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(54) **A LED LIGHT SIMULATING THE STRUCTURE OF INCANDESCENT LIGHT**

(57) This invention discloses a LED light simulating the structure of incandescent light comprising a lamp holder (2), a light-emitting component connecting with the lamp holder (2) and a glass bulb (3) surrounding the outside of light-emitting component and connecting with the lamp holder (2). The light emitting component comprises an LED chip (15) attached to the front side of a metal wire substrate (11). The anode and cathode of LED chip (11) are directly or indirectly connected with the anode and cathode of the metal wire substrate through gold bonding wire (14). One electrode (12) is connected with outer leads of the metal wire substrate (11) and fixed with the outer lead of the metal substrate through an insulation joint (13). A second electrode is connected with the lamp holder (2) through a wire (6). The front and back sides of the metal wire substraten (11) are coated with a fluorescent colloid (16), covering the LED chip (15). The LED chip is a blue light wafer, and the fluorescent colloid is RGB three-color fluorescent powder to make the LED filament emit white light.

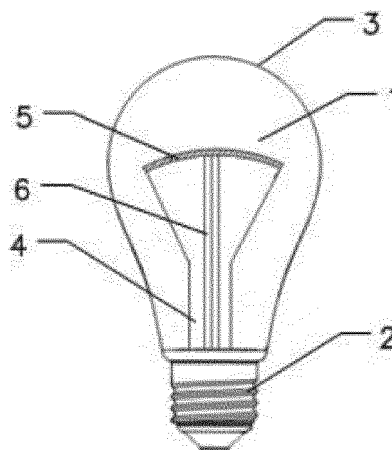


Fig. 1

Description

Technical field

[0001] This invention relates to the field of LED light, and more particularly to a LED light simulating the structure of incandescent light.

Background art

[0002] As for traditional incandescent light, tungsten filament is electrified and heated in an incandescent state. Visible lighting source emits by thermal radiation. Heat-resistant glass is used to produce bulb in which tungsten filament is mounted. The air in bulb is pumped, and then inert gases are filled in it.

[0003] Incandescent light has good color rendering and even spectra, and it is closer to the sunlight without pollution. These advantages cannot be achieved by other alternative light sources. However, incandescent light consumes large power and has short service life, and its performance is far lower than the new-generation light source. For energy saving and environmental protection, incandescent light will be gradually eliminated. People are unwilling to accept the fact that the incandescent light which has been used for over 100 years. Therefore, more energy-saving and environmental light source similar to the structure of incandescent light is developed urgently in market.

Contents of the invention

[0004] To overcome the above shortcomings in prior art, the purpose of this invention is to provide a LED light simulating the structure of incandescent light comprising a lamp holder, a light-emitting component connecting with the lamp holder and a glass bulb surrounding the outside of light-emitting component and connecting with the lamp holder.

[0005] The said light-emitting component comprises a LED filament and a stem.

[0006] One end of the stem is connected with the said lamp holder, the other end of the stem is connected with the LED filament, and the said stem is set with the wire.

[0007] The said LED filament comprises a metal wire substrate, an electrode, an insulation joint, a LED chip, a gold bonding wire and a fluorescent colloid.

[0008] LED chip is attached and fixed onto the front of the metal wire substrate. The anode and cathode of LED chip is directly or indirectly connected with the anode and cathode of metal wire substrate through the gold bonding wire. The said anode and cathode are respectively connected with outer leads of the anode and cathode of substrates set on the metal wire substrate.

[0009] One end of the said electrode is connected with outer leads of the metal wire substrate through the gold bonding wire and fixed with the outer lead of the metal substrate through the insulation joint. The other end of

the said electrode is connected with the lamp holder through the wire.

[0010] The fluorescent colloid is coated on the front and back of the metal wire substrate through the transparent AB glue, and covers the LED chip.

[0011] The said LED chip is blue light wafer, and the said fluorescent colloid is RGB three-color fluorescent powder to make LED filament a white light LED source.

[0012] Preferably, the said light-emitting component comprises the first LED filament, the second LED filament, the third LED filament, the fourth LED filament, the fifth LED filament and current-limiting resistance.

