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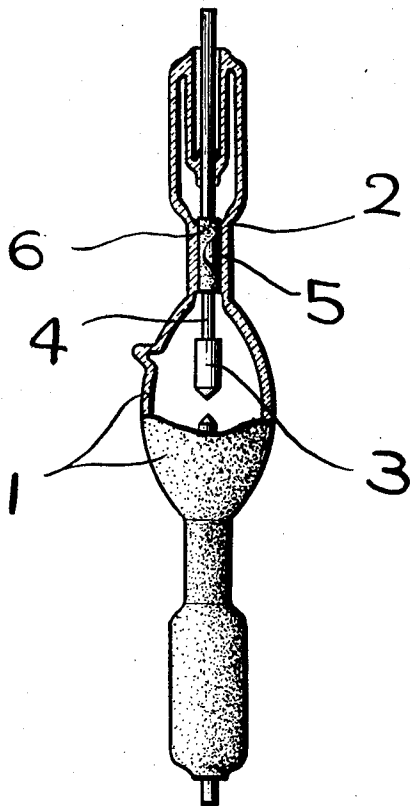
[54] **GASEOUS DISCHARGE TUBE WITH METALLICALLY COATED, ELECTRODE SUPPORT PORTIONS**
2 Claims, 2 Drawing Figs.

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313/220
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217, 218, 220, 43; 174/50.64, 50.58, 50.61;
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ABSTRACT: A discharge tube characterized in that a coat of an element selected from the group consisting of rhenium, niobium and rhodium is applied to a supported portion of an electrode or an electrode supporting member of an electrode which is supported by an electrode supporting portion of a quartz or glass envelope of the discharge tube.



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Fig. 1

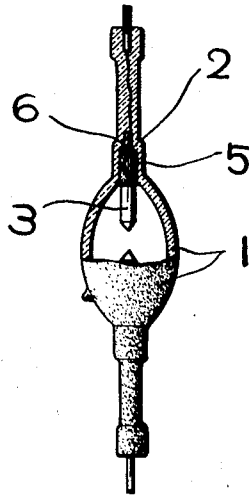
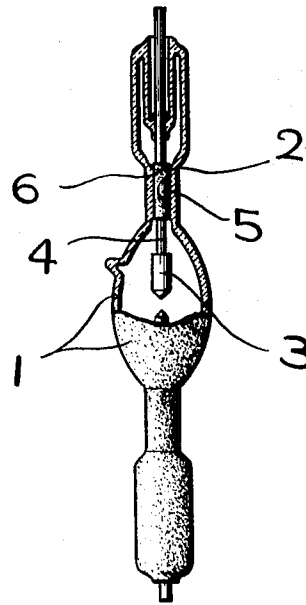


Fig. 2



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GASEOUS DISCHARGE TUBE WITH METALLICALLY COATED, ELECTRODE SUPPORT PORTIONS

DISCLOSURE

The present invention relates to a discharge tube.

In making discharge tubes including an envelope formed of quartz or glass, there is a disadvantage in that since quartz and glass have melting points of about 1,750° C. And about 500° to 700° C. Respectively, it is impossible to effect sealing of the glass or quartz envelope and an electrode or an electrode supporting member by heating same in the neighborhood of the above temperatures for mechanically holding the electrode or the electrode supporting member by the envelope without causing melt adhesion of the surface of the electrode or electrode supporting member formed of tungsten, molybdenum or other heat resisting metals with the glass or quartz envelope during the sealing operation. If this occurs, the quartz or glass envelope may develop cracks after sealing is completed due to differences in the coefficient of thermal expansion between tungsten, molybdenum or the like and quartz or glass as the temperature is lowered. Such adhesion may be prevented if sealing is effected at low temperatures with great care, but advanced skill is required in maintaining the heating temperature at an optimum level, so that this practice is not suitable for common use.

It has hitherto been customary to apply a sheath of molybdenum foil of less than about 0.02 mm. thick to a supported portion of an electrode or an electrode supporting member by winding same thereon so that the supported portion of the electrode or the electrode supporting member can be supported by an electrode supporting portion of quartz or glass through said molybdenum foil. This arrangement is effective in reducing cracks occurring in the glass or quartz envelope because the small thickness of the molybdenum foil makes it possible to minimize strain caused to develop in the portion of quartz or glass in contact with the molybdenum foil by a difference in thermal expansion between molybdenum and quartz or glass when there occurs melt adhesion between these substances. Also, no internal stresses are caused to develop by a difference in the coefficient of thermal expansion between the molybdenum foil and the electrode or the electrode supporting member because no melt adhesion occurs between them when heated to about 1,750° C.

However, the conventional method described above is not without disadvantages. The sheath of molybdenum foil applied to the electrode or the electrode supporting member by winding tends to develop wrinkles, thereby marring the appearance and markedly reducing marketability of the product. There may also develop irregular gaps in which mercury is accumulated in the case of a mercury lamp and effective amount of mercury in the discharge space is varied thereby, causing variations to occur in lamp voltage and light volume. Thus, it becomes difficult to produce discharge lamps of constant performance.

