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[12] Patent Specifications for a Utility Model

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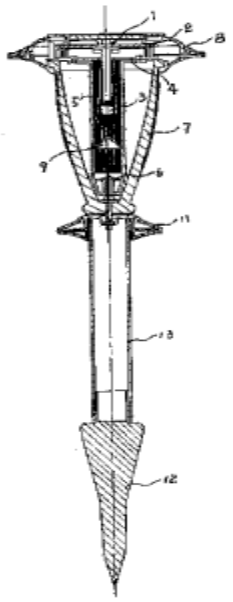
[54] Title of the utility model: Solar Lamp

[57] Abstract

The utility model discloses a solar lamp comprising a solar energy conversion unit, a reflector unit, and a fixture unit. The solar energy conversion unit is mounted on the lamp cover and the reflector panel is fixed in the lamp cover. The light emitting diode (LED) on the PCB in the solar energy conversion unit passes through the center hole in the reflector panel to reach the reflector cylinder. A reflector cone is equipped at the bottom of the reflector cylinder. Annular saw-tooth stripes are set on the exterior wall of the reflector cylinder, while vertical arc stripes are set on the interior wall. A transparent reflector cone can additionally be equipped in the reflector cylinder. The utility model enables light beams to extend to cover the entire length of the reflector cylinder. The patterns formed by crossed stripes on the interior and exterior walls of the reflector cylinder make light more garish.



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1. A solar lamp comprising a solar energy conversion unit, a reflector unit, and a fixture unit, wherein the solar energy conversion unit is mounted on the lamp cover, the reflector panel is fixed in the lamp cover, the LED on the PCB in the solar energy conversion unit passes through the center hole in the reflector panel to reach the reflector cylinder, a reflector cone is equipped at the bottom of the reflector cylinder, annular saw-tooth stripes are available on the exterior wall of the reflector cylinder, and vertical arc stripes are available on the interior wall.

2. The solar lamp of claim 1, wherein a transparent reflector cone is additionally equipped in the reflector cylinder and is suspended in the middle of the reflector cylinder.

3. The solar lamp of claim 1 or 2, wherein a ground socket is equipped below the lamp holder, the ground socket and the lamp holder are connected with a connecting tube, the ground socket sleeve is put on the lower end of the connecting tube, and the upper end of the connecting tube is connected to the bottom of the lamp holder with a key structure.

Solar Lamp

The utility model relates to a solar lamp.

A prior solar lamp usually consists of a solar energy conversion unit, a reflector unit, and a fixture unit. The solar energy conversion unit mainly comprises a solar chip, a control printed circuit board (PCB), cadmium sulfide (CDS) photosensitive switches, rechargeable batteries, and an LED. The reflector unit mainly comprises a reflector panel, a reflector cylinder, a reflector cone, and a lamp chimney. The fixture unit comprises a lamp cover to which the solar energy conversion unit and the reflector unit are fixed, a lamp holder, and other connecting pieces. The reflector cylinder of the reflector unit is usually a transparent cylinder whose interior and exterior walls are smooth. The defect of such a reflector cylinder is that light beams formed are short and discontinuous, with a low luminance.

The utility model is intended to provide a solar lamp which can produce long and continuous light beams with a high luminance.

The invention of the utility model is achieved by the following technical measures: The solar lamp comprises a solar energy conversion unit, a reflector unit, and a fixture unit, wherein the solar energy conversion unit is mounted on the lamp cover, the reflector panel is fixed in the lamp cover, the LED on the PCB in the solar energy conversion unit passes through the center hole in the reflector panel to reach the reflector cylinder, a reflector cone is equipped at the bottom of the reflector cylinder, annular saw-tooth stripes are set on the exterior wall of the reflector cylinder, and vertical arc stripes are set on the interior wall.

A transparent reflector cone can additionally be equipped in the reflector cylinder to improve the luminance. The transparent reflector cone is suspended in the middle of the reflector cylinder.

Arc stripes, which refract light, can be set up on the exterior wall of the lamp chimney of the reflector unit.

For the utility model, a ground socket can be equipped below the lamp holder. In this case, the ground socket and the lamp holder are connected with a connecting tube, the ground socket sleeve is put on the lower end of the connecting tube, and the upper end of the connecting tube is connected to the bottom of the lamp holder with a key structure. At the time of installation, the solar lamp can be fixed by aligning the convex keys on the top of the connecting tube to the keyways at the bottom of the lamp holder, inserting the keys, and rotating them clockwise, without any tool.

In addition, flash circuits can be designed for the utility model so that the lamp can automatically provide flashes in three different colors or lock a light color.

