

A Flexible Tubular Light

Technical Field

The present utility model relates to a decorative illumination device, in particularly to an improved structure of a flexible tubular light body capable of simulating the continuous uniform and fresh smoothing light effect.

Background

The existing flexible tubular lights as the decorative illumination lights are widely applied to places such as garden, commercial advertisement and landscape decoration etc., the advantages of which are as following: the manufacturing cost is low due to the production using extrusion by the auto-machine; it could be bend-molded into any shapes at use; and it could be jointed or cut; it has good safety reliability with impact resistance; it could be manufactured into any decorative patterns by the consumer as he desires with wonderful decorative effects of endless variation. However, the disadvantage of existing flexible tubular light is also apparent in that the light emitted is not uniform and continuous without the light effect of the neon light. The reason for that is due to the light sources enclosed in the flexible tubular light tube is a plurality of point light sources, such as micro light bulbs or LED, distributed with spacing along the longitudinal direction in the light tube, the light emitted by such granule point light sources could not achieve the beauty of uniform and continuous light from a neon light.

Neon light as the decorative illumination light has the advantages of not only being bright and colorful but also uniform, continuous, fresh and smoothing, therefore it could be widely applied to places such as shop fronts, signboards, character advertisements, ballrooms, hotels, bars and also the exterior walls of the building. However, the neon light has its fatal disadvantages, such as large power consumption, high voltage, high cost, fragile glass tube, inconvenient transportation, and it could not be bended into any shapes at will or tailored, the installation and the maintenance requires professional technicians so that it is not easy to maintain and not safe either. Therefore, an alternative light source for neon light has been sought for many years.

For example, it is proposed to use a flexible tubular light to simulate the neon light, creating a "plastic neon"(or referred as "flexible neon"). The flexible tubular has built-in LEDs serving as the point light source device, so as to avoid the disadvantages of large power consumption, high voltage, fragile and difficult installation and maintenance etc., and it could be also bend-molded freely and it could be cut or jointed, however, because the LEDs enclosed therein have large spacing, and the thickness of sheath made of transparent material is uniform and thin, the point light sources of LED granules are not continuous so that the light effect is discontinuous granule-like without continuity and uniformity, therefore the flexible tubular light could not achieve the decorative effect of the neon light. In order to address the issue related to continuous and uniform light, a translucent hard light cover is added outside of the flexible tubular light to diffuse the lights emitted from the LED point light source so as to achieve the uniform, continuous and smoothing light effect. However by doing so, it is inevitable to increase the cost and still could not be bend-molded at will, not easy to tailor, nor convenient to transport.

Based on the above, a simulative neon light using an enclosure made from an acrylic material was invented. The simulative neon light could be bend-molded when heated, which is an advancement. Furthermore, the light from the simulative neon light is uniform and continuous so as to achieve the lighting effect of the neon light. However, because the acrylic material is hard and fragile, the simulative neon light could be not bend-molded at will at room temperature, and it is not easy to tailor either; also because it uses the flexible tape circuit board as the electrical connection component and use adhesive potting to secure the flexible tape circuit board and LED, the process is complicated, the manufacturing is difficult and the cost is high. Furthermore, because the flexible tape circuit board could not be jointed, the length thereof is limited. Moreover, the adhesive potting is not environmentally friendly. Therefore, the decorative illumination market still demands a light device with low power assumption, safe low voltage, simple structure and process, low cost, easy transportation, installation and maintenance, which could be bend-molded freely and easy to tailor and joint based on the needs with a uniform, continuous, and fresh smoothing light effect.

The current flexible tubular light typically comprises the following parts, as shown in Fig. 12: the strip like transparent plastic core 110, at least two conducting wires 120, 130 disposed longitudinally, there are spaces disposed inside the transparent plastic core such as longitudinal recess 140 or a plurality of lateral holes 150a, 150b, 150c, 150d, 150e so as to accommodate a plurality of light bulbs 160a, 160b, 160c and the connection wire 170a, 170b. Said light bulbs are electrically connected to the conducting wires after being connected in series, then a transparent plastic cladding layer 180 is applied to enclose said transparent plastic core.

