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ELECTRODE

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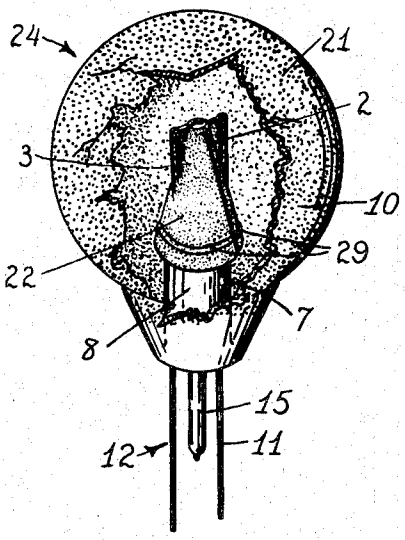

Fig. 1

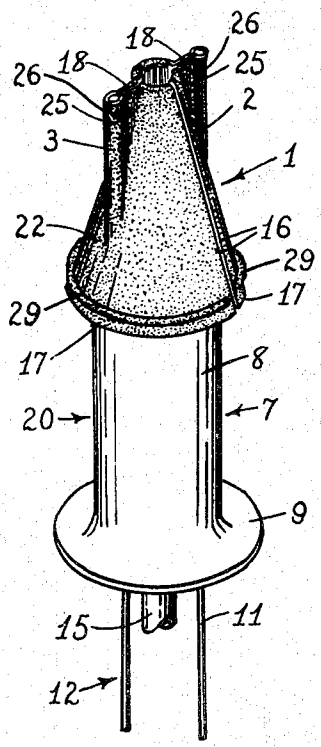

Fig. 2

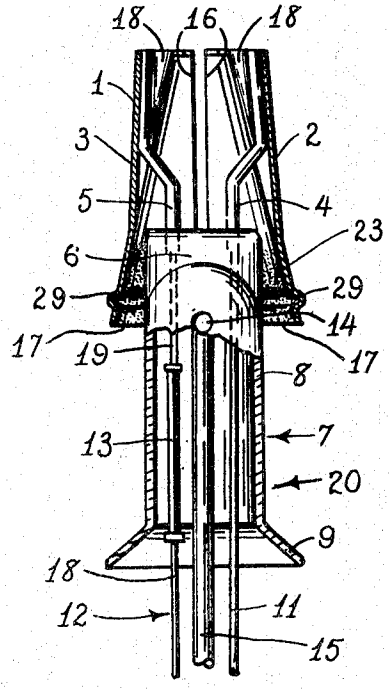

Fig. 3

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ELECTRODE

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12 Claims. (Cl. 176—126)

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This invention relates to electric gaseous discharge devices and more particularly to those of the negative glow type.

An object of this invention is to provide an electrode for a negative glow discharge lamp.

Another object of this invention is to provide an electrode which will permit maximum light output.

A further object is to provide an electrode which will permit the lamp to be started at relatively low voltages.

Another object is to provide an electrode which is especially adapted for use in a glass envelope or other suitable container which is relatively small in size.

Another object is to provide an electrode which is so constructed geometrically that it makes possible the complete and substantially uniform illumination of the entire surface of the envelope in which the electrode is sealed.

Further objects, advantages and features will be apparent from the following specification when read in conjunction with the accompanying drawing in which:

Figure 1 shows a lamp provided with the electrode assembly of our invention.

Figure 2 is a front elevational view of a lamp mount with the electrode assembly of our invention mounted thereon.

Figure 3 is a partial sectional view taken along the longitudinal axis of the mount of Figure 2.

Our invention embodies the idea of providing a glow lamp with a new and novel electrode structure and assembly which comprises two identical stamped metal members which serve as the electrodes and which, when disposed on a suitable stem, present a substantially frusto-conical structure with the longitudinal peripheral edges of the two members adjacent each other and spaced a short distance apart, and the projected apex of the complete conical structure designed to fall within the lamp bulb.

One of the main features of this construction is the fact that it makes possible uniform light distribution, free from shadows and bright spots, at all points on the lamp bulb wall. The outer surface of the frusto-conical electrode assembly is provided with a coating of electron emissive material, such as barium peroxide for example. The lamp bulb is provided with a filling of inert gas, such as argon or neon for example. When the lamp is operated on alternating current, each half of the frusto-conical electrode assembly functions alternately as the cathode and then the anode. Since the electrode assembly is substantially frusto-conical in contour and the projected apex of the cone falls within the bulb, no part of the bulb wall is hidden from the radiation originating at the surface of the electrode assembly.