Compared with the prior art, the utility model has the following advantages: (1) Since annular saw-tooth stripes are set on the exterior wall of the reflector cylinder and vertical arc stripes are set on the interior wall, light beams can extend to cover the entire length of the reflector cylinder and the patterns formed by crossed stripes on the interior and exterior walls of the reflector cylinder make light more garish. (2) The PCB of the utility model is set on the reflector panel, which centralizes electronic circuits to facilitate installation and maintenance. (3) The lamp cover in which the solar energy conversion unit is mounted can completely be detached from other parts so that the user can conveniently replace batteries or repair circuits. (4) The solar lamp can automatically provide flashes in three different colors or lock one light color.

The following further describes the utility model in combination with the drawings and an embodiment.

Figure 1 is an exploded view of the 3-D structure of one embodiment of the utility model.

Figure 2 is a vertical cutaway view of the assembled embodiment in Figure 1.

Figure 3 shows the structure of the reflector cylinder in Figure 1.

Figure 4 is a top view of the reflector cylinder in Figure 3.

Figure 5 is an enlarged partial view of the reflector cylinder in Figure 4.

Figure 6 is an enlarged view of the transparent reflector cone in Figure 2.

Figure 7 shows the circuit of the embodiment in Figure 1.

From Figure 1 and Figure 2, it can be seen that the embodiment comprises a solar energy conversion unit, a reflector unit, and a fixture unit. The solar energy conversion unit comprises a solar chip (1), a control PCB (2), and an LED (3). The reflector unit mainly comprises a reflector panel (4), a reflector cylinder (5), an electroplated reflector cone (6), and a lamp chimney (7). The solar energy conversion unit is mounted on the lamp cover (8). A square hole is opened at the top of the lamp cover (8) to contain the solar chip (1). The solar chip, bonded with silica gel and packaged with resin, is characterized with sun blocking, water proofing, and anti-corrosion. The reflector panel (4) is fixed on to the two studs in the lamp cover (8). The LED (3) on the control PCB (2) passes through the center hole in the reflector panel (4) to reach the reflector cylinder (5). The reflector cone (6) is located at the bottom of the reflector cylinder (5). Annular saw-tooth stripes are set on the exterior wall of the reflector cylinder (5) and vertical arc stripes are set on the interior wall. See Figure 3 through Figure 5. A transparent reflector cone (9) is equipped in the reflector cylinder (5). The transparent reflector cone is suspended in the middle of the reflector cylinder (5), as shown in Figure 2. There are saw-tooth stripes on the surface of the transparent reflector cone, as shown in Figure 6. Arc stripes are set up on the exterior wall of the lamp chimney (7) of the reflector unit of the utility model and they can refract light. In addition, a ground socket (12) is equipped below the lamp holder (11). The ground socket (12) and the lamp holder (11) are connected with a connecting tube (13). The lower end of the ground socket (12) looks like a spike so that it can easily be inserted into soft soil in a garden. The upper end of the ground socket (12) is put into the lower end of the connecting tube (13). The upper end of the connecting tube (13) is snapped into the bottom of the lamp holder (11) via a key structure. That is to say, two rectangular convex keys are equipped on the top of the connecting tube (13), and keyways which match the convex keys are equipped at the bottom of the lamp holder (11) accordingly. At the time of installation, the solar lamp can be fixed by aligning the rectangular convex keys to the keyways at the bottom of the lamp holder, inserting the keys, and rotating them clockwise.

A circuit shown in Figure 7 is designed for the embodiment so that the solar lamp can not only automatically provide flashes in three different colors, but also lock one light color. The principle of operation is as follows: In the day, the solar chip automatically converts optical energy into electric energy, and stores it into two nickel-cadmium batteries via diode IN5817. As night comes, the resistance of the photo resistor gradually increases due to a low luminance. When the resistance increases to a certain value, triode Q4 is turned on and the potential of the pin of the integrated block (15) decreases. Then, triodes Q6, Q7, and Q8 are turned on in turn so that the LED emits, in turn, red, yellow, and green light with a super luminance. Switch SW1 is a power switch and switch SW2 is used to select a light color. If switch SW2 is quickly moved to position 2 when the LED emits red light, oscillation signals are cut off and fail to enter the integrated block. In this way, red light is locked. And so on, yellow or green light can be locked.

Triodes Q3 and Q5, and capacitors C4 and C5 form an oscillator circuit. Oscillation signals are first input into pin 1 of switch SW2 and then into pin 14 of the IC. In the circuit, the IC type is CD4017. The operating voltage of the green LED is about 3.5 V, while the voltage of the power supply is about 2.5 V. Therefore, in the circuit, triodes Q2 and Q8 form a booster circuit to supply power to the green LED.

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