In the prior art of the flexible tubular light industry, the flexible tubular light could be divided into two kinds of structures based on the arrangement of the light source(such as light bulbs, LED): one is referred as a recess-type (Horizontal type), in which the longitudinal recess is disposed in the core wire of the flexible tubular light to accommodate a plurality of light sources, and the arrangement direction of the light sources is the same as the longitudinal direction of the light tube; the other is referred as an aperture-type (Vertical type), in which the lateral holes are disposed in the core wire of the flexible tubular light to accommodate a plurality of light sources, and the arrangement direction of the light sources is perpendicular to the longitudinal direction of the light tube.

The US patent No. 4,607,317 issued on August 19, 1986 with patent title "non-neon light" disclosed an invention referred as "non-neon light", which is an aperture-type flexible tubular light as discussed above. The patented flexible tubular light has better performance over the glass neon light in safety, packing, installation, operation, and maintenance. However the patent did not disclose the light source defects of the flexible tubular light compared with the neon light, that is, the light sources enclosed in the flexible tubular light tube are granule point light emitting bodies such as micro light bulbs or LED distributed along the light tube with spacing therebetween, so that the light emitted by such granule point light sources could not achieve the beauty of the uniform continuous light emitted by the neon light.

The US patent No. 6,186,645 B1 issued on February 13, 2001 with patent title of flexible illumination system and the installation method thereof disclosed an improved structure of a recess-type flexible tubular light, in which longitudinal

recess-like texture is provided on either the exterior surface of the core or the interior surface of the cladding layer of the flexible tubular light. The improved structure could scatter the light emitted by the flexible tubular light source so as to improve the uniformity of the light emitted by the flexible tubular light. However the patent did not declare that the invention could achieve the continuous uniform light effect simulating the neon light, and in fact, the invention could not achieve the continuous uniform light effect simulating the neon light based on the above.

The US patent No. 6,565,251 B2 issued on May 20, 2003 with patent title of tubular decorative light disclosed an improved structure of a recess-type flexible tubular light, in which the core and the cladding layer could be disposed in various shapes such as circle, square, oval, convex, concave or corrugated, and one or more longitudinal spaces are formed between the core and the cladding layer into for potting the insulating liquid to improve the refractive and reflective effect of the light from the light sources. The longitudinal holes may have various shapes in cross-section such as circle, triangle, square, oval and trapezoid. The patent did not declare that the invention could achieve the continuous uniform light effect simulating the neon light. In fact, there are no products of the patent available from the market that could achieve the continuous uniform light effect of the neon light.

The Summary of the Invention

The Object of the Invention

Therefore, a flexible tubular light structure truly capable of achieving the uniform continuous and fresh smoothing light effect of the neon light which could be freely bend-molded and easy to tailor and jointed based on needs, is what the flexible tubular light industry is aiming for a long time.

The Technical Solution of the Invention

In order to obtain the above objects, an improved structure of the flexible tubular light body of the present utility model comprises:

a core wire, a strip body of a prescribed length extrusion-molded from flexible opaque plastics of white or other colors, at least two copper strands extended along the longitudinal direction by the same length as the strip body on the top of each other with spacing therebetween on one side of the cross-section of the strip body, at least one column of lateral holes parallel to the copper strands on the other side of the cross-section of the strip body, the plurality of holes uniformly distributed along the longitudinal direction of the whole trip body with prescribed spacing therebetween;

a plurality of LED bulbs, connected in series through wires connecting the conducting leads of the LED bulbs, and connected in series with at least one current limiting resistance, the wires on the head end and the tail end of the LEDs string in series connection electrically connected with the copper strands of said core wires, said plurality of LED bulbs, current limiting resistance and the series connection node of the wires thereof plugged into the plurality of lateral holes in said core wires, respectively;

a scattering body, a opalescent translucent body of the prescribed height and the

prescribed width disposed above said plurality of LED bulbs with the same length as said core wires for diffusing the lights from the LEDs; and

a cladding layer extrusion molded from flexible plastics enclosing said core wire, said scattering body and said plurality of LED bulbs with the same length as said core wire, the portion of said cladding layer on which the LED bulbs irradiate is a semi-circle curved surfaces simulating a glass tubular light emitting surface of a neon light.

The improved structure of a flexible tubular light body of the present utility model could further disposing a LED driving element injection molded on a power supply line, the LED driving element is a current conversion element converting alternating current into direct current, or a LED pulse current driving element.

