United States Patent [19]

Marcucci

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[54] **METHOD OF MAKING ARCH SHAPED ARC TUBE**

[75] Inventor: **Rudoph Marcucci,** Beverly, Mass.

[73] Assignee: **GTE Sylvania Incorporated,** Danvers, Mass.

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[52] **U.S. Cl.** **316/20;** 65/59; 313/220

[51] **Int. Cl.** **H01j 9/38**

[58] **Field of Search** ..... 316/17, 18, 19, 20, 21; 313/220, 317; 29/25.16; 220/2.1 R; 65/34, 36, 42, 54, 59

[56] **References Cited**

UNITED STATES PATENTS

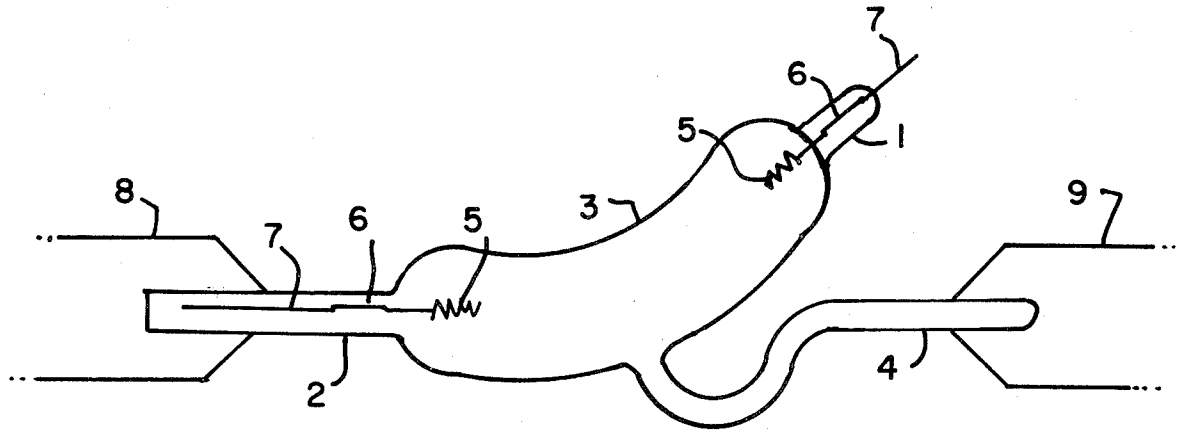
760,789	5/1904	Hewitt	316/26
2,145,157	1/1939	Cowhig	316/19
3,260,583	7/1966	Eisler	65/34
3,466,488	9/1969	Evans et al.	220/2.1 R

Primary Examiner—Roy Lake
Assistant Examiner—James W. Davie
Attorney, Agent, or Firm—James Theodosopoulos

[57] **ABSTRACT**

In the manufacture of an arch shaped arc tube having electrodes sealed at its ends, a cylindrical tube of quartz is prepared with smaller diameter quartz tubing extending from its ends. The tube is then bent into an arch shape and electrodes are vacuum sealed into the tubing extensions, using a suitably shaped exhaust tube fastened to the center of the arc tube as a support.

