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ELECTRIC CATHODE GLOW DEVICE
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Fig. 1.

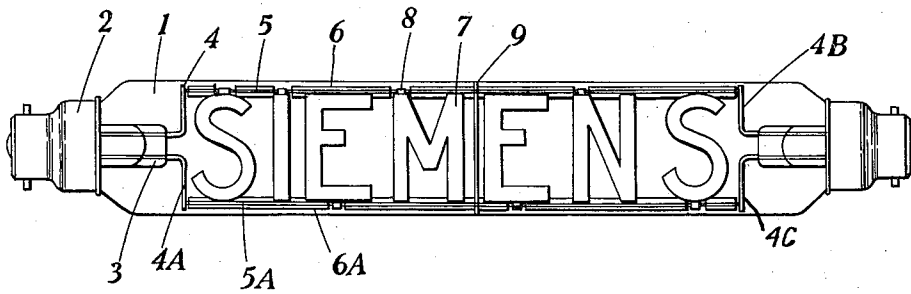
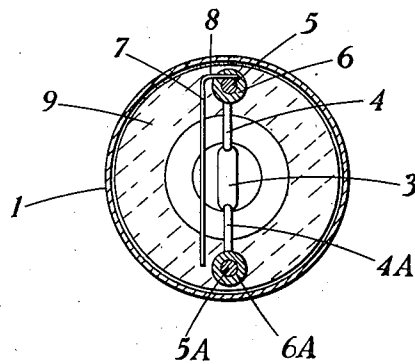


Fig. 2.



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ELECTRIC CATHODE GLOW DEVICE

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mens Electric Lamps and Supplies Limited,
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3 Claims. (Cl. 176—14)

This invention relates to electric cathode glow devices and has for its object an improved sign in which characters, or representations, are arranged in sequential formation or in line.

5 In particular the invention has in view an improved device for use with alternating current. In such devices it is desirable that the characters or representations should glow with even luminosity and as little as possible show the flickering due to the current alternations. Where the characters or representations are all attached to one bus bar, or feeding electrode, the characters are illuminated only at each alternate half cycle of the alternating current supply, and as the characters or representations must be arranged adjacent to a second bus bar or electrode, this latter would glow at the other alternate half cycle giving an undesirable result.

10 The running current value of a device depends upon the surface area of the characters and the intensity of glow required as consistent with the life of the device, the running current value being limited by the inclusion of a resistance in series with the device. Thus it will be appreciated that unless the surface area of the second bus bar approaches the surface area of the characters or representations then during the period when the former is acting as cathode it would not only give an undesired cathode glow, but owing to its smaller surface area would be overloaded and tend to produce a premature blackening of the container.

15 In the present invention in such a device the characters are attached some to one bus bar and some to another bus bar, the bus bars being connected to the alternating current supply, so that the characters on one bus bar act as opposite electrodes to the electrodes on another bus bar. In order to obtain an even illuminating effect of the characters the surface area of the characters attached to each bus bar should be substantially the same. It can of course be arranged that the characters on one bus bar glow with a greater intrinsic brilliancy than the characters on the other bus bar. As before mentioned the running current of a tube is limited by a resistance in series with the device, and therefore, if the total surface area of the characters attached to each bus bar, and of the individual characters, is substantially the same, then all of the characters will glow with substantially the same brilliancy. However, if the surface areas of the characters on the different bus bars are different, then the smaller number of characters will give a greater intrinsic glow,

and this inequality of glow can exist provided that the characters of the smaller total surface area are not overloaded.

The bus bars need not be straight but may be curved or shaped to give any desired sequential formation of characters, or more than one pair of bus bars may be used.

The bus bars may be supported by wires branching out of glass feet sealed into the opposite ends of the container enclosing the characters, the bus bars being spot welded to the wires which may be insulated.

The bus bars may be insulated except at the points where the characters are attached, the insulation suitably taking the form of glass tubing.

A current limiting device may be contained in one or both of the connecting caps.

The bus bars may be supported along their lengths by supports bearing on or depending from the walls of the tube.

The tube is exhausted of air and filled with a rare gas or mixture of gases with or without the presence of a metallic vapour or volatile element.

20 In order that the invention may be more clearly understood reference should be made to the following description read in conjunction with the accompanying drawing which is given by way of example. In the drawing Fig. 1 shows a front view of a device, and Fig. 2 a slightly enlarged and sectional view taken between two of the characters such as the letters E and N.