The scattering body of the improved structure of a flexible tubular light body of the present utility model is preferably an opalescent PVC translucent body extruded together with the cladding layer at equal length and is integrated with the cladding layer, in which a longitudinal through hole is provided.

The face of the core wires of the present utility model face on top of the LED may be designed to have a shape with a recess designed as an inverted trapezoid.

The present utility model is an improved structure of a flexible tubular light body which could simulate the uniform continuous light effect of the neon light to achieve what is desired and sought for a long time by the flexible tubular light industry, while also achieve the continuous automatized mass production of the simulative neon lights, so that it has higher yield and lower manufacturing cost compared with the simulative neon lights with many other structures so that it has an incomparable edge over the simulative neon lights and flexible tubular lights with other structures.

Brief Description of the Drawings

Fig. 1 is a perspective view of the first preferable embodiment of the present utility model;

Fig. 2 is a cross-section view taken along the line A-A of the perspective view of Fig. 1;

Fig. 3 is a schematic view explaining the extrusion molding of the first preferable embodiment of the present utility model;

Fig. 4 is a schematic view explaining the optical mechanism of the first preferable embodiment of the present utility model;

Fig. 5 is a perspective view of the second preferable embodiment of the present utility model;

Fig. 6 is a cross-section view taken along the line B-B of the perspective view of Fig. 5;

Fig. 7 is a schematic view explaining the extrusion molding of the second preferable embodiment of the present utility model;

Fig. 8 is a schematic view explaining the optical mechanism of the second preferable embodiment of the present utility model;

Fig. 9 is a perspective view of another structure variation of the second preferable

embodiment of the present utility model;

Fig. 10 is a cross-section view taken along the line C-C of the perspective view of Fig. 9;

Fig. 11 are cross-section views of three structure variations of other structure shapes of the core wire of the present utility model;

Fig. 12 is a perspective view showing the prior art of the present utility model; and

Fig. 13 is a view showing an installation application of the present utility model.

Best Modes for carrying out the Invention

The present utility model is further described by referring to the accompanying drawings.

Fig. 1 is a perspective view of the first preferable embodiment of the present utility model, Fig. 2 is a cross-section view taken along the line A-A of the perspective view of Fig. 1, Fig. 3 is a schematic view explaining the extrusion molding of the first preferable embodiment of the present utility model.

The manufacturing process of the first preferable embodiment of the improved structure of the utility model comprises: typically 2 copper strands 01a, 01b pass through forming holes (not shown) of the extruder so as to automatically and continuously extrude flexible opaque plastics, typically a flexible opaque PVC material with soft white or other colors to form a strip-like body of a prescribed length, which is also referred as the core wire 02 in the art. The number of the copper strands passing through the forming holes of the extruder, ie. the number of the copper strands in the core wire may be at least 2, or may be 3 or 4 etc.

Then, along the whole longitudinal length of the core wire 02, a plurality of lateral holes 03a, 03b, 03c and 03d parallel with the copper strands 01a, 01b is punched with the uniform spacing by an auto-dieing machine. The lateral holes are disposed in the core wire 02 on the opposite side of the copper strands 01a, 01b and parallel with the copper strands 01a, 01b. The lateral through holes punched along the core wire are disposed in at least one column, or in two columns, three columns etc..

As shown in Fig. 12, for the aperture-type flexible tubular light of the prior art, the lateral holes 150a, 150b, 150c, 150d, 150e on the core wire 110 and light bulbs 160a, 160b, 160c as well as the light bulb leads twist 170a, 170 are disposed between the copper strands 120, 130 and perpendicular to the copper strands 120, 130. But one important feature of the improved structure of the flexible tubular light body of the present utility model as shown in Fig. 1 and 2 is that the copper strands 01a, 01b are disposed on top of each other with spacing therebetween on one side of the cross-section of the core wire 02, and the lateral through holes 03a, 03b, 03c, 03d are disposed in the core wire 02 on the other side parallel with the copper strands 01a, 01b. Therefore when the flexible tubular light of the present utility model is bent along the longitudinal length on the mounting bottom face, the copper wires 01a, 01b are on the same bending radius with the same extension length so as to be easily bent at installation and use, as shown in Fig. 13, thus avoiding the disadvantages of the aperture-type flexible tubular light of the prior art as shown in Fig. 12, in which when the flexible tubular light are bent on the mounting bottom face (ie. the bottom face of

the light emitting body), the copper strands 120, 130 are on the different bending radii with different extension lengths, resulting in the installation difficulty at bending and the tensile failure for the electrical connection of the copper strands 120, 130.