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Our invention is further characterized by a novel positioning of this electrode structure with reference to the stem on which it is mounted. We have found that when this particular type of electrode structure is employed it permits the lower portion of the frusto-conical electrode structure to be fitted over the upper portion of the stem. This is a feature which is particularly desirable when the lamp in which it is used is of the bulbous type because it aids considerably in the attainment of uniform light distribution. In the structure of our invention no point on the bulb wall is substantially closer to the electrode assembly than any other point thereon. This design feature is of considerable importance because it reduces the possibility of bright spots during operation of the lamp. Many times these bright spots have been caused by the fact that certain portions of the activated electrode structure are considerably nearer the bulb wall than others, thus causing a more concentrated radiation at these points. These concentrated points of radiation are not present in our structure.

Another advantage which is obtained by the frusto-conical electrode structure of our invention is that it makes it considerably easier to apply a uniform coating of electron-emissive material thereto because the surface thereof is substantially a surface of revolution. This is an added factor which contributes to the attainment of a light source which gives uniform light distribution.

The above-described structural features makes practical the use of a stem with a long throat. This in turn permits the disposition of a ballasting resistor within the throat as an integral part of one of the lead wires. This is a distinct advantage over conventional structures which usually incorporate the resistor in the lamp base.

Referring now to the drawing, the electrode assembly 1, comprising electrode members 2 and 3, are supported by the wires 4 and 5 which are sealed in the press 6 of a stem 7. The stem 7 is provided with an elongated throat 8, the lower portion thereof being provided with a flared portion 9 which adapts the stem for sealing to a glass bulb 10. Lead wires 11 and 12 are sealed in the press 6 of the stem 7 and are connected to the wires 4 and 5 which support members 2

and 3 of the electrode assembly 1. The elongated throat 8 of the stem 7 provides a suitable chamber for a ballasting resistor 13 which forms a part of one of the lead wires. The stem press 6 is provided with an aperture 14 and a tubulation 15 through which a connection may be made to any suitable system adapted to evacuate the bulb 10 after the stem 7 has been sealed thereto.

The electrode members 2 and 3, when mounted on the wires 4 and 5, present a substantially frusto-conical structure with the longitudinal peripheral edges 16 adjacent each other and spaced a short distance apart. Each electrode member 2 and 3 is provided with a channel 18 which defines wings 25 extending longitudinally thereof, in which the upper portions of the wires 4 and 5 are seated. The wings 25 are crimped and the wires 4 and 5 are spot welded to the crimped wings at 26. The seating of a large portion of the wires 4 and 5 in these channels permits spot welding of the wires to the crimped wings at only one point without impairing the rigidity of the structure. The electrode members 2 and 3 may be provided with a circumferential rib 29 disposed adjacent the base of the electrode assembly structure. The rib 29 serves to reinforce the structure. This structural arrangement is particularly advantageous in the present application where a relatively small bulb 10 is used because it permits a more compact and sturdier mount assembly.

Another feature of the electrode assembly 1, which is particularly advantageous for the reasons above-mentioned when a small bulb is used is embodied in the disposition of the assembly 1 with respect to the stem 7. The lower edges 17 which form the base of the frusto-conical electrode assembly 1 extend down over the upper portion of the stem. This is an additional structural feature which characterizes the compact, sturdy electrode structure of our invention.

It has been the practice, whenever it was desired to incorporate a ballasting resistor in an electronic device to place it within the main body thereof and shielded from the discharge or in the base. When a device as small as the one shown and described in this application is concerned, neither of these two conventional methods proved very satisfactory. Therefore we have provided the stem 7 with an elongated throat 8, the walls thereof defining a suitable chamber within which a ballasting resistor 13 may be disposed. Thus the composite lead wire 12 comprises the wire 18 the resistor 13 and the wire 19 which is connected through the stem press 6 to the electrode-supporting wire 5.

The mount 20 which comprises the stem and electrode assemblies is sealed in a glass bulb 10, the inner wall of which is provided with a coating of fluorescent material 21. The outer surface of the electrodes 2 and 3 is provided with a suitable coating 22 of an oxide of one or more of the alkaline earth metals, such as barium peroxide for example. The inner surface of the electrodes 2 and 3 may be provided with a suitable coating 23 of zirconium or titanium metal powder to act as a getter during evacuation of the lamp 24 and to prevent emission from the inner surfaces of the electrodes 2 and 3 during operation of the lamp.

