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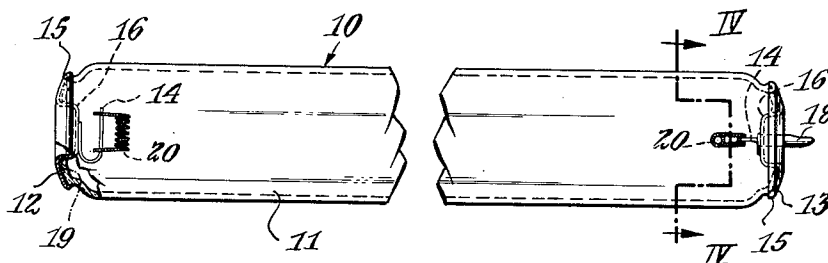
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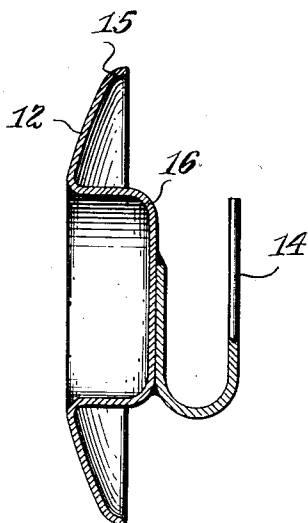
GAS DISCHARGE LAMP AND METHOD OF MAKING

Filed June 25, 1937

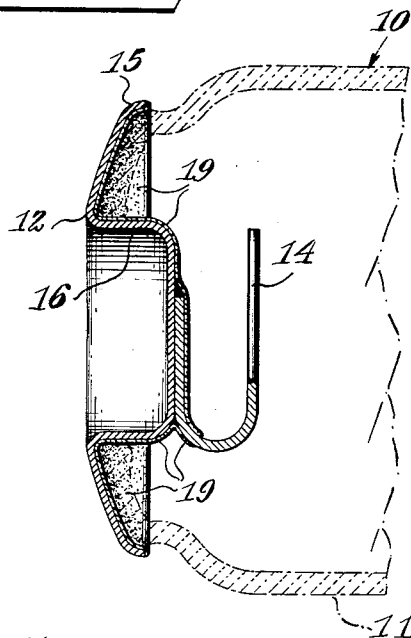
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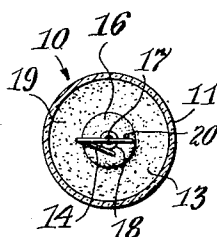
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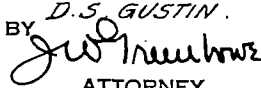


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GAS DISCHARGE LAMP AND METHOD OF MAKING

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12 Claims. (Cl. 176—126)

This invention relates to gas discharge lamps and, more particularly, to such as fluorescent "Lumiline" type lamps which have metal contact caps at their ends to carry the electrodes.

The principal object of our invention, generally considered, is to improve on gas discharge lamps having metal caps serving as leading-in conductors, in order to avoid heating up of said caps to an undesirable extent, and other troubles.

Another object of our invention is the manufacture of gas discharge lamps comprising tubular envelopes, the ends of which are closed by caps serving as leading-in conductors and each carrying one of the electrodes, each cap being interiorly coated with a film of glass to prevent the arc striking it and unduly heating the same.

A further object of our invention is the manufacture of discharge lamps in which the electrodes are carried by end caps, including the coating of the interior surface of said caps with glass, as by finely powdering said glass, mixing it with a binder, spraying the mixture on said caps, and firing at such a temperature that the binder is decomposed and the glass fused to the caps.

Other objects and advantages of the invention, relating to the particular arrangement and construction of the various parts will become apparent as the description proceeds.

Referring to the drawing illustrating our invention:

Fig. 1 is a fragmentary side elevational view, partly in longitudinal section, of a fluorescent "Lumiline" lamp embodying our invention.

Fig. 2 is an enlarged longitudinal sectional view of one of the metal end caps, removed from the lamp, before glazing and application of the associated electrode thereto.

Fig. 3 is a similar longitudinal sectional view of the metal cap, after being coated with glass, before the associated electrode has been connected thereto, the adjacent end of the glass envelope being fragmentarily shown in dot-dash lines.

Fig. 4 is a transverse sectional view on the line IV—IV of Fig. 1 in the direction of the arrows.

In manufacturing gas discharge lamps, and particularly those of the fluorescent "Lumiline" type in which the ends of a cylindrical or tubular envelope are closed by metal contact caps which carry the electrodes, we have observed that quite frequently when such lamps are operated, the discharge, instead of moving to the electrodes, will strike the metal caps. When this

happens, the electrodes carried by the caps will act only as cathodes, while the caps will act as anodes. This causes these caps or ends to heat up to an undesirable degree, resulting in undue heating of the socket, which takes heat away from the electrodes carried thereby, which electrodes should be maintained at an electron-emitting temperature by the discharge so as to operate efficiently as cathodes.

We have found that this trouble can be avoided if these caps are glazed or coated interiorly with a film of glass, or other refractory insulating material, before sealing to the tube or envelope. The same kind of glass is desirably used for the coating as for forming the bulb. A preferred method of application comprises finely powdering the glass, mixing it with a suitable liquid binder, such as nitrocellulose in amyl acetate, and spraying it onto the inner surface of the cap before connection with the tube or envelope. The sprayed cap is then fired to decompose the binder and fuse the glass to the cap. Before spraying, a lead wire is fused to the inner surface of the cap in order to provide for carrying the associated electrode.