LED bulbs has excellent properties such as low power consumption, low degree of heat, high brightness and small volume, therefore the spacing between the LED bulbs could be decreased to increase the number of the LED bulbs in the unit length of the flexible tubular light without over heat the flexible tubular light, thus safely enhance the luminance of the flexible tubular light to make it possible to exceed the luminance of the glass neon light. In the preferable embodiment of the improved structure of a flexible tubular light body of the present utility model, the diameter of the LED bulb is 3-5 mm, the luminance of the LED is about 200 Mcd, and the center distance between the lateral holes accommodating three LED bulbs is only 1/2 inch.

After the formation of the core wire 02, the LED bulbs 04a, 04b are plugged in the lateral holes 03a, 03c one by one. There are lateral holes 03b, 03d left for plugging in the series connection wires 05 of the LED bulbs and the current limiting resistor 06 between the laterals holes in which the LED bulb 04a and LED bulb 04b are plugged. The distal end wire 07 of the LED bulbs series connection string and the terminal end wire (not shown) are electrically connected with the copper strands 01a, 01b in the core wire 02 (as shown in Fig.1) respectively.

After the LED light string are plugged in the whole core wire 02 of a prescribed length, the core wire 02 and the prefabricated opalescent translucent body, ie. the light scattering body 08 of the improved structure of the flexible tubular light body of the present utility model pass through the forming hole 21 of the extruder 20 together at the same time, as shown in Fig. 3, so as to automatically continuously extrude a cladding layer 14 formed of flexible plastics 22 for example a flexible transparent PVC for enclosing the core wire 02 and the light scattering body 08 at the equal length with the core wire. The portion of the cladding layer 14 above the LED bulbs 02, ie. the portion above the light scattering body 08 has an appearance of semi-circle curved surface for simulating the light emitting surface of the glass tube of the neon light.

When the core wire 02 and the light scattering body 08 pass through the forming holes of the extruder 20, the prefabricated light scattering body must be disposed just above the LED bulbs 04 in the core wire 02, that is, the LED bulbs 04 should be disposed under the light scattering body to proximate the center line of the light scattering body. The implementation of the above operations requires only common knowledge in the flexible tubular light industry, which is omitted herein.

Since the core wire 02 is made from the opaque plastics, after the LED bulbs are accommodated in the lateral holes of the core wire, the light emitted therefrom could not penetrate the both side faces of core wire 02, thus the opaque core wire serves to block the light, in particularly block the side light emitted from the LED bulbs 04 to make the light exit only from the top of the LED bulbs 04 to the outside through the light scattering body 08.

The light scattering body 08 of the improved structure of a flexible tubular light body of the present utility model is opalescent translucent body, or referred as hazy translucent body, which is typically extrusion-molded from the flexible opalescent PVC or acrylic material. The width and the height of the body are depend on the

luminance and the irradiation angle of the LED bulbs in the core wire. The luminance of the LED bulbs is high or the irradiation angle is large, the height and the width of the body could be made larger; the luminance of the LED bulbs is low or the irradiation angle is small, the height and the width of the body could be made smaller. The larger the height and the width of the scattering body is, the more will be lost for the outer luminance of the flexible tubular light body of the present utility model with the better effect of avoiding the appearance of the point light sources; the smaller the height and the width of the scattering body is, the weaker effect of avoiding the appearance of the point light sources but with the corresponding high luminance. In the preferable embodiment of the improved structure of the flexible tubular light body of the present utility model, the diameter of the LED bulbs is 3-5 mm, and the luminance of the LED bulbs is about 200Mcd, the emitting angle is 45° , and the center distance between lateral holes accommodating the LED bulbs is only 1/2 inch. The height H of the light scattering body 08 is 14 mm, and the width L of the light scattering body 08 is 8 mm, as shown Fig. 2. After the light emitted by the light scattering body 08 passes through the transparent PVC layer ie. the cladding layer 14 twice to be refracted and passes through the light scattering body 08 to be diffused and refracted, the peripheral regions of the lights emitted by the adjacent LED bulbs 04a, 04b, 04c, 04d overlap with each other, for example, the peripheral regions of the lights emitted by the LED 04b, 04c form an overlapping region 12, so that the lighting luminance of the LED bulbs at the peripheral region is enhanced so as to be approximately equal to the lighting luminance emitted at the center part of LED bulbs, as shown in Fig. 4. Therefore, it has the continuous uniform lighting effect of neon light above the LED bulb 04 of the flexible tubular light of the present utility model, ie. on the semicircle curved surface of the cladding layer 14.

