Patented Oct. 6, 1931 1,826,387

UNITED STATES PATENT OFFICE

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METHOD OF DEADENING MERCURY IN BLUE NEON TUBES

No Drawing. Application filed February 10, 1927. Serial No. 167,374.

This invention relates to vacuum tube lighting systems of the kind in which the passage of a high potential alternating current through a column of more or less rarefied gas in a tube causes the tube contents to glow and radiate light. More particularly, the invention relates to such systems in which the tube contents comprises a gas, such as neon, and a metallic vapor. Such tubes are properly termed gaseous conductor tube lamps.

When such a lighting system is used commercially, as for advertising sign lighting, the tubes or portions thereof are frequently dispcsed in a substantially vertical position, in which event, during periods of inactivity, the mercury vapor tends to condense and collect in the lowermost portions of the tubes and in all circumstances, it has been found quite difficult to maintain an even distribution of the mercury throughout the tube.

The present invention has for its object to effect an even distribution of the mercury throughout the tube under all conditions, that is, to deaden the motion of the mercury in the tube so that it may not tend to collect in certain areas and leave portions of the tube free of mercury. To this end the mercury is caused to collect in small globules on the walls of the tube throughout its entire length during periods of inactivity of the tube. It has been discovered that an amalgamation of the mercury with a small percentage of one of the elements of the alkali metals group, lithium, sodium, potassium, rubidium, or cæsium, will cause the mercury to adhere readily on condensation to the walls of the tube in the form of small globules.

In order that the invention may be clearly understood and readily carried into effect, one method of preparing an amalgam suitable for use in rarefied gas tubes will now be described using potassium as an example, it being understood that the temperatures and proportions, as well as the steps outlined, are given by way of example only and may be varied according to circumstances.

The amalgam may be prepared by heating pure mercury to from about 67° C. to 73° C. and immersing beneath the surface of the heated mercury, with the aid of a pair of tweezers, small pieces of clean and pure potassium metal. The potassium melts rapidly and forms a potassium mercury amalgam. The two metals are stirred to diffuse thoroughly and the oxide or scum is skimmed off. Preferably the amalgam should contain not more than 1½% of potassium.

The amalgam should be kept free from moisture. Best results are obtained when freshly prepared amalgam is used in the tubes.

When the mercury is thus amalgamated with one of the elements of the alkali metals group, its tendency is to collect during periods of tube inactivity, in small globules over the walls, which readily vaporize upon the passage of current through the tube and thus insure the presence of the metallic vapor evenly distributed throughout the tube.

Various modifications may be made in the proportions and temperatures entering into the preparation of the amalgam, as well as in the composition thereof, dependent to some extent upon the particular conditions under which the tube operates, without departing from the spirit and scope of the invention.

What I claim is:—

1. A glow discharge luminescent tube containing an amalgam of mercury and an alkali metal, said tube, when on open circuit, having the mercury distributed over the interior surface thereof in the form of small globules, whereby the mercury is readily vaporized upon the passage of current.

2. A glow discharge luminescent tube containing an amalgam of mercury and potassium, said tube, when on open circuit, having the mercury distributed over the interior surface thereof in the form of small globules, whereby the mercury is readily vaporized upon the passage of current.

3. A glow discharge luminescent tube containing an amalgam of mercury with not more than 1½% of alkali metal, said tube, when on open circuit, having the mercury distributed over the interior surface thereof in the form of small globules, whereby the

mercury is readily vaporized upon the passage of current.

4. A glow discharge luminescent tube containing an amalgam of mercury with not more than 1½% of potassium, said tube, when on open circuit, having the mercury distributed over the interior surface thereof in the form of small globules, whereby the mercury is readily vaporized upon the passage of current.

5. The method of processing and operating a glow discharge luminescent tube which comprises charging the tube with a rare gas and with an amalgam of mercury with an alkali metal and discharging currents of the order of 15 to 30 milliamperes through the tube at high voltages whereby the mercury is deposited and distributed upon the interior surface of the tube as fine globules and whereby development of the blue color of the tube upon starting is facilitated.

In testimony whereof I affix my signature.

LEO L. BECK.