Now referring to the drawing in detail, like parts being designated by like reference characters, there is shown a gas discharge lamp 10 comprising a tubular or cylindrical envelope 11, closed at its ends by discs or caps 12 and 13 formed of suitable material such as "Alleghany" metal or alloy containing from 25% to 28% of chromium and the remainder iron, each cap being adapted to serve as a contact and leading-in conductor for the lamp, and carrying a lead wire or conductor 14 fused to its inner surface.

Each cap desirably has its peripheral portion 15 formed slightly concave inwardly, or generally spherically curved, as shown most clearly in Fig. 2, and its central portion inwardly dished or embossed, as indicated at 16. One of the caps, 13 for example, is provided with a central exhaust aperture 17, and carries an exhaust tube 18 connected therewith.

After welding the lead wires 14 to the caps 12 and 13, each cap has its interior surface sprayed with a mixture of powdered glass, preferably the same kind of glass as that forming the envelope 11, and a binder liquid such as nitro-cellulose in amyl acetate, forming a coating 19. As will be seen from Fig. 3, this coating desirably covers the entire inner surface of the cap 12 and a portion of the lead wire 14 extending therefrom. The cap and its lead wire is then fired to such a temperature that the binder is decomposed and

the glass fused to the cap. The electrodes 20, which in the present embodiment, are each in the form of a coiled wire which may be oxide coated, are then welded to the cap lead wires 14, as shown most clearly in Fig. 1. The caps 12 and 13 are then secured to the ends of the envelope 11, by overlapping the end portions of the envelope with the coated peripheral generally spherical portions of the caps and sealing the engaging relatively large surfaces of said envelope and caps, as illustrated in Fig. 3, the coating 19 of glass facilitating the operation of connecting the caps to the envelope, and improving the bond therebetween. The embossed portions 16 extend inwardly beyond the inner surfaces of the overlapping end portions of the envelope, and serve to protect them from the heating effects of the discharge.

The discharge lamp illustrated may be of any desired type, but, in the present embodiment, the envelope is supposed to be filled with a rare gas at a reduced pressure and coated on its inner surface with fluorescent material forming what is generally designated as a fluorescent "Lumiline" type lamp.

Although a preferred embodiment of our invention has been illustrated and described, it will be understood that modifications may be made within the spirit and scope of the appended claims.

We claim:

1. A lamp comprising an envelope, a metal contact cap, substantially the entire inner surface of said cap being coated with insoluble insulating material, the cap-adjacent portion of said envelope overlapping only the peripheral portion of the coated face of said cap and sealed thereto, for effecting closure of said envelope.

2. A discharge lamp comprising a tubular glass envelope, metal contact caps, substantially the entire inner surfaces of said caps being coated with the same kind of glass, the cap-adjacent portions of said envelope overlapping only the peripheral portion of the coated face of each cap and sealed thereto, for effecting closure of said envelope.

3. A discharge lamp comprising a tubular envelope, the ends of which are overlapped by the peripheral portion, and closed by, metal contact caps, the inner surfaces of said caps being embossed inwardly of the inner surfaces of the overlapped end portions of said envelope, carrying lead wires, and coated with glass.

4. A discharge lamp comprising a tubular envelope, the ends of which are bent inwardly and closed by metal contact caps sealed to the outer surfaces thereof, lead wires secured to the inner surfaces of said caps, an electrode carried by each lead wire and a coating of glass on the inner surface of each cap and the adjacent portion of said lead wire, that portion of each cap inward of the seal with the envelope being em-

bossed inwardly of the inner surface of the connected end portion of the envelope.

5. A discharge lamp comprising a generally cylindrical envelope open at its ends, and metal contact caps coated on their inner surfaces with glass and sealed to the ends of said envelope for closing the same, each cap comprising an inwardly embossed portion carrying an electrode and an outwardly extending flange portion concavely curved inwardly and sealed to the outer surface of the adjacent end portion of said envelope.

6. A contact cap for a discharge lamp comprising a centrally embossed portion and an outer, generally spherically curved flange extending therefrom, the concave surface of said flange and the contiguous surface of the embossed portion being coated with a film of glass.

7. The method of making a lamp comprising coating, with insulating material, the interior surfaces of contact caps for said lamp, and overlapping and sealing end portions of the lamp envelope to coated peripheral surface portions of said contact caps.

8. The method of making a lamp comprising forming a tubular open-ended envelope of glass, forming contact caps adapted to close the ends of said envelope, coating the envelope-adjacent surfaces of said caps with glass of the same kind as that of the envelope, overlapping the end portions of said envelope with the coated peripheral portions of said caps and sealing the engaging surfaces of said envelope and caps.

9. The method of making a contact cap for an electrical device comprising forming a cap from metal, and coating one side thereof with a suspension of powdered glass.

10. The method of making a contact cap for an electrical device comprising forming a cap from metal, spraying the inner surface with a suspension of powdered glass in a binder, and firing to decompose the binder and cause the glass to fuse on said surface.

11. A contact cap for a discharge lamp comprising a hollow generally cylindrical portion terminating at one end in a flat central closure and at the other end in a generally spherically curved flange, said flat closure carrying an electrode and the inner surface of said cap and the connected portion of said electrode being coated with a film of glass.

12. A lamp comprising a tubular envelope, metal contact caps closing the ends and sealed to the outer surfaces thereof, a conductor secured to the inner surface of each of said caps and with its inner portion spaced therefrom and a coating of insulating material on the inner surface of each cap and the adjacent portion of said conductor, that portion of each cap inward of its peripheral portion which is sealed to the envelope being embossed toward the other cap.

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