After the formation of the cladding layer, the copper strands 01a, 01b should be electrically connected with the power supply line 11. A plastic cover is disposed on the electrical connection to protect the electrical connection so as to form a junction 12, as shown in Fig. 1. Meanwhile, a plastic cover for enclosing the terminal end of the copper strands and the electrical connection thereof is disposed on the terminal end of the core wire 02 and the cladding layer 14 so as to form a terminal enclosure 13 as shown in Fig. 1. Since the electrical connection and the plastic cover protecting the electrical connection have various implementations in the art, the details are omitted herein.

In order to improve the luminous efficiency and the illumination intensity of the simulative neon light, a LED driving element 15 may be disposed on the power supply line 11 by the injection molding, as shown in Fig. 1. The LED driving element may be a current conversion element converting an alternative current into a direct current which powers the LED bulb with the direct current to make the emission of the LED bulb stable so as to avoid the flickering of the LED bulb. It is generally use 4 diodes to rectify to covert an alternative current to a direct current in the art, or other finer rectifying technologies, which will not be further described herein. The LED driving element of the present utility model may also be a LED pulse current driving element which powers the LED bulb with a pulse current so as to improve the luminous efficiency of the LED bulb to reduce the power consumption. In other words, LED bulb could enhance the lighting luminance with the same power consumption and the same thermal loss so as to further enhance the illumination intensity of the simulative neon light.

The second preferable embodiment of the improved structure of the flexible tubular light body of the present utility model is described as following. As shown in Fig. 5, Fig. 6, and Fig. 7, after the LED light string are plugged in the whole core wire 02 of the predetermined length, it is not necessary to prefabricate the light scattering body, but when the core wire 02 passes through the forming hole 17 of the extruder 16, the light scattering body ie. the opalescent translucent body is automatically and continuously extruded together with the cladding layer at the equal length, so that the light scattering body 09 is formed above the core wire 02 and the cladding layer 141 below the core wire 02 and on both sides of the core wire 02. The light scattering body 09 and the cladding layer 141 is extruded together at equal length to integrate with each other. The plastic 19 for forming the light scattering body 09 and the cladding layer 141 is a flexible opalescent plastic, typically a flexible opalescent translucent PVC material. The height H of the light scattering body 09 above the core wire 02 is 14 mm and the width L of the light scattering body 08 is 8 mm.

In the second preferable embodiment of the improved structure of the flexible tubular light body of the present utility model, after the lights emitted from LED bulbs passes through the light scattering body 09 to be diffused and refracted, the peripheral regions of the lights emitted from the adjacent LED bulbs 04a, 04b, 04c, 04d overlap with each other, for example, the peripheral regions of the lights emitted from the LED bulbs 04b, 04c form a overlapping region 121, so that the lighting luminance of the LED bulbs at the peripheral region is improved so as to be approximately equal to the lighting luminance of the LED bulbs at the center part, as shown in Fig. 8.

The structure of the second preferable embodiment could be modified to another configuration, in which a longitudinal through hole 091 is disposed in the light scattering body above the core wire 02 to save the materials when the light scattering body is automatically and continuously extruded together with the cladding layer 141 at equal length so as to form a light scattering body 90, as shown in Fig. 9, Fig. 10. The light scattering body 090 and the cladding layer 141 is extruded together at the equal length to integrate with each other. At the time, since the air in the longitudinal through hole 091 is not as good as the light scattering body of the opalescent translucent PVC material in terms of the refracting and the scattering ability of the light, in order to achieve the same continuous uniform light effect of the neon light, the height H1 and the width L1 of the light scattering body 090 above the core wire 02 as shown in Fig. 9 and Fig. 10 should be larger than the height H and width L of the light scattering body 09 above the core wire 02 in the second preferable embodiment as shown in Fig. 5 and Fig. 6. If the size of the longitudinal through hole 091 is different, the height H1 and the width L1 of the light scattering body 090 is also different. The detailed size will not be further described herein.

