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(71) Applicant: **Shenzhen BSN Technology Co., Ltd.**
Shenzhen City, Guangdong (CN)

(72) Inventor: **Zhang, Yong**
Shenzhen Ciy (CN)

(74) Representative: **Dennemeyer & Associates S.A.**
Poccistrasse 11
80336 München (DE)

(54) **Integral multi-functional waterproof flexible light strip**

(57) An integral multi-functional waterproof flexible light strip comprising a power line (1), an infrared controller and a light strip body, one end of said infrared controller being connected to one end of said power line (1) and the other end thereof being connected to one end of said light strip body. The other end of said power line (1) is fitted with a waterproof power connector (11); and, said infrared controller, a connecting end between said infrared controller and said power line (1), and a connecting end between said infrared controller and said light strip body are sealed in a shell and integrated.

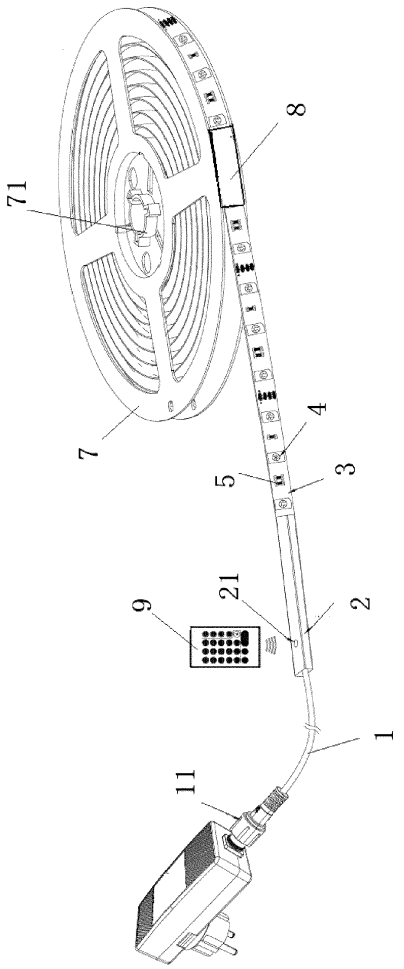

Fig.1

EP 2 942 558 A1

Description

Technical field

[0001] This invention relates to an LED lighting device, in particular to an integral multi-functional waterproof flexible light strip.

Background

[0002] At present, due to large light-emitting angle, soft and uniform light, and easy installation, LED is widely used in indoor decoration and dressing of houses, malls, hotels and entertainment venues, lighting setups of malls and exhibition design. Comparing with traditional lamp fixtures, both color and brightness of the LED lamp fixtures may be more satisfying in terms of individual light-dimming demands. Most of the available LED light strips are multifunctional, for example, brightness or color adjustable. However, the corresponding controllers and the LED light strips are split-mounted. When an LED light strip is arranged outdoor, it is likely to be damaged for its poor waterproof ability, especially in rainy days. Furthermore, if it is required to withdraw the light strip temporarily, there is no appropriate accommodating tool, and uneasy carrying.

[0003] In view of the defects of the existing technologies, as well as the reality of the urgent needs of the present invention, creators after long-term study and practice finally got this creation.

Content of invention

[0004] To achieve the above mentioned object, the present invention provides an integral multi-functional waterproof flexible light strip which has excellent waterproof ability, easy accommodation and carrying.

[0005] The technical scheme of the invention: An integral multi-functional waterproof flexible light strip, comprising a power line, an infrared controller and a light strip body, one end of said infrared controller being connected to one end of said power line and the other end thereof being connected to one end of said light strip body, characterized in that, the other end of said power line is fitted with a waterproof power connector, ; and, said infrared controller, a connecting end between said infrared controller and said power line, and a connecting end between said infrared controller and said light strip body are sealed in a shell and integrated.

[0006] Better, said flexible light strip further includes a winding frame for accommodating said light strip body, and said light strip body is encased with a transparent silicone tubing.

