is fixedly mounted inside the lamp base (4).

**2.** The lamp of claim 1, further comprising a lamp base fixture (5), one end of the lamp base fixture (5) is fixedly connected with the lamp tube (1), and the other end of the lamp base fixture (5) is fixedly connected with the lamp base (4).

**3.** The lamp of claim 2, wherein the lamp base fixture (5) has a hole (51) arranged from one end extending to the other end, the hole (51) being configured to mount the lamp tube (1) along an axial direction of the lamp tube (1).

**4.** The lamp of claim 2 or 3, wherein a card slot (52) is arranged at the other end of the lamp base fixture (5), and a buckle to be engaged with the card slot (52) is arranged at one end of the lamp base (4) connected to the lamp base fixture (5).

**5.** The lamp of any one of preceding claims, wherein a first terminal (31) is disposed at an end of the drive assembly (3) near the light source assembly (2), and a first terminal seat (21) into which the first terminal (31) is inserted is disposed at an end of the light source assembly (2) near the drive assembly (3).

**6.** The lamp of claim 2, further comprising a lamp tube fixture (6), and a first rib (7) for fixing the light source assembly (2) is disposed on the lamp tube (1), the lamp tube fixture (6) or the lamp base fixture (5) to fix the light source assembly (2) in the lamp tube (1).

**7.** The lamp of claim 6, wherein the lamp tube (1) has a flat bottom structure (12) on one side, and the first ribs (7) are disposed on both sides of the flat bottom structure (12) to fit a surface of the light source assembly (2) without light bead to the flat bottom structure (12).

**8.** The lamp of claim 7, wherein a plurality of second ribs (8) are disposed at the outside of the flat bottom structure (12) of the lamp tube (1).

**9.** The lamp of any one of preceding claims, wherein the light source assembly (2) comprises a LED light source group (22) of strip structure, and the LED light source group (22) is arranged to extend along an axial direction of the lamp tube (1).

**10.** The lamp of claim 9, wherein at least two LED light source groups (22) are disposed in the segment (11) of the lamp tube (1), and the surfaces of the LED light source groups (22) without light bead are opposite to each other to form different light emitting surfaces.

**11.** The lamp of any one of preceding claims, wherein the lamp base (4) further comprises a copper pin (41), a mounting hole (42) for accommodating the copper pin (41) is disposed in one end surface of the lamp base (4), and a second terminal (32) is disposed on the drive assembly (3), passes through the mounting hole (42) and is electrically connected to the copper pin (41).

**12.** The lamp of any one of preceding claims, wherein the light source assembly (2) and the lamp tube (1) are fixedly connected by means of gluing.

**13.** The lamp of any one of preceding claims, wherein the lamp tube (1) includes a circular tube, an elliptical tube or a square tube.

**14.** The lamp of claim 6, wherein each pair of the lamp tube fixture (6) and the lamp tube (1), the lamp tube (1) and the lamp base fixture (5), and the lamp base fixture (5) and the lamp are connected to each other by means of ultrasonic welding.