[0013] The anode terminal of the first LED filament is connected with the anode terminal of the fourth LED filament and the cathode of the third LED filament. The cathode terminal of the second LED filament is connected with the cathode terminal of the fifth LED filament and the anode of the third LED.

[0014] One end of the current-limiting resistance is connected with AC power terminal, and the other end of the current-limiting resistance is connected with the cathode of the fourth LED filament and the anode of the fifth LED filament.

[0015] The cathode of the first LED filament and the anode of the second LED filament are connected with AC power terminal.

[0016] Preferably, the said metal wire substrate is of iron, copper or iron-copper alloy.

[0017] The surface of the said metal wire substrate has a coating which is of silver or gold.

[0018] Preferably, the said electrode is of iron, copper or iron-copper alloy.

[0019] Preferably, the dimension of the said metal wire substrate is as follows: length: 10mm~100mm; width: 0.5mm~2mm; thickness: 0.2mm~1mm.

[0020] Preferably, the said current-limiting resistance is adjustable resistance. The said adjustable resistance is used to regulate the current of the first LED filament, the second LED filament, the third LED filament, the fourth LED filament, the fifth LED filament. The current control range goes between 5~20mA.

[0021] Preferably, the said wire comprises inner wire, Dumet wire and outer wire. The said inner wire is used to conduct electricity and fix LED filament, and the said inside wire is made with copper wire or nickel-plated iron wire.

[0022] The said Dumet wire is wrapped outside the inner wire, the said outer wire is wrapped outside the said Dumet wire, the said outer wire is of copper wire, and the outer wire is used to collect LED filament and lamp holder.

[0023] Preferably, the said stem is a trumpet-shaped glass part, and the stem is connected with the glass bulb. The stem is used to fix LED filament, the said stem is set with an exhaust pipe. The exhaust pipe is used to pump out the air in the glass bulb, and the inert gases are filled in the bulb.

[0024] Preferably, the inert gases include helium, hydrogen or the mixed gas consisting of helium and hydro-

gen.

[0025] Preferably, the said glass bulb includes A-type bulb, G-type bulb, P-type bulb, B-type bulb, C-type bulb or T-type bulb.

[0026] It can be seen from the above technical solutions that this invention has the following advantages.

[0027] The LED light provided in this invention light has good color rendering and even spectra, and it is closer to the sunlight without pollution. LED light features little power consumption, energy saving and environmental protection.

Brief description of the drawings

[0028] To explain the technical solutions more clearly in this invention, the following is a brief introduction to the attached drawings required for the description. Apparently, the following drawings are only some embodiments in this invention. The ordinary technicians in this field can obtain other drawings based on these drawings without creative work.

Fig. 1 is a diagram for overall structure of LED light;

Fig. 2 is a diagram for structure of LED light;

Fig. 3 is a diagram for electrical connection of LED filament.

Detailed description of preferred embodiments

[0029] To make purpose, characteristics and advantages of this invention more apparent and understandable, the following embodiments and drawings will be used to clearly and completely describe the technical solutions of this invention. Apparently, the following drawings are only some embodiments in this invention but not all the embodiments. Based on the embodiments in this patent, the ordinary technicians in this field can obtain other drawings without creative work. This is within the protection scope of this patent.

[0030] A LED light simulating the structure of incandescent light is provided in the embodiment, as shown in Fig.1 and Fig.2, comprising a lamp holder 2, a light-emitting component connecting with the lamp holder 2 and a glass bulb 3 surrounding the outside of light-emitting component and connecting with the lamp holder 2.

[0031] The light-emitting component comprises a LED filament 5 and a stem 4. One end of the stem 4 is connected with the lamp holder 2, the other end of the stem 4 is connected with the LED filament 5, and the stem 4 is set with the wire 6.

[0032] The LED filament 5 comprises a metal wire substrate 11, an electrode 12, an insulation joint 13, a LED chip 14, a gold bonding wire 15 and a fluorescent colloid 16.

[0033] LED chip 14 is attached and fixed onto the front of the metal wire substrate 11. The anode and cathode

of LED chip 14 is directly or indirectly connected with the anode and cathode of metal wire substrate 11 through the gold bonding wire 15. The anode and cathode are respectively connected with outer leads of the anode and cathode of substrates 11 set on the metal wire substrate.

