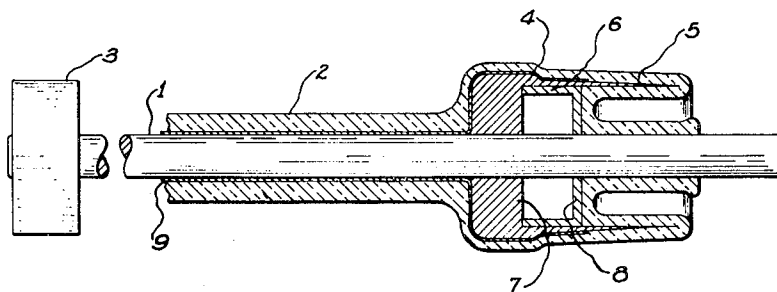


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QUARTZ-TO-METAL SEAL

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QUARTZ-TO-METAL SEAL

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2 Claims. (Cl. 176—126)

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This invention relates to quartz-to-metal seals for high pressure discharge devices, such as high pressure mercury vapor discharge lamps.

In my co-pending application Serial No. 24,523, filed May 1, 1948, which application is assigned to the assignee of the present application, a quartz-to-metal seal in the form of a stem comprising a conductor and a thimble hermetically united around the conductor and having a feathered sealing edge embedded in and making a fused hermetic joint with the wall of the stem tube is disclosed and claimed. The principal object of my invention is to provide an improved seal of this type also in the form of a stem and capable of withstanding even higher vapor pressures. Further objects and advantages of the invention will appear from the following description of a species thereof and from the accompanying drawing in the single figure of which a seal in the form of a stem embodying the invention is shown in an elevational, partly sectional fragmentary view.

Referring to the drawing, the lamp stem comprises a tube 1 of vitreous material, such as quartz, through which extends a thick conductor rod 2, of tungsten, for example, having an electrode of refractory metal 3 which may be of tungsten mounted on its inner end. The tube 1 is provided with a flare at its inner end (not shown) for fusion with the walls of an opening in a spherical quartz envelope to close the opening and support the electrode 3 in proper position therein. The quartz envelope may have another stem of similar structure provided with a cooperating electrode all as disclosed in the aforesaid co-pending application.

In order to conduct large currents to the lamp, which may have a current consumption of 10 kilowatts and higher, the rod 2 must be of substantial thickness. It is well known that fused joints between the metal rod and quartz which will be gas-tight over a temperature range of hundreds of degrees centigrade cannot be made when the metal conductor is thick enough to conduct such heavy currents. In the stem structure shown in the drawing, and in the similar structure disclosed in the co-pending application, the quartz stem tube 2 is not fused, therefore, to the conductor rod. Instead, a thimble of metal 4, such as molybdenum, is hermetically united around the rod 1, by a brazed platinum joint, for example, and a thin feathered sealing edge 5 on the thimble is embedded in the wall of the quartz tube 2 which is hermetically

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fused therewith to constitute the seal between the rod 1 and the tube 2.

In the aforesaid co-pending application a spacer having a cylindrical part around the rod and engaging the rod and the end wall of the thimble, and having also a disc-like flange at its end toward the open end of the thimble is provided between the rod and the inner wall of the thimble to keep these parts in alignment during manufacture of the seal and also to close off the inside of the thimble above its sealing edge portion. Thus, during manufacture the quartz is fused only to the inner and outer surfaces of the said sealing edge portion and not to the inner surface of the thicker portions of the thimble which avoids cracking of the seal.

While such seals successfully withstand temperature changes of hundreds of degrees centigrade and pressures of the order of many atmospheres, such as the mercury vapor pressure in high pressure quartz arc lamps, the part of the cylindrical thimble wall between feathered sealing edge portion and the end wall of the thimble is unsupported against the force of the pressure in the lamp during operation tending to bow it inward.

In the stem shown in the drawing, this portion of the cylindrical thimble wall is supported against such forces by a spacer including a cylindrical part 6 engaging the said cylindrical thimble wall and the end wall 7 of the thimble and a disc part 8 engaging the rod 1 and constituting an inwardly extending annular flange. The spacer 6, 8 thus serves to align the rod 1 and the thimble 4, prevents the plastic quartz going into the thimble beyond the sealing edge portion 5 during fabrication of the stem and, in addition, supports the portion of the thimble wall between the feathered sealing edge portion 5 and the end wall 7 against forces tending to bow it inward. The stem structure disclosed herein is thus capable of withstanding even higher pressures than that disclosed and claimed in the co-pending application.

A thin molybdenum foil 9 is wrapped around the rod and the outer surface of the thimble back from the sealing edge to prevent the quartz tube 2 sticking thereto during fabrication of the stem.

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

1. In a high pressure resistant stem comprising a high softening point vitreous stem tube, a refractory metal conductor rod extending through said

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tube, a refractory metal thimble wholly within said tube, hermetically united to and around said rod and having a relatively thin cylindrical wall tapering to a sealing edge and with its said edge embedded in the wall of said tube to hermetically seal off the space between the tube and the outside of the thimble from the space in the thimble, a refractory metal spacer member within the thimble and around the rod and having a cylindrical part engaging the inner surface of the cylindrical thimble wall to strengthen the said wall against forces tending to collapse it and having also an inwardly extending annular flange disposed around the rod and adjacent the inner end of the sealing edge to mechanically close the annular space between the rod and the thimble and limit the flow of plastic vitreous material into the thimble in the fabrication of the stem.

2. In a stem for high pressure mercury vapor discharge lamp having a quartz envelope, a quartz stem tube, a thick tungsten rod extending through said tube, a molybdenum thimble wholly within said tube, hermetically united to and around said rod and having a relatively thin cylindrical wall tapering to a sealing edge and with its said edge embedded in the wall of said tube to hermetically seal off the space between the tube and the outside of the thimble from the

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space in the thimble, a molybdenum spacer member within the thimble and around the rod and having a cylindrical part engaging the inner surface of the cylindrical thimble wall to strengthen the said wall against forces tending to collapse it and having also an inwardly extending annular flange disposed around the rod and adjacent the inner end of the sealing edge to mechanically close the annular space between the rod and the thimble and limit the flow of plastic vitreous material into the thimble in the fabrication of the stem.

ALFRED GREINER.

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