The present invention obviates disadvantages of the prior art described above. In general, when quartz is heated to above its melting point temperature or 1,300° to 1,750° C. while maintained in contact with a metal material, there is shown a strong tendency to melt adhesion between the two substances when the metal material is tungsten, molybdenum, tantalum or the like. If, however, rhenium, niobium or rhodium is added to tungsten, molybdenum, tantalum or the like, melt adhesion does not occur between any of these substances and quartz even if heated for a prolonged period in vacuum. This is supported by experimental data. It is believed that rhenium, niobium and rhodium having a melting point of above 1,750° C. which are weakly oxidizable are not combined chemically with quartz but maintained in contact therewith physically when heated.

The present invention has as its object the provision of a discharge tube which utilizes this property of rhenium, niobium and rhodium. Other objects and advantages of the invention will become apparent from consideration of the descrip-

tion set forth hereunder when considered in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevation of one embodiment of this invention, with certain parts being cut out; and

FIG. 2 is a front elevation of another embodiment of the invention, with certain parts being cut out.

Preferred embodiments of the invention will now be explained with reference to the accompanying drawings. In the drawings, 1 refers to a quartz or glass envelope of a discharge tube, 2 to an electrode supporting portion thereof, 3 to an electrode, 4 to an electrode supporting member made of a heat resisting metal, such as tungsten, molybdenum, tantalum or the like, 5 to a supported portion of the electrode 3 or the electrode supporting member 4, and 6 to a coat of rhenium, niobium or rhodium of 0.001 to 10 μ thick applied to the surface of the supporting portion 5.

In an embodiment shown in FIG. 1, the supported portion 5 of the electrode 3 is directly supported by the electrode supporting portion 2 of the envelope 1, while in another embodiment shown in FIG. 2, the electrode supporting portion 2 of the envelope 1 supports the supported portion 5 of the electrode supporting member 4 of the electrode 3. The coat of rhenium, niobium or rhodium 6 is applied to the surface of the supported portion 5 of the electrode 3 in the embodiment of FIG. 1 and to the surface of the supported portion 5 of the electrode supporting member 4 in the embodiment of FIG. 2.

In the discharge tube according to this invention, the coat of rhenium, niobium or rhodium 6 is applied to the surface of the supported portion 5 of the electrode 3 or the electrode supporting member 4 which is brought into close contact with the electrode supporting portion 2 of the envelope 1 of the discharge tube as aforementioned. The provision of the coat 6 is conducive to preventing adhesion between the electrode supporting portion 2 of the envelope 1 and the supported portion 5 of the electrode 3 or the electrode supporting member 4. No adhesion occurs between the coat 6 and the electrode supporting portion 2 of the envelope 1, either. This ensures that the electrode 3 or the electrode supporting member 4 is firmly held mechanically at its supported portion 5 by the electrode supporting portion 2 of the envelope.

Owing to cooling after sealing is effected, there may develop between the electrode supporting portion 2 of the envelope 1 and the electrode 3 or the electrode supporting member 4 fine gaps whose dimensions are determined theoretically by a difference in the coefficient of thermal expansion between the substances involved. Such fine gaps can act as a buffer for easing the strain caused in these substances by thermal expansion and contraction when the lamp is turned on or off. In the case of mercury lamps, it is only a small amount of mercury that is accumulated in these fine gaps, and moreover the amount is constant, so that such gaps exert to adverse influences on the performance of the lamps. The lamps show no variations in lamp voltage and light volume. Moreover, the additional operation of winding a molybdenum foil can be eliminated in this invention, thereby contributing to increased production efficiency.

We claim:

1. A discharge tube comprising a spherical vitreous container having two tubular extensions thereon, two electrodes made of tungsten or molybdenum sealed therein, a gaseous or vaporous atmosphere therein, seal members in said tubular extensions, metallic lead wires for connecting an electric source to said electrodes, vitreous electrode supporting portions on said tubular extensions for supporting portions of said electrodes, and metal coatings applied to said portions of the electrodes, said metal coatings being made of a metal selected from the group consisting of rhenium, niobium and rhodium and having a thickness of 0.001 to 10 μ .

2. A discharge tube comprising a spherical vitreous container having two tubular extensions thereon, two electrodes made of tungsten or molybdenum sealed therein, a gaseous or vaporous atmosphere therein, seal members in said tubular extensions, electrode supporting rods for supporting said elec-

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trodes and connecting an electric source to said electrodes, vitreous rod supporting portions on said tubular extensions for supporting portions of said electrode supporting rods, and metal coatings applied to said portions of the electrode sup-

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porting rods, said metal coatings being made of a metal selected from the group consisting of rhenium, niobium and rhodium and having a thickness of 0.001 to 10 μ .

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