[0034] One end of the electrode 12 is connected with outer leads of the metal wire substrate 11 through the gold bonding wire 15 and fixed with the outer lead of the metal substrate 11 through the insulation joint 13. The other end of the electrode 12 is connected with the lamp holder 2 through the wire. The fluorescent colloid 16 is coated on the front and back of the metal wire substrate 11 through the transparent AB glue, and covers the LED chip 14. The LED chip 14 is blue light wafer, and the fluorescent colloid 16 is RGB three-color fluorescent powder to make LED filament 5 a white light LED source.

[0035] The glass bulb 3 is spherical and made with heat-resistant glass. The glass bulb 3 isolates the LED filament 5 and the air. It is transparent and plays a protection role.

[0036] The wire 6 comprises inner wire, Dumet wire and outer wire. The inner wire is used to conduct electricity and fix LED filament 5, and the inside wire is made with copper wire or nickel-plated iron wire. The outer wire is wrapped outside the Dumet wire, the outer wire is of copper wire, and the outer wire is used to collect LED filament 5 and lamp holder 2.

[0037] The stem 4 is a trumpet-shaped glass part, and the stem 4 is connected with the glass bulb 3. The stem 4 is used to fix LED filament 5, the stem 4 is set with an exhaust pipe. The exhaust pipe is used to pump out the air in the glass bulb 3, and the inert gases are filled in the bulb. The lower end of the glass bulb 4 is welded and sealed, and LED light is sealed. The lamp holder 2 is a metal part connecting the lamp holder and the power supply. The lamp holder 2 is bonded with the glass bulb 3. The inert gases include helium, hydrogen or the mixed gas consisting of helium and hydrogen. The glass bulb 3 includes A-type bulb, G-type bulb, P-type bulb, B-type bulb, C-type bulb or T-type bulb.

[0038] Thus, LED light has good color rendering and even spectra, and it is closer to the sunlight without pollution. LED light features little power consumption, energy saving and environmental protection.

[0039] In this embodiment, as shown in Fig.3, the light-emitting component comprises the first LED filament 21, the second LED filament 22, the third LED filament 23, the fourth LED filament 24, the fifth LED filament 25 and current-limiting resistance 26.

[0040] The anode terminal of the first LED filament 21 is connected with the anode terminal of the fourth LED filament 24 and the cathode of the third LED filament 23. The cathode terminal of the second LED filament 22 is connected with the cathode terminal of the fifth LED filament 25 and the anode of the third LED filament 23.

[0041] One end of the current-limiting resistance 26 is connected with AC power terminal, and the other end of the current-limiting resistance 26 is connected with the

cathode of the fourth LED filament 24 and the anode of the fifth LED filament 25. The cathode of the first LED filament 22 and the anode of the second LED filament are connected with AC power terminal.

[0042] Alternating current passes through the fifth LED filament 25, the third LED filament 23 and the first LED filament 21. Or it passes through the second LED filament 22, the third LED filament 23 and the fourth LED filament 24. When alternating current passes through the fifth LED filament 25, the third LED filament 23 and the first LED filament 21, the fifth LED filament 25, the third LED filament 23 and the first LED filament 21 are lightened. When alternating current passes through the second LED filament 22, the third LED filament 23 and the fourth LED filament 24, the LED light is lightened. Three LED lights have good color rendering and even spectra, making radiance appearance and glaring effect of LED light basically same as tungsten filament of traditional incandescent light. Its imitation effect is vivid.

[0043] In this embodiment, the metal wire substrate 11 is of iron, copper or iron-copper alloy. The surface of the metal wire substrate 11 has a coating which is of silver or gold. The electrode 12 is of iron, copper or iron-copper alloy.

[0044] The current-limiting resistance 26 is adjustable resistance. The adjustable resistance is used to regulate the current of the first LED filament 21, the second LED filament 22, the third LED filament 23, the fourth LED filament 24 and the fifth LED filament 25. The current control range goes between 5~20mA. By controlling the supply current between 5~20mA, the glaring effect of LED light is basically same as tungsten filament of traditional incandescent light. Its imitation effect is vivid. The brightness of LED light can be regulated by regulating the current-limiting resistance 26. The current-limiting resistance 26 can be changed by setting slide rheostat in LED light switch, and the brightness can be regulated to make LED light adapt to user's operating environment.

