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LUMINOUS BODIES

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2,713,629

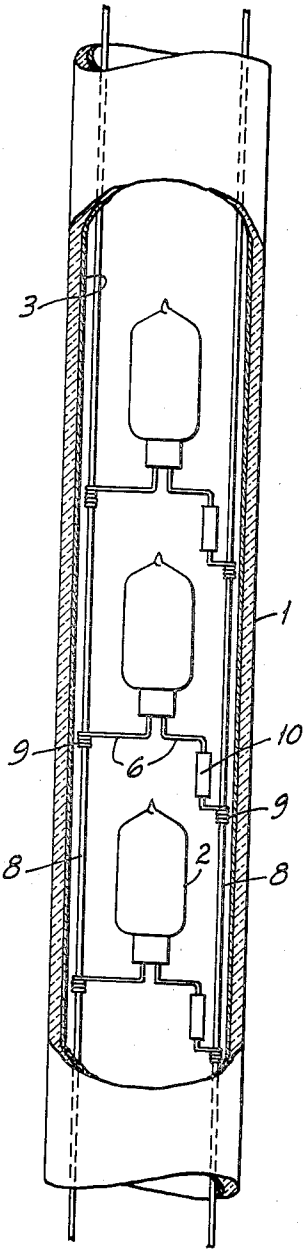


Fig. 1

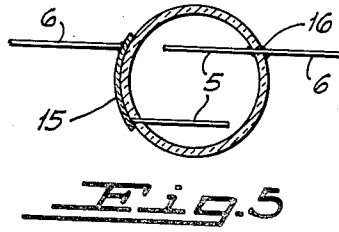


Fig. 5

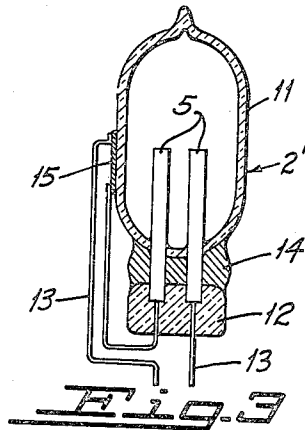


Fig. 3

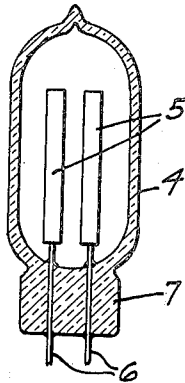


Fig. 2

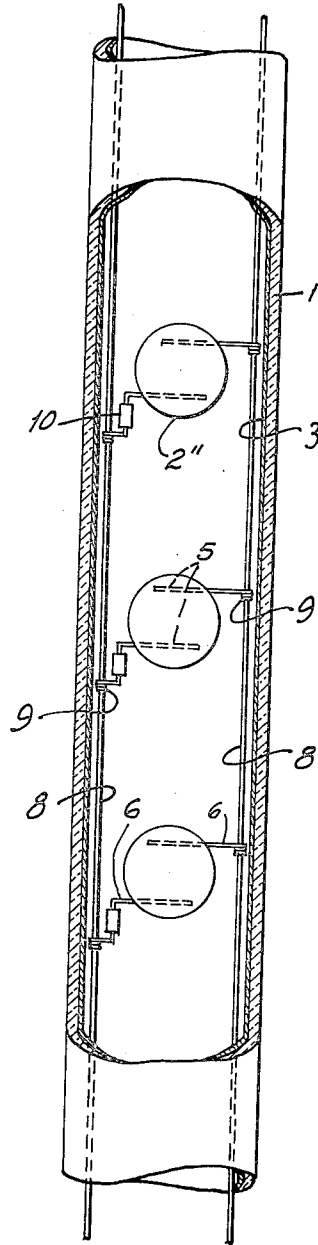


Fig. 4

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LUMINOUS BODIES

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9 Claims. (Cl. 240—2.25)

The present invention relates to luminous bodies, particularly intended to serve the purposes for which neon tubes or fluorescent tubes are generally employed at the present time, and the principal object of the invention is to provide a luminous body of the character described that may be readily bent to form various shapes such as letters and other characters in advertising display and other uses.

More particularly, it is proposed to provide a tube or similar elongated structure made of plastic or any other suitable flexible and light transmitting material, and to arrange within said tube or structure spaced sources of light disposed in such a manner that they do not interfere with the bending or cutting of the tube or structure into desired shapes and lengths, the sources of light being in the form of ampoules containing luminous gas.

It is proposed to provide the luminous flexible tubes in such a manner that they may be marketed in long units adapted for rolling on large spools to be cut into desired lengths by the user or the retail merchant.