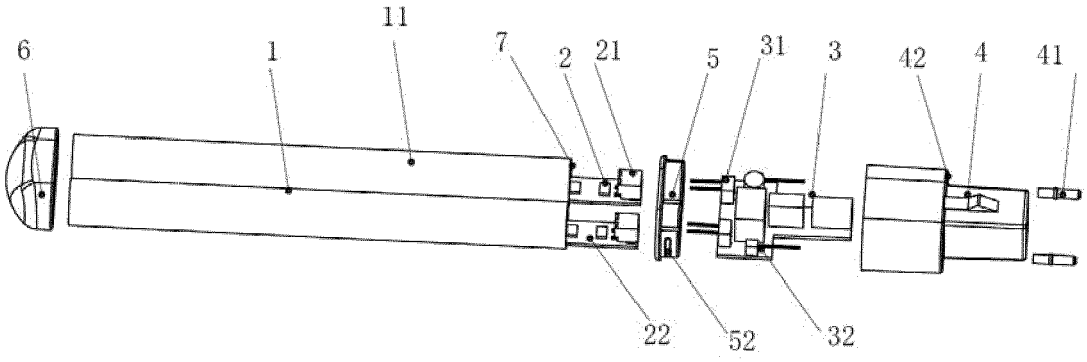


FIG. 1

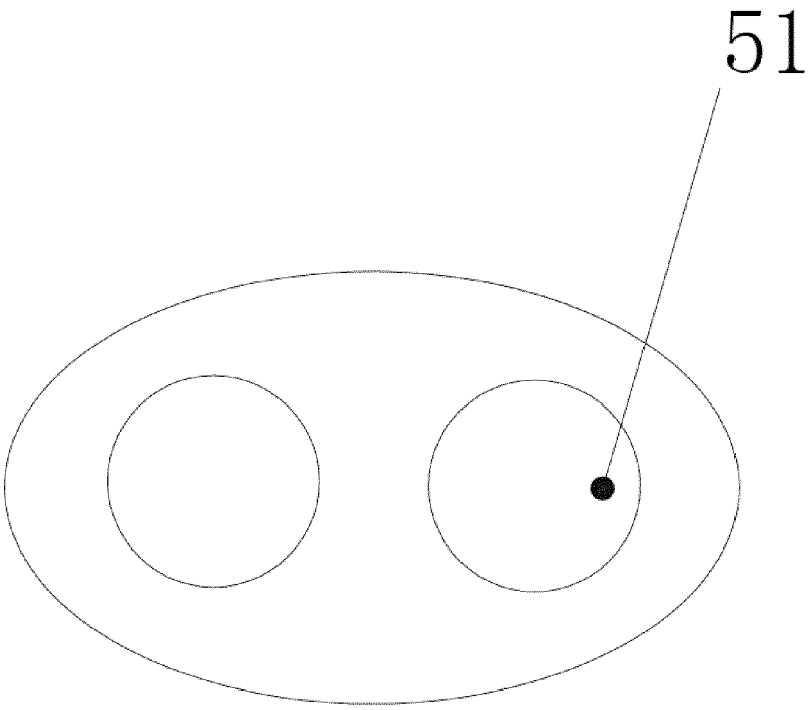


FIG.. 2

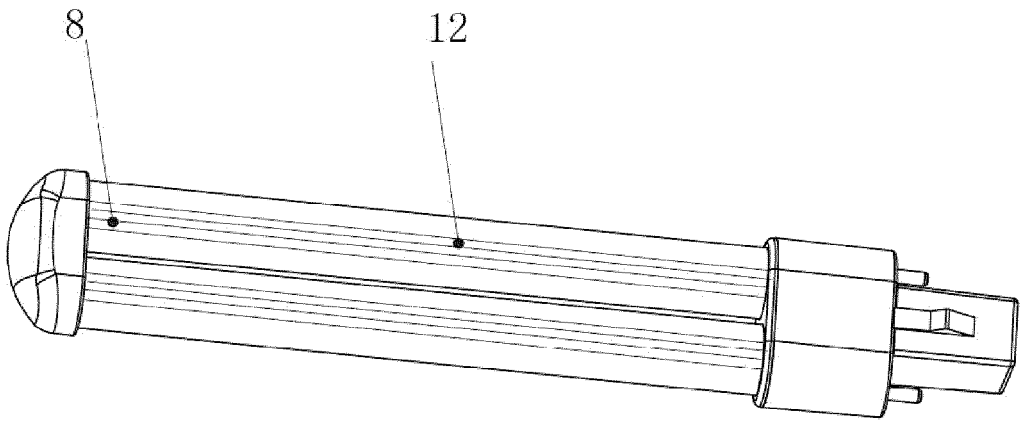


FIG.. 3

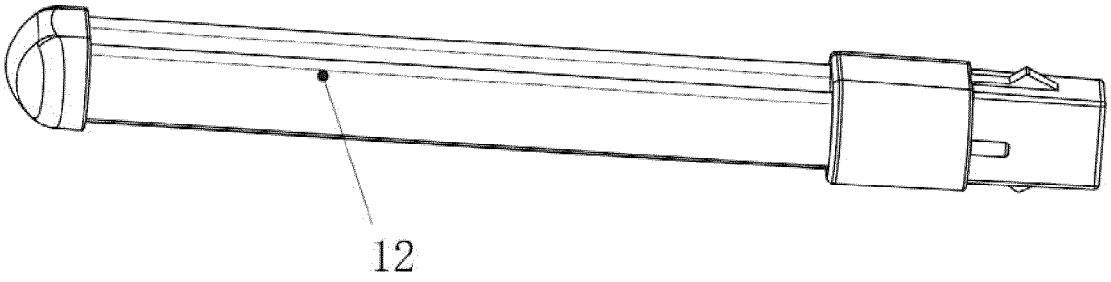


FIG. 4

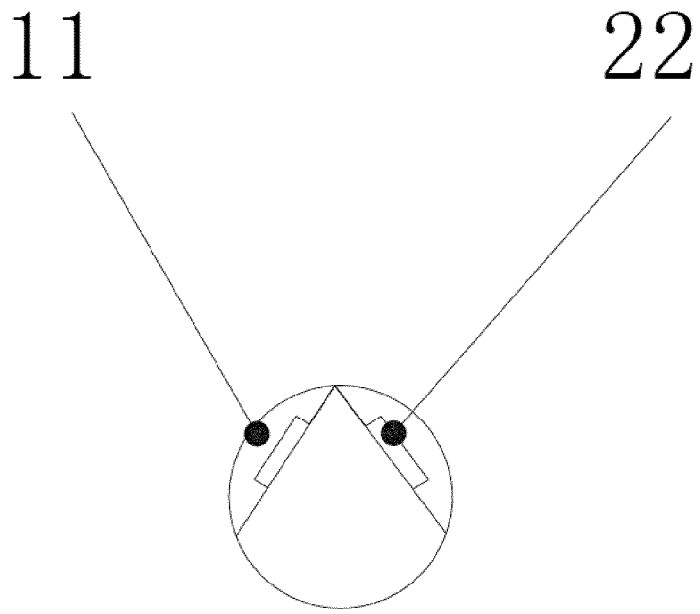


FIG. 5

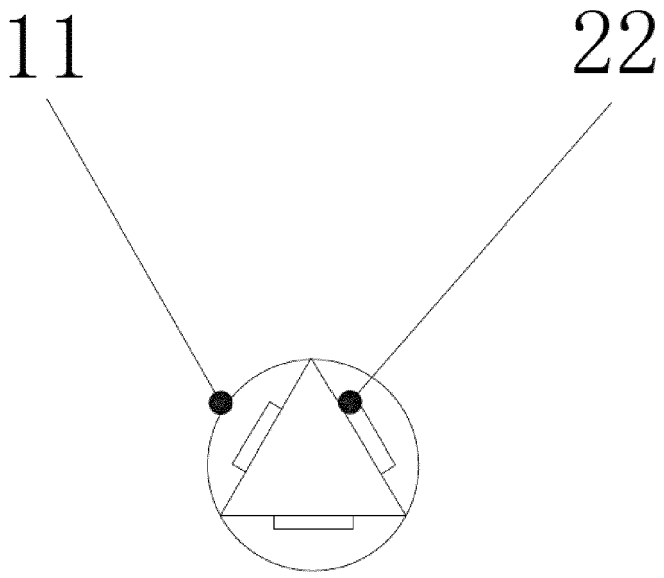


FIG. 6

Europäisches Patentamt
European Patent Office
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# EUROPEAN SEARCH REPORT

Application Number
EP 19 18 8352

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 10 December 2019 | Allen, Katie |

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# EUROPEAN SEARCH REPORT

Application Number
EP 19 18 8352

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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