[0007] Better, on the edge of said light strip winding frame, is provided is a light strip clip, , said light strip clip comprising a frame body and two clip teeth, ; the tips of said two clip teeth facing the inside of said frame body and being located in a cross section, said two clip teeth being able to be movable in said cross section.

[0008] Better, said flexible light strip further includes a plug fitted onto the tail end of said transparent silicone tubing.

[0009] Better, said light strip body comprises a strip flexible circuit board, a plurality of LED lamps on said flexible circuit board and glue, said glue sealing said flexible circuit board and said LED lamps.

[0010] Better, said glue is a transparent milky-white glue, the composition of which is polyurethane improved epoxy or organic resin with good waterproof ability and flexibility.

[0011] Better, said LED lamps are SMD LED lamps, full-color SMD LED lamps or other LED lamps for decoration purposes.

[0012] Better, current-limiting resistors are provided in series between said LED lamps. Better, said shell has a transparent window thereon, through which infrared rays pass.

[0013] Better, said infrared controller comprises a signal receiving unit, a signal conversion unit and a driving unit, ; said signal receiving unit being located under said transparent window, ; said signal receiving unit being used for receiving an infrared control signal from the remote controller, ; said signal conversion unit being connected to said signal receiving unit to convert said infrared control signal into an LED driving command and then output to said driving unit which controls the LED lamps to make corresponding actions according to said LED driving command after receiving said LED driving command.The present invention has the following advantages over the prior art. For this integral multi-functional waterproof flexible light strip, by providing a waterproof power connector on the power line, and by sealing said infrared controller, a connecting end between said infrared controller and said power line, and a connecting end between said infrared controller and said light strip body into a shell, the infrared controller is integrated with the light strip body; besides, a plug provided on the end of said transparent silicone tubing improves the waterproof ability of light strip.

Attached figures

[0014]

Fig.1 is a structural diagram of an integral multi-functional waterproof flexible light strip according to the present invention;

Fig.2 is a structural diagram of the integral multi-functional waterproof flexible light strip according to the present invention, with a plug fitted onto the tail end of the transparent silicone tubing; and

Fig.3 is a sectional view of the integral multi-functional waterproof flexible light strip according to the present invention, with a clip 8 seized onto the transparent silicone tubing.

Preferred embodiment

[0015] The foregoing and/or further technical features and advantages of the present invention will be further described in details with reference to the accompanying drawings.

[0016] Referring to Fig.1, the structure diagram of an integral multi-functional waterproof flexible light strip according to the present invention is shown, including a power line 1, an infrared controller and a light strip body, one end of said infrared controller being connected to one end of said power line 1 and the other end thereof being connected to one end of said light strip body. The other end of said power line 1 is fitted with a waterproof power connector 11. Said infrared controller, a connecting end between said infrared controller and said power line 1, and a connecting end between said infrared controller and said light strip body are sealed into a shell 2 and integrated. A transparent window 21, through which infrared rays pass, is provided on said shell 2.

[0017] Said light strip body includes a strip flexible circuit board 3, a plurality of LED lamps 4 on the flexible circuit board and glue, said glue sealing said flexible circuit board 3 and said LED lamps 4. Said light strip body is encased with a transparent silicone tubing, thus enabling waterproof performance without affecting light emission and flexibility, further, its excellent waterproof ability ensures its long service life outdoor. Said glue is a transparent milky-white glue, the composition of which is polyurethane improved epoxy or organic resin with good waterproof ability and flexibility. Said LED lamps 4 are SMD LED lamps, full-color SMD LED lamps or other LED lamps for decoration purposes. Current-limiting resistors 5 are provided in series between said LED lamps. Said light strip body consists of a plurality of parallel elements, and thus may be cut out as necessary according to the multiple of length of each element within the total length, easy arrangement and shaping. Shown as in Fig. 2, this integral multi-functional waterproof flexible light strip further includes a plug 6 fitted onto the tail end of said transparent silicone tubing, thus the cut-out transparent silicone tubing may be sealed with glue after plugged with said plug 6, protected against water intrusion.