It is further proposed, in the present invention, to incorporate in such tubes or structures a certain amount of fluorescent material, which may be applied in the form of a coating to the inside or the outside of the tube or other structure, or sandwiched within layers, or may be embedded in the material thereof, and which will be excited to glow by ultraviolet rays emitted from the luminous gas in the ampoules.

The present invention is a further development of the invention described in my pending application Serial No. 163,381 filed May 22, 1950, now Patent No. 2,644,113, and this application is a continuation in part thereof. The principal difference between the two inventions is that while in the invention of the pending application it was proposed to use radio frequency waves or similar agents for rendering the luminous gas active for illumination, in the present invention it is proposed to provide a luminous tube of the character described that is adapted for connection to ordinary A. C. or D. C. systems.

Further objects and advantages of my invention will appear as the specification proceeds, and the novel features of my invention will be fully defined in the claims attached hereto.

The preferred forms of my invention are illustrated in the accompanying drawing, in which:

Figure 1 shows a side view on an enlarged scale of my luminous tube, a portion being broken away to disclose the interior construction,

Figure 2, a detail view of a glow lamp used in my construction,

Figure 3, a detail view, in section, of a modified form of glow lamp used in my construction,

Figure 4, a side view, partly in section, of a modified form of my luminous tube, and

Figure 5, a sectional detail view of a slightly modified form of a glow lamp used in the structure of Figure 4.

While I have shown only the preferred forms of my invention, I wish to have it understood that various

changes and modifications may be made within the scope of the claims attached hereto without departing from the spirit of the invention.

Referring to the drawing in detail, my luminous body, as illustrated in Figures 1 and 2 comprises a tube 1 and a chain of lamps 2 disposed inside thereof.

The tube 1 is preferably made of plastic material, transparent or translucent, and sufficiently flexible to allow the tube to be bent into any desired shape to present letters of the alphabet, numerical figures, or any other characters usually employed in advertising signs or similar appliances, or for decorative and utilitarian lighting. The tube is preferably made of the same dimensions as the conventional neon tube, that is approximately one-half inch in outer diameter, with a wall approximately $\frac{1}{16}$ inch in thickness.

The inner wall of the tube is shown as provided with a coating 3 of phosphor or other fluorescent material. This coating may be applied to the outside, or the entire body of plastic material may be impregnated with fluorescent material, or the fluorescent material may be sandwiched between layers of the flexible body.

The lamps 2 may be of any suitable shape and character suited for the purpose and are here shown as commercial neon glow lamps comprising a glass wall or envelope 4, a pair of spaced electrodes 5 and a pair of connecting wires 6 sealed in the base 7 of the lamp. The envelope 4 is filled with a luminous gas.

The lamps are carried by two conducting wires 8 which extend lengthwise through the tube, preferably in parallel and spaced relation, the lead wires 6 of the lamps being secured upon the conducting wires 8 in a suitable manner as at 9. The lamps and the conducting wires thus form a chain which may be drawn through the tube into any position desired and which will retain the position to which it has been adjusted due to the flexibility of the chain, which allows numerous portions thereof to enter into frictional contact with the inner face of the tube, particularly as the latter is bent and flexed into shape to present a desired character.

Each of the lamps has a resistance, impedance, reactance or capacitor 10 incorporated in one of the lead wires thereof, or within the lamp itself. The two main conducting wires 8 may be connected to a suitable plug (not shown) adapted for connection into any suitable socket such as conventionally used in a house wiring circuit. The conducting wires 8 and the points where they are attached will be insulated in any number of ways.

The lamps are here shown as being made in the form of cylindrical ampoules of relatively small diameter as compared with the inner diameter of the tube so that the latter may be freely bent and flexed about the ampoules, within operative limits, without exposing the ampoules to the danger of breaking. The lamps are also sufficiently short, as compared with the length of the tube and sufficiently spaced to allow for bending operations of the tube, while the supporting wires are sufficiently flexible to follow curves of the tube. While normally most letters and characters in advertising signs are formed on large curves as compared with a tube one-half inch in diameter, I find that it is perfectly feasible to bend the tube into a coil two or three inches in diameter and to form any desired angularities normally employed in advertising signs or similar appliances. Furthermore, this flexible tubing can be brought up to an inflection point and crimped, a feat which would not be possible in the luminous tube trade.

While I do not desire to limit myself to any specific dimensions, I might say that in my working model I employ ampoules about $\frac{1}{4}$ inch in diameter and one inch in length, with $\frac{1}{2}$ inch spacing between the ampoules. Where plain plastic material is used for the tube, the

lamps, when lit, will show up as spaced sources of light, sufficiently close, however, to define the outline of the tube. If a more uniform glow following the length of the tube is desired, the fluorescent material is added to the tube, as at 3. This material will be excited to glow by ultraviolet rays emitted from the luminous gas in the ampoules and to spread the lighting effect over the entire tube.

