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ELECTRIC LAMP AND SIMILAR DEVICES

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Fig. 1.

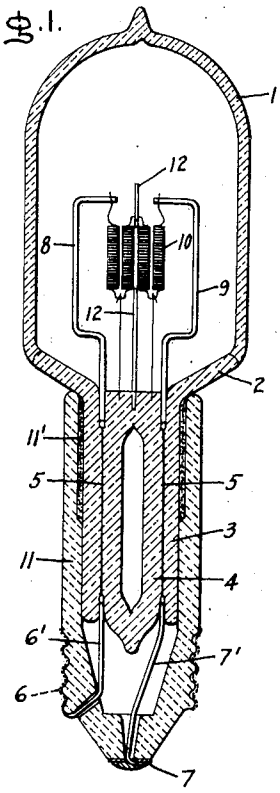
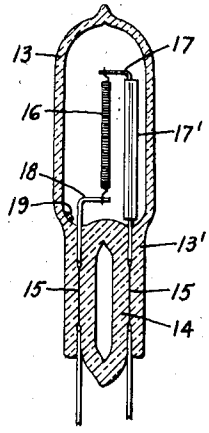


Fig. 2.



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ELECTRIC LAMP AND SIMILAR DEVICES

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3 Claims. (Cl. 176—38)

Our invention relates to electric lamps and similar devices generally, and more particularly to a seal for the leading-in conductors, especially where the said leading-in conductors are sealed in quartz or a high silica glass similar to quartz.

It has been suggested heretofore that in order to obtain a thermally and mechanically strong hermetic seal of conductors in quartz or high silica glass the said conductors be made in the form of extremely thin ribbons or foils, particularly molybdenum foils having a thickness of less than 20 microns. Tests have shown that with such foil or ribbon conductors it is possible to obtain, by properly designing the seal, single ended electric incandescent lamps, particularly projection lamps carrying a high load, which are easy to manufacture and will withstand high stresses.

According to our invention the incandescent electric lamp comprises a bulb of quartz or glass with a high silicic acid content having an outwardly extending stem or neck portion in which the ribbon-like conductors are sealed, preferably between a rod or tube and a surrounding stem tube which may be the neck portion of the bulb. In the manufacture of these lamps, the ribbons are inserted in the narrow annular gap between the stem tube and the axially disposed rod or tube, the said annular gap is evacuated and the stem tube, and consequently also the axial tube, is heated by means of external flames whereby the softened stem tube is pressed tightly against the ribbons which are held in position and supported by the axial rod or tube, while the other points of the stem tube melt and form a cylindrical body together with said rod or tube. The new lamp construction is particularly advantageous for high intensity projection lamps, especially those lamps containing a filling of a chemically inert gas or vapor such as mercury vapor or mixtures thereof at high pressures of above one atmosphere for example.

A particularly good seal is obtained when a counter pressure is produced within the axially disposed tube during the sealing process. This pressure may be produced, for example, by connecting the tube to a high pressure line or by employing a tube which is closed at both ends and contains a gas or vapor filling of such quantity that the heating which occurs during the sealing produces the desired gas or vapor pressure. The amount of pressure is so controlled that even when a thin-walled tube is used, collapsing of the soft tube wall is avoided and up to a certain extent the tube wall is pressed outward against the contracting external stem tube so that the ribbons are embedded under pressure.

Where a tube is arranged axially within the stem tube it may, if desired, constitute the exhaust tube of the bulb, particularly where the bulb is filled with gases. However, if desired, an additional leading-in conductor, for example a fine tungsten wire, may be sealed into the axis of the stem tube. In certain instances, if may also be desirable to flatten the axially disposed rod or tube at the points where the ribbons are located, or to employ a rod or tube of prismatic shape, for example a flat rectangular rod with the ribbon arranged on each of the wide sides.

For a further understanding of our invention, reference may be had to the drawing in which Figs. 1 and 2 are elevations, in section, of two forms of incandescent lamps comprising our invention.

The projection lamp shown in Fig. 1 comprises a heavy-walled bulb 1 of quartz sealed to the annular flange 2 of an outwardly extending stem comprising a quartz stem tube 3 and an axially arranged inner quartz tube 4. Thin ribbons or foils 5—5 of refractory metal, such as molybdenum for example, are sealed between said tubes 3 and 4 and serve as the leading-in conductors together with our lead wires 6', 7' and inner lead and support wires 8, 9 connected to the ends thereof. A filament 10 is supported by and connected at its ends to said inner lead wires 8, 9. The outer lead wires 6', 7' are connected to a screw thread contact 6 and an end contact 7, of metal powder for example, on a ceramic base 11 which surrounds the stem 3, 4 and is attached thereto by cement 11'. A support wire 12 is sealed into the upper or inner end of tube 4 and serves as an additional support for the filament 10.

The device shown in Fig. 2 is a high-pressure mercury lamp comprising a quartz bulb 13, the neck portion 13' of which surrounds a small quartz tube 14 closed at both ends, said neck portion 13' and tube 14 comprising an outwardly extending stem. The molybdenum strips or foils 15—15 which serve as portions of lead-in conductors are sealed between the axial tube 14 and bulb neck 13'. A filament 16 extends axially of the bulb 13 and is supported at its ends by inner lead-in wires 17 and 18, lead-in wire 17 having thereon an insulating covering 17' such as a vitreous tube. The bulb 13 contains a gaseous filling comprising rare gases or nitrogen or mixtures thereof and also a small quantity of mercury 19 which, during operation, may be com-

pletely vaporized and which supplies the desired high vapor pressure of, for instance, ten atmospheres.

When it is desired to use the tube 14 or 4 for evacuation and gas filling of the bulb, the upper or inner end thereof is left open, and the lower or outer end thereof is sealed in the usual manner after the bulb has been filled with the desired gas or vapor. During the sealing-in of the lead-in conductors a pressure may be produced within the tube 14 or 4 by closing both ends of said tube after it has been filled with a suitable quantity of gas or vapor so as to develop the desired pressure when heated by the sealing flames. Support wires such as wire 12 may also be employed for supporting other internal elements, such as a reflector arranged behind the filament. Also, if desired, an additional lead-in conductor may be extended axially through tube 4 or 14.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A high-intensity electric lamp comprising a bulb of high-silica vitreous material containing a light source, a stem of high-silica vitreous material extending outwardly from said bulb and comprising a stem tube and an inner tube extending axially of said stem tube, lead-in conductors of thin refractory metal extending along and fused in said stem between said tubes, and inner lead-in conductors connected to said first-mentioned conductors and to said light source, said inner tube being sealed at both ends and containing a gaseous filling used for creating a pressure in said tube during the sealing-in of said first-mentioned lead-in conductors.

2. The method of manufacturing a stem which comprises assembling a vitreous stem tube, a vitreous inner tube extending axially within said stem tube and sealed at both ends with a gaseous filling therein, and lead-in conductors extending longitudinally between said tubes, and then applying heat to fuse said tubes together with the said leading-in conductors sealed therebetween, the gaseous filling in said inner tube being expanded by the heat to exert a pressure expanding the walls of said tube against said lead-in conductors and the surrounding stem tube.

3. An electric lamp comprising a bulb of vitreous material containing a light source, a stem of vitreous material at an end of said bulb comprising a stem tube and an inner tube extending axially of said stem tube, and lead-in conductors having portions extending along and fused in said stem between said tubes, said conductors extending into said bulb to said light source, said inner tube being sealed at both ends and containing a gaseous filling used for creating a pressure in said tube during the sealing-in of said lead-in conductors.

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