The conical design of the electrode assembly 1 is particularly adapted to the fluorescent type glow lamp. The projected apex of the complete cone surface, of which the frustum is a part is designed to fall within the bulb dimensions. This

permits the illumination of the entire bulb surface with no part of the bulb wall hidden from radiation originating at the surface of the electrode assembly, without using a continuous electrode surface such as is produced by expensive deep-drawing operations. The conical design also allows the electrode assembly to be fitted around the top portion of the stem, thus economizing on mount space and permitting a stem with an elongated throat to be used. The long-throated stem makes a sturdier mount and provides a suitable chamber for a resistor as part of one of the lead wires.

What we claim is:

1. A mount assembly for an electric gaseous discharge device comprising a stem, a pair of electrode-supporting wires sealed in and projecting from said stem, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure, the longitudinal peripheral edges of the electrodes being adjacent each other and spaced a short distance apart.

2. A mount assembly for an electric gaseous discharge device comprising a stem, a pair of electrode-supporting wires sealed in and projecting from said stem, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure, the longitudinal peripheral edges of the electrodes being adjacent each other and spaced a short distance apart and the peripheral edges which define the base of said frusto-conical structure being disposed substantially below the top of said stem.

3. A mount assembly for an electric gaseous discharge device comprising a stem having a press and an elongated throat, a pair of electrode-supporting wires sealed in and projecting from said press, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure, the longitudinal peripheral edges of the electrodes being adjacent each other and spaced a short distance apart.

4. A mount assembly for an electric gaseous discharge device comprising a stem having a press and an elongated throat, a pair of electrode-supporting wires sealed in and projecting from said press, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure, the longitudinal peripheral edges of the electrodes being adjacent each other and spaced a short distance apart, and the peripheral edges which define the base of said frusto-conical structure being disposed substantially below the top of said stem.

5. A mount assembly for an electric gaseous discharge device comprising a stem having a press and an elongated throat, a pair of electrode-supporting wires sealed in and projecting from said press, a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure, the longitudinal peripheral edges of the electrode being adjacent each other and spaced a short distance apart, a pair of lead wires connected through the stem press to said electrode-supporting wires and extending through a chamber defined by said elongated throat, and a resistor connected to one of said lead wires and disposed within the chamber defined by the elongated throat of the stem.

6. A mount assembly for an electric gaseous discharge device comprising a stem having a press and an elongated throat, a pair of electrode-supporting wires sealed in and projecting from said press, a pair of electrodes mounted on said wires, said electrodes defining a substantially

frusto-conical structure, the longitudinal peripheral edges of the electrode being adjacent each other and spaced a short distance apart, and the peripheral edges which define the base of said frusto-conical structure being disposed substantially below the top of said stem, a pair of lead wires connected through the stem press to said electro-supporting wires and extending through a chamber defined by said elongated throat, and a resistor connected to one of said lead wires and disposed within the chamber defined by the elongated throat of the stem.

7. An electric gaseous discharge device comprising a glass envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projecting upwardly from said stem into the chamber defined by said glass envelope and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope.

8. An electric gaseous discharge device comprising a glass envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projecting upwardly from said stem into the chamber defined by said glass envelope, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, the peripheral edges which define the base of said frusto-conical structure are disposed substantially below the top of said stem, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope.

9. An electric gaseous discharge device comprising a glass envelope, a filling of an inert gas in said envelope, a coating of luminescent material on the inner wall of said envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projecting upwardly from said stem into the chamber defined by said glass envelope and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope.

10. An electric gaseous discharge device comprising a glass envelope, a filling of an inert gas in said envelope, a coating of luminescent material on the inner wall of said envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projecting upwardly from said stem into the chamber defined by said glass envelope, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, the peripheral edges which define the base of said frusto-conical structure are disposed substantially below the top of said stem, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope.

11. An electric gaseous discharge device comprising a glass envelope, a filling of an inert gas in said envelope, a coating of luminescent material on the inner wall of said envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projecting upwardly from said stem into the chamber defined by said glass envelope and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope, and a coating of electron-emissive material on said electrodes.

12. An electric gaseous discharge device comprising a glass envelope, a filling of an inert gas in said envelope, a coating of luminescent material on the inner wall of said envelope, a stem sealed in said envelope, a pair of electrode-supporting wires sealed in and projected upwardly from said stem into the chamber defined by said glass envelope, and a pair of electrodes mounted on said wires, said electrodes defining a substantially frusto-conical structure in which the longitudinal peripheral edges of the electrodes are adjacent each other and spaced a short distance apart, the peripheral edges which define the base of said frusto-conical structure are disposed substantially below the top of said stem, and the projected apex of the cone-like structure falls within the chamber defined by the glass envelope, and a coating of electron-emissive material on said electrodes.

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