[0018] Said integral multi-functional waterproof flexible light strip further includes a light strip winding frame 7 including a fixed shaft 71 and a rotating shaft, said rotating shaft being sleeved onto said fixed shaft 71, as shown in Fig.3. On the edge of said light strip winding frame 7, provided is a light strip clip 8 including a frame body 81 and two clip teeth 82, the tips of both said clip teeth 82 facing the inside of said frame body 81 and being located in a cross section, both said clip teeth 82 being able to be movable in said cross section. When accommodating the light strip body, said light strip body is wound onto said rotating shaft, said light strip clip 8 is then clipped onto said light strip winding frame 7, and finally the light strip body encased with the transparent silicone tubing is securely held by the fitting of said two clip teeth 82 and said frame body 81, to protect the light strip body from detaching, easy carrying.

[0019] Besides, the transparent silicone tubing may give great effect on the mechanical properties of the light strip body, especially at low temperature. If the light strip body is wound onto the light strip winding frame 7 for a long period of time, the shape of the light strip body may be stabilized; that is, when the light strip body is taken from the winding frame 7, its original curve will be kept, which may give adverse effect on the light strip arrangement and shape-making. With a light strip clip 8 on the edge of the winding frame 7, when a user withdraws the light strip body outward, tips of two clip teeth 82 on the clip 8 may scratch the transparent silicone tubing, thus to relief the stress in this direction. Consequently, the force for bending the light strip body toward an opposite direction becomes less, which may offset the deformation of the light strip as a result of winding onto said winding frame 7 for a long period of time. A user may further adjust said two clip teeth 82 to relief stress in different directions.

[0020] Said infrared controller includes a signal receiving unit, a signal conversion unit and a driving unit, said signal receiving unit being located under said transparent window, said signal receiving unit being used for receiving an infrared control signal from the remote controller 9, said signal conversion unit being connected to said signal receiving unit to convert said infrared control signal into an LED driving command and then output to said driving unit which controls LED lamps to make corresponding actions according to said LED driving command after receiving it, for example, lighting on or off, changing color or brightness, etc.

[0021] For this integral multi-functional waterproof flexible light strip provided by the present invention, by providing a waterproof power connector on the power line, and by sealing said infrared controller, a connecting end between said infrared controller and said power line, and a connecting end between said infrared controller and said light strip body into a shell, the infrared controller is integrated with the light strip body; besides, a plug provided on the end of said transparent silicone tubing improves the waterproof ability of light strip.

[0022] The foregoing is just preferred embodiments of the present invention, and these preferred embodiments are merely illustrative, not restrictive. It should be understood by an ordinary person skilled in the art that, the present invention may have various changes, modifications, or even equivalent variations without departing from the spirit and scope defined by the appended claims; and these changes, modifications or equivalent variations shall fall into the scope of the present invention.

Claims

1. An integral multi-functional waterproof flexible light strip, comprising a power line, an infrared controller

and a light strip body, one end of said infrared controller being connected to one end of said power line and the other end thereof being connected to one end of said light strip body, **characterized in that**, the other end of said power line is fitted with a waterproof power connector; and, said infrared controller, a connecting end between said infrared controller and said power line, and a connecting end between said infrared controller and said light strip body are sealed in a shell and integrated.

2. The integral multi-functional waterproof flexible light strip according to claim 1, **characterized in that**, said flexible light strip further includes a winding frame for accommodating said light strip body, and said light strip body is encased with a transparent silicone tubing.

3. The integral multi-functional waterproof flexible light strip according to claim 2, **characterized in that**, on the edge of said light strip winding frame is provided a light strip clip, said light strip clip comprising a frame body and two clip teeth; the tips of said two clip teeth facing the inside of said frame body and being located in a cross section, said two clip teeth being able to be movable in said cross section.

4. The integral multi-functional waterproof flexible light strip according to claim 2, **characterized in that**, said flexible light strip further includes a plug fitted onto the tail end of said transparent silicone tubing.

5. The integral multi-functional waterproof flexible light strip according to claim 1, **characterized in that**, said light strip body comprises a strip flexible circuit board, a plurality of LED lamps on said flexible circuit board and glue, said glue sealing said flexible circuit board and said LED lamps.