[0045] The dimension of the metal wire substrate 11 is as follows: length: 10mm~100mm; width: 0.5mm~2mm; thickness: 0.2mm~1mm.

[0046] In this embodiment, the metal wire substrate of LED filament 5 is of iron silver plated material. The dimension of the metal wire substrate is as follows: length: 40mm; width: 0.8mm; thickness: 0.4mm. Blue light chips are fixed on the metal wire substrate through die bond and in series connection through gold bonding wire. Then, the fluorescent colloid is coated on the blue light LED chips to form the LED filament in this embodiment. After being electrified, it emits the white light with 2,700K color temperature.

[0047] The current-limiting resistance 60025726 is used to regulate the current of the first LED filament 21, the second LED filament 22, the third LED filament 23, the fourth LED filament 24 and the fifth LED filament 25. In an electrified state, the third LED filament 23 is normally on while other filaments are alternatively on in this embodiment. The filament which is connected with the

above method is welded on the stem and placed in A60 bulb. The air in the bulb is pumped out from the exhaust hole in the stem 4. Helium is filled as a protective gas and heat dissipation gas. Electrification is realized by connecting filament and lamp holder with wire. The lamp holder 2 is a metal part connecting the lamp holder and the power supply. It is bonded with the glass bulb by welding mud.

[0048] Each embodiment in the specifications is described in a progressive manner. Each embodiment is focused on stressing its differences from other embodiments. The same or similar parts among embodies can be refereed each other.

[0049] The terms "the first", "the second", "the third" and "the fourth" etc. (if applicable) in the specifications, claims and the above drawings are used to distinguish similar objects but not necessarily used to describe the specific orders or sequences. It is understood that the data can be exchanged if appropriate so that the embodiments described in this invention can be implemented beyond the orders which are shown in the diagram or described herein. In addition, the terms "comprises" and "has" and their transformation are intended to cover the inclusion without exclusion.

[0050] The above explanation of the above disclosed embodiments should be available to or used by the technicians in this field. Various amendments on these embodiments will be obvious for the technicians in this field. The general principle defined in this document can be realized in other embodiments when the spirit or scope of this invention is not separated. Therefore, this invention will not be limited to the embodiments in this document but complies with the widest scope which is consistent with the principle and novel features disclosed in this document.

Claims

1. A LED light simulating the structure of incandescent light is **characterized in that** it comprises a lamp holder, a light-emitting component connecting with the lamp holder and a glass bulb surrounding the outside of light-emitting component and connecting with the lamp holder.

The said light-emitting component comprises a LED filament and a stem.

One end of the stem is connected with the said lamp holder, the other end of the stem is connected with the LED filament, and the said stem is set with the wire.

The said LED filament comprises a metal wire substrate, an electrode, a LED chip, a gold bonding wire and a fluorescent colloid.

LED chip is attached and fixed onto the front of the metal wire substrate. The anode and cathode of LED chip is directly or indirectly connected with the anode and cathode of metal wire substrate through the gold

bonding wire. The said anode and cathode are respectively connected with outer leads of the anode and cathode of substrates set on the metal wire substrate.

One end of the said electrode is connected with outer leads of the metal wire substrate through the gold bonding wire and fixed with the outer lead of the metal substrate through the insulation joint. The other end of the said electrode is connected with the lamp holder through the wire.

The fluorescent colloid is coated on the front and back of the metal wire substrate through the transparent AB glue, and covers the LED chip.

The said LED chip is blue light wafer, and the said fluorescent colloid is RGB three-color fluorescent powder to make LED filament a white light LED source.

2. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said light-emitting component comprises the first LED filament, the second LED filament, the third LED filament, the fourth LED filament, the fifth LED filament and current-limiting resistance.

The anode terminal of the first LED filament is connected with the anode terminal of the fourth LED filament and the cathode of the third LED filament. The cathode terminal of the second LED filament is connected with the cathode terminal of the fifth LED filament and the anode of the third LED.