In case it is desired to use quartz glass, or other ultraviolet transmitting glass or material, for the ampoules for more effective emission of ultraviolet rays, the structure shown in Figure 3 may be used. Quartz glass does not lend itself to sealing over lead-in wires and it is desirable therefore to make the ampoule 2' in three parts, a main body portion 11 for holding the luminous gas made of quartz glass, a base 12 of ordinary glass having the lead wires 13 embedded therein and a seal 14 between the main body portion and the base.

In this form the resistor or condenser is made by printing or painting a small section of the ampoule, as at 15, the print or paint being connected into one of the lead wires as shown.

The form shown in Figures 4 and 5 is substantially similar to the form previously described, except that spherical lamps 2'' are substituted for the ampoules, the electrodes being suitably connected into the lamps as shown at 16. In the form of Figure 4 the resistors 10 are shown in conventional form, while in Figure 5 a printed or painted surface section is substituted as at 15.

While my flexible luminous body has been described as comprising a flexible hollow tube and a relatively independent chain of lamps and accessories adapted for mounting in the tube, various modifications may be made embodying the principle of the invention.

I claim:

1. A luminous body comprising a flexible tube of light transmitting material adapted for bending into a desired shape, and a chain of electrical lamps extending through the tube, the chain comprising a pair of spaced conductors arranged in diametrically opposed relation within the tube, pairs of lead wires extending from the conductors toward one another, and lamps secured upon the lead wires and supported thereby substantially in central relation with respect to the tube, and the lamps being of a width substantially equal to one-half of the tube diameter and being spaced along the length of the tube sufficiently close to substantially illuminate the entire tube area.

2. A luminous body comprising a flexible tube of light transmitting material adapted for bending into a desired shape, and a chain of electrical lamps extending through the tube, the chain comprising a pair of spaced conductors arranged in diametrically opposed relation within the tube, pairs of lead wires extending from the conductors toward one another, and lamps secured upon the lead wires and supported thereby substantially in central relation with respect to the tube, and the lamps being of a width substantially equal to one-half of the tube diameter and being spaced along the length of the tube sufficiently close to substantially illuminate the entire tube area, and the tube having fluorescent material incorporated in the wall thereof to cause the entire wall of the tube to glow in response to light rays emitted by the lamps.

3. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, and a chain of electric lamps extending through the tube, the tube being of uniform flexibility and bendability and light-transmittance throughout the length thereof, the chain comprising a pair of spaced conductors extending lengthwise through the tube and arranged in diametrically opposed relation within the tube, pairs of lead wires extending from the conductors toward one another, and lamps secured upon the lead wires and

supported thereby substantially in central relation with respect to the tube.

4. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, and a chain of electric lamps extending through the tube, the tube being of uniform flexibility and bendability and light-transmittance throughout the length thereof, and the chain including a member extending through the tube longitudinally so as to be adapted for pulling through the tube without disturbing the lamp arrangement.

5. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, and a chain of electric lamps extending through the tube, the tube being of uniform flexibility and bendability and light-transmittance throughout the length thereof, and the chain being longitudinally continuous to maintain the lamps in selected spaced relation when the chain is drawn through the tube.

6. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, and a chain of electric lamps extending through the tube, the tube being of uniform flexibility and bendability and light-transmittance throughout the length thereof, and the chain including a pair of longitudinally continuous conducting wires having the lamps mounted thereon in spaced relation and adapted to maintain the lamps in such spaced relation when the chain is drawn through the tube.

7. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, a pair of conducting wires extending lengthwise through the tube in spaced relation, a series of lead wires secured upon the wires in spaced relation and transversely to the axis of the tube, and lamps secured upon the lead wires intermediate the conducting wires and electrically connected thereto.

8. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, a pair of conducting wires extending lengthwise through the tube in spaced relation, a series of lead wires secured upon the wires in spaced relation, and transversely to the axis of the tube, and lamps secured upon the lead wires intermediate the conducting wires and electrically connected thereto, the lamps being in the form of elongated ampoules and being mounted upon the lead wires with their axes substantially in registry with the tube axis.

9. A luminous body comprising a flexible, plastic tube of light-transmitting material adapted for bending into a desired shape, a pair of conducting wires extending lengthwise through the tube in spaced relation, a series of lead wires secured upon the wires in spaced relation and transversely to the axis of the tube, and lamps secured upon the lead wires intermediate the conducting wires and electrically connected thereto, the lamps being in the form of spherical glow lamps and having the lead wires extending thereinto from opposite sides.

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