6. The integral multi-functional waterproof flexible light strip according to claim 5, **characterized in that**, said glue is a transparent milky-white glue, the composition of which is polyurethane improved epoxy or organic resin with good waterproof ability and flexibility.

7. The integral multi-functional waterproof flexible light strip according to claim 5, **characterized in that**, said LED lamps are SMD LED lamps, full-color SMD LED lamps or other LED lamps for decoration purposes.

8. The integral multi-functional waterproof flexible light strip according to claim 7, **characterized in that**, current-limiting resistors are provided in series between said LED lamps.

9. The integral multi-functional waterproof flexible light strip according to claim 1, **characterized in that**, said shell has a transparent window thereon, through which infrared rays pass.

10. The integral multi-functional waterproof flexible light strip according to claim 9, **characterized in that**, said infrared controller comprises a signal receiving unit, a signal conversion unit and a driving unit; said signal receiving unit being located under said transparent window; said signal receiving unit being used for receiving an infrared control signal from the remote controller; said signal conversion unit being connected to said signal receiving unit to convert said infrared control signal into an LED driving command and then output to said driving unit which controls the LED lamps to make corresponding actions according to said LED driving command after receiving said LED driving command.

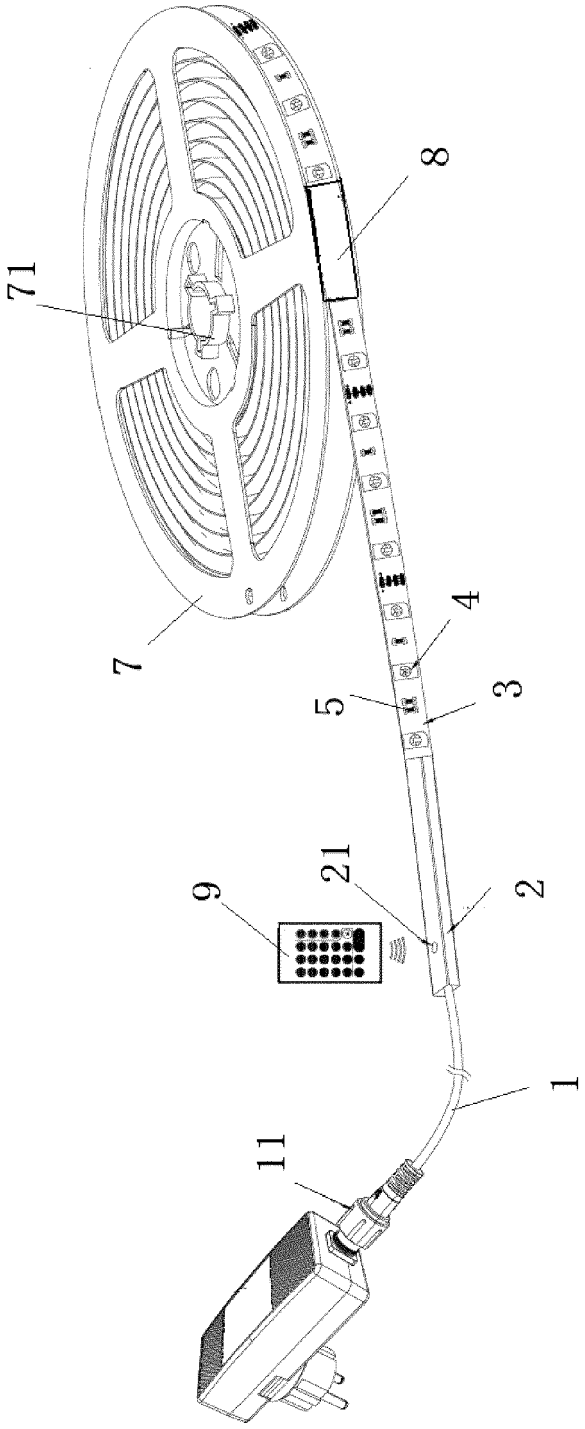

Fig.1

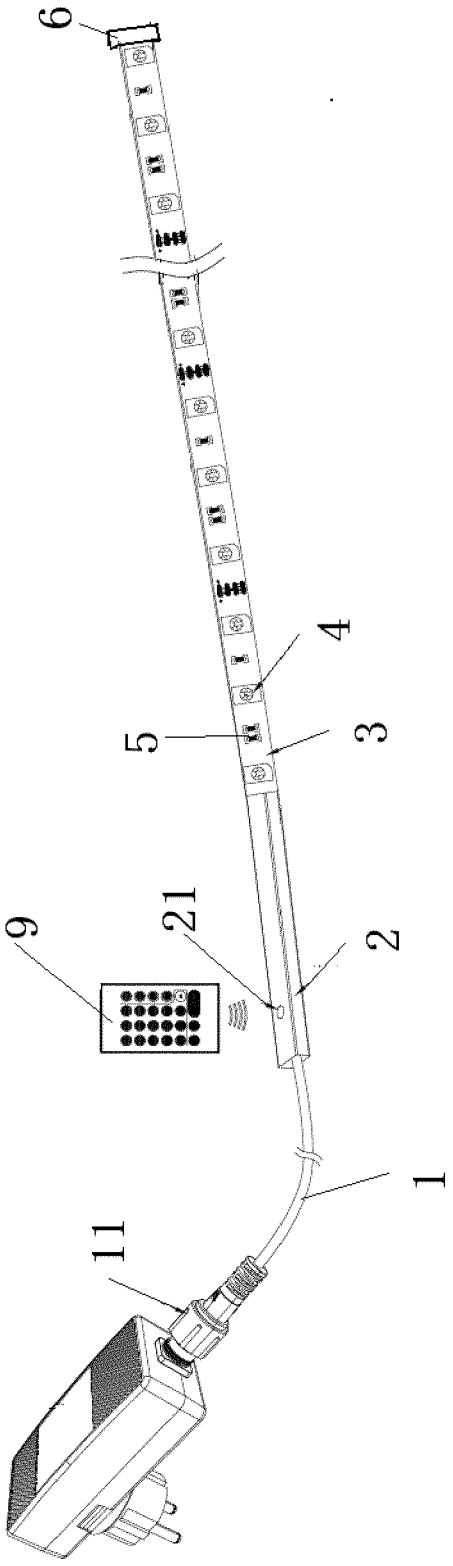

Fig.2

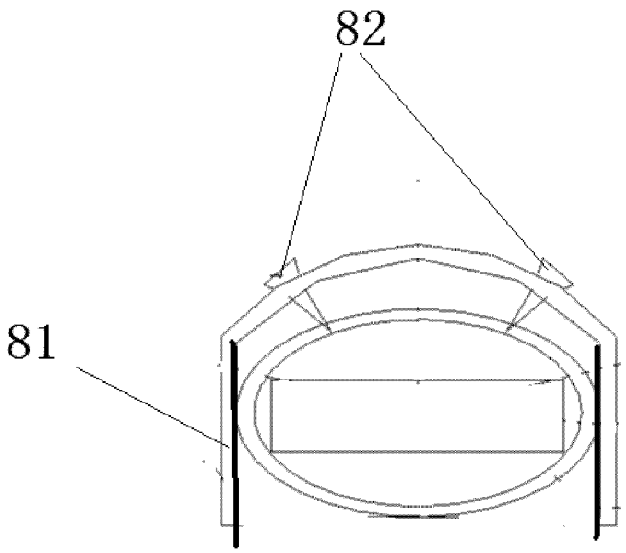

Fig.3

Figures marks

1-power line, 2- shell, 3- strip flexible circuit board, 4- LED lamps, 5-current-limiting resistors, 6- plug, 7- light strip winding frame, 8- light strip clip, 9-remote controller, 11- waterproof power connector, 21- transparent window, 71-fixed shaft, 81- frame body , 82- clip teeth.

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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 7389

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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TECHNICAL FIELDS SEARCHED (IPC)

F21V
F21S
F21Y
B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 October 2014	Menn, Patrick

CATEGORY OF CITED DOCUMENTS

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22-10-2014

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