The structure of the core wire of the improved structure of the flexible tubular light body of the present utility model could be modified to another configuration, such as the core wire 020 shown in Fig. 11, in which the face of the core wire on the top of the LED bulb 04 may be designed as a shape with a recess. The recess is designed as an inverted trapezoid with both inclined faces serving to converge and retroreflect the light emitted from the LED bulbs 04 in the core wire 020, thus enhancing the outer luminance viewed from the semicircle curved face 10 of the flexible tubular light of the present utility model so as to have better continuous uniform and fresh bright light effect of the neon light. The sub-Fig. A1-A1, B1-B1, C1-C1 in Fig. 11 are the cross-section views of the present utility model made from the core wire 020. Fig. A1-A1 is

the cross-section view of the first preferable embodiment, Fig. B1-B1 is the cross-section view of the second preferable embodiment and Fig. C1-C1 is cross-section view in which a longitudinal through hole is disposed in the light scattering body of the configuration of the second preferable embodiment.

As shown in Fig. 13, the improved structure of the flexible tubular light body of the present utility model is used for making a sign "OPEN" of the simulative neon light. At installation, the flexible tubular light of the present utility model is tailored to have a desired character pattern such as "OPEN", and the appropriate fixing device such as a clamp 30 is used to secure the light bodies of the segments of the character pattern to the mounting face 31. Therefore, the improved structure of the flexible tubular light body of the present utility model is simple to install with safety and reliability. Furthermore, it has the continuous uniform light effect viewed from the outside of the semicircle curved surface of the improved structure of the flexible tubular light body of the present utility model. The rest of the lights are blocked by the opaque core wire, so that the character pattern made from the improved structure of the flexible tubular light body of the present utility model has the light effect simulating the neon light, thus achieving what is desired and sought for a long time by the flexible tubular light industry. It also make it possible to achieve the continuous automized mass production of the simulative neon light so that it has an incomparable edge over the simulative neon lights and the flexible tubular lights with other structures with higher yield and lower manufacturing cost.

What is claimed is:

1. An improved structure of a flexible tubular light body, characterized by comprising: a core wire, a strip body of a prescribed length extrusion-molded from flexible opaque plastics of white or other colors, at least two copper strands extended along the longitudinal direction by the same length as the strip body on the top of each other with spacing therebetween on one side of the cross-section of the strip body, at least one column of lateral holes parallel to the copper strands on the other side of the cross-section of the strip body, the plurality of holes uniformly distributed along the longitudinal direction of the whole trip body with prescribed spacing therebetween; a plurality of LED bulbs, connected in series through wires connecting the conducting leads of the LED bulbs, and connected in series with at least one current limiting resistance, the wires on the head end and the tail end of the LEDs string in series connection electrically connected with the copper strands of said core wires, said plurality of LED bulbs, current limiting resistance and the series connection node of the wires thereof plugged into the plurality of lateral holes in said core wires, respectively;
a scattering body, a opalescent translucent body of the prescribed height and the prescribed width disposed above said plurality of LED bulbs with the same length as said core wires for diffusing the lights from the LEDs; and
a cladding layer extrusion molded from flexible plastics enclosing said core wire, said scattering body and said plurality of LED bulbs with the same length as said core wire, the portion of said cladding layer on which the LED bulbs irradiate is a semi-circle curved surfaces simulating a glass tubular light emitting surface of a neon light.
2. According to the improved structure of a flexible tubular light body of claim 1, characterized by further disposing a LED driving element injection molded on a power supply line.
3. According to the improved structure of a flexible tubular light body of claim 2, characterized in that the LED driving element is a current conversion element converting alternating current into direct current.
4. According to the improved structure of a flexible tubular light body of claim 2, characterized in that the LED driving element is a LED pulse current driving element.
5. According to the improved structure of a flexible tubular light body of claim 1, characterized in that the scattering body is extruded together with the cladding layer at equal length and is integrated with the cladding layer.
6. According to the improved structure of a flexible tubular light body of claim 1, characterized in that the scattering body is an opalescent PVC translucent body.
7. According to the improved structure of a flexible tubular light body of claim 5, characterized by the scattering body in which a longitudinal through hole is provided.
8. According to the improved structure of a flexible tubular light body of claim 1, characterized in that the face of the core wire on top of the LED is designed to have a recess designed as an inverted trapezoid.