The container 1 shown tubular is of plain or suitably colored glass or other suitable translucent material and terminates at each end in a single point bayonet cap 2, and from the connecting point of each cap extends a connecting wire 4 and 4A, firmly sealed into and passing through the feet 3, of the container. Within each foot is also sealed a supporting wire 4A and 4B, and each of the wires 4, 4A, 4B, 4C is bent at right angles to itself so that the free ends of adjacent pairs 4, 4A and 4B, 4C are substantially at 180° to each other and lie on the same line. The wires 4 and 4B support a bus bar 5, and the wires 4A and 4C support a bus bar 5A, the wires encircling the ends of the bus bars and being spot welded thereto. The bus bars are preferably of nickel. The wires and the joints with the bus bars are coated with insulation such as a ceramic, cement, or enamel.

The characters 7, are made from thin sheet metal and each is provided with a tongue 8 which is bent at right-angles to the plane of the character and spot welded to one of the bus bars.

The bus bars, 5 and 5A, between the points of support of the characters are insulated such as by glass tubing, a ceramic, cement, or enamel, as indicated at 6 and 6A.

5 It is arranged that the surface areas of the characters on the two bars as near as possible equal each other so that maximum and even luminosity is obtained, adjacent characters acting as opposite electrodes. Obviously the characters may be arranged on the bus bars as desired.

10 At approximately the centre of the container the bus bars are supported from the walls of the container by an annulus 9 of insulating and preferably translucent material, such as mica, which fits into the container and is provided with holes through which pass the bus bars the centre aperture being provided to allow a free flow of ions from one part to the other part of the container.

20 Obviously this method of support need not be employed, but the bus bars may be supported from the wall of the container 1 in any suitable manner such as by wires extending from and sealed into the wall. Obviously this support may not be needed in a short tube.

The container and or bus bars may not be straight but may be curved or shaped to give any desired sequential formation of the character as will be appreciated.

30 In the case of the device illustrated the electrodes are formed by adjacent characters such as S and I, and E, E and M, and so on.

Within one or both of the caps 2 of the device may be inserted a current limiting series resistance for limiting the current to a suitable running value after the device has struck. In order to obtain the value of the running current, the running current necessary to give a satisfactory glow of a single character as consistent with its life is multiplied by the number of characters on a bus bar, and knowing this and the main voltage the resistance is easily calculated. It is preferred that the running current does not exceed about 1 milli-ampere per square centimetre of letter surface area, and is preferably of the order of 0.5 milli-ampere per square centimetre. The characters on their rear faces may be coated with an insulating material.

50 The container 1 before sealing is exhausted of air and filled with a gas or a mixture of gases, with or without the addition of a metallic vapour, under requisite pressures which gas or mixture upon ionization produces a luminosity of the required colour. For example the container may

be filled with neon or a mixture of neon and some other elemental gas or metallic vapour. A mixture of neon and hydrogen to pressures of 5m/m and 0.05m/m respectively of mercury is suitable. An atmosphere of neon saturated with a metallic vapour such as mercury vapour to pressures between 10 and 25 milli-metres gives suitable results. Other gases such as helium, argon, alone or in mixture with some other metallic vapour or gas such as hydrogen, may be employed.

What is claimed is:—

1. An electric cathode glow device for operation with alternating current including a sealed container, a pair of bus bars within said container and connectible to opposite leads of the electric supply, characters forming cathodic electrodes arranged in sequential formation connected some to one bus bar and some to the other bus bar such that within the sequence, an area of character connected to one bus bar is succeeded by an approximately equal area of character connected to the other bus bar, the areas acting as opposite electrodes.

2. An electric cathode glow device for operation with alternating current including a sealed container, feet projecting from the walls of and into said container, a pair of bus bars being supported between said feet, connecting caps adjacent said feet on the outside of said container, connections between the bus bars and the contact points of said caps, characters forming cathodic electrodes arranged in sequential formation and connected some to one bus bar and some to the other bus bar such that an area of character on one bus bar is succeeding by an approximately equal area of character on the other bus bar, the areas acting as opposite electrodes, and insulation covering said bus bars.

3. An electric cathode glow device for operation with alternating current including a sealed container, a pair of bus bars mounted in said container, cathodic electrodes in the form of characters connected in sequential formation some to one bus bar and some to the other bus bar such that an area of character on one bus bar is succeeded by an approximately equal area of character on the other bus bar, the said areas acting as opposite electrodes, an insulating member bearing on the wall of said container and supporting said bus bars, said member having an aperture to allow the free flow of ions and electrons along said container.

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