One end of the current-limiting resistance is connected with AC power terminal, and the other end of the current-limiting resistance is connected with the cathode of the fourth

LED filament and the anode of the fifth LED filament. The cathode of the first LED filament and the anode of the second LED filament are connected with AC power terminal.

3. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said metal wire substrate is of iron, copper or iron-copper alloy.

The surface of the said metal wire substrate has a coating which is of silver or gold.

4. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said electrode is of iron, copper or iron-copper alloy.

5. According to Claim 1 or Claim 3, the said LED light simulating the structure of incandescent light is **characterized in that** the dimension of the said metal wire substrate is as follows: length: 10mm~100mm; width: 0.5mm~2mm; thickness: 0.2mm~1mm.

6. According to Claim 2, the said LED light simulating

the structure of incandescent light is **characterized in that** the said current-limiting resistance is adjustable resistance. The said adjustable resistance is used to regulate the current of the first LED filament, the second LED filament, the third LED filament, the fourth LED filament, the fifth LED filament. The current control range goes between 5~20mA.

7. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said wire comprises inner wire, Dumet wire and outer wire.

The said inner wire is used to conduct electricity and fix LED filament, and the said inside wire is made with copper wire or nickel-plated iron wire.

The said Dumet wire is wrapped outside the inner wire, the said outer wire is wrapped outside the said Dumet wire, the said outer wire is of copper wire, and the outer wire is used to collect LED filament and lamp holder.

8. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said stem is a trumpet-shaped glass part, and the stem is connected with the glass bulb. The stem is used to fix LED filament, the said stem is set with an exhaust pipe. The exhaust pipe is used to pump out the air in the glass bulb, and the inert gases are filled in the bulb.

9. According to Claim 8, the said LED light simulating the structure of incandescent light is **characterized in that** the inert gases include helium, hydrogen or the mixed gas consisting of helium and hydrogen.

10. According to Claim 1, the said LED light simulating the structure of incandescent light is **characterized in that** the said glass bulb includes A-type bulb, G-type bulb, P-type bulb, B-type bulb, C-type bulb or T-type bulb.

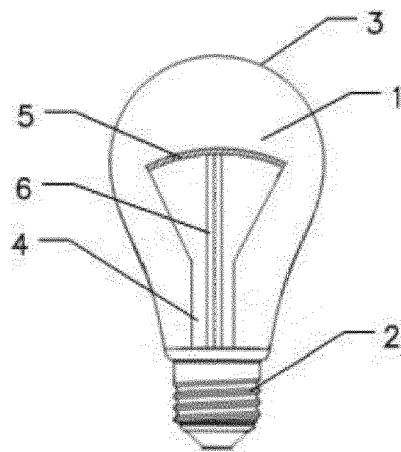


Fig. 1

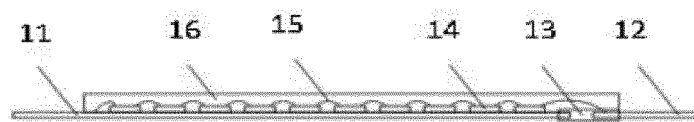


Fig. 2

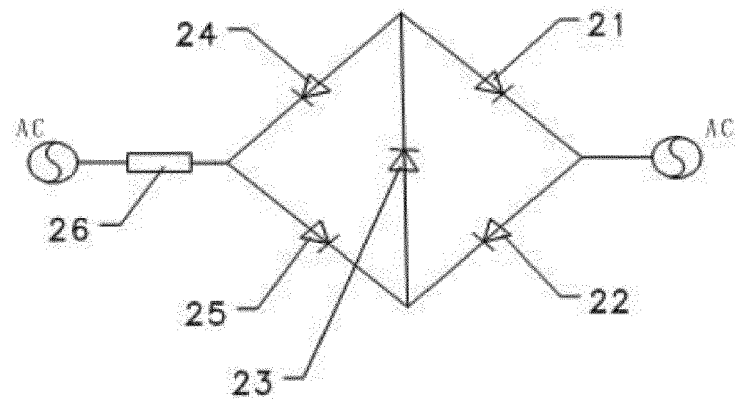


Fig. 3



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Place of search The Hague		Date of completion of the search 22 April 2016	Examiner Soto Salvador, Jesús
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