3 Claims, 5 Drawing Figures



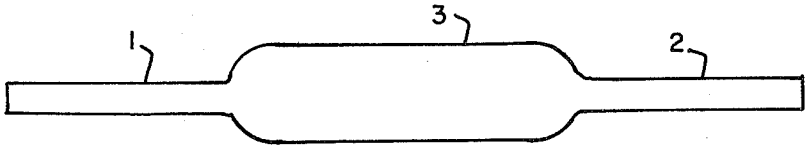


FIG. 1

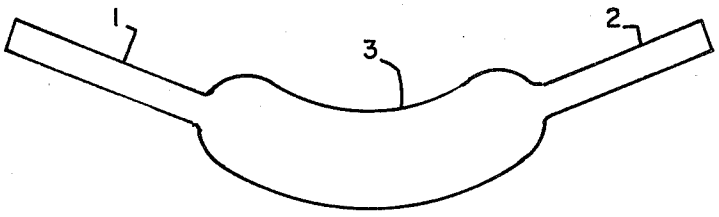


FIG.2

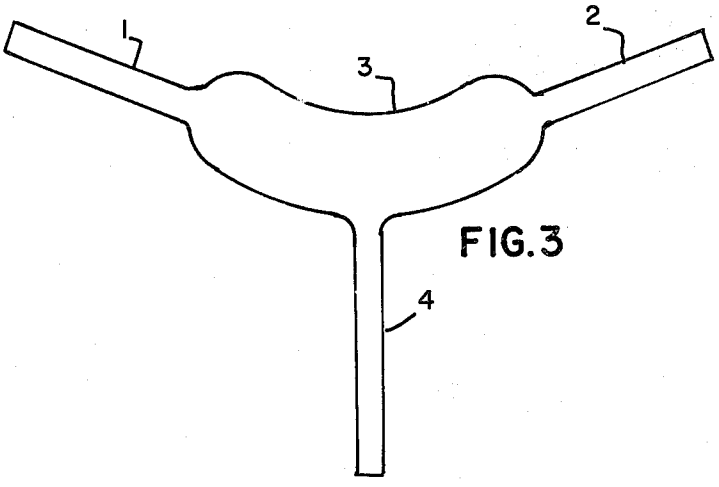


FIG.3

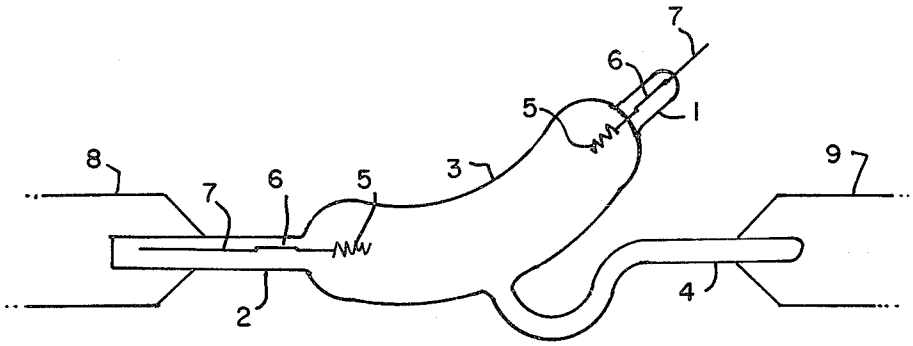


FIG. 4

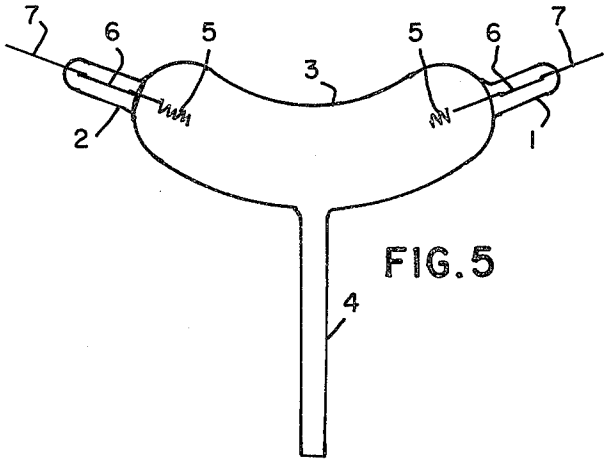


FIG. 5

METHOD OF MAKING ARCH SHAPED ARC TUBE

THE INVENTION

This invention is in the field of high intensity arc discharge lamps and relates particularly to the manufacture of arc tubes used in such lamps.

The arc tubes of such lamps have generally been straight cylindrical tubes having electrodes at each end, usually sealed therein by press seals.

This invention is concerned with the manufacture of an arch shape arc tube, which can be used with a horizontally operated high intensity arc discharge lamp to increase the efficiency thereof.

As a brief description of the drawing

FIGS. 1–5 show the sequential steps in the manufacture of an arc tube in accordance with this invention.

As shown in FIG. 1, initially two lengths of quartz tubing 1 and 2 were joined to the ends of a larger diameter quartz tube 3. In a specific example, tubes 1 and 2 were each 4 inches long having inner and outer diameters of 4 mm and 8 mm respectively. Tube 3 was 55 mm long and had inner and outer diameters of 20 and 22 mm respectively.

Tube 3 was then heated, such as by an oxygen-hydrogen flame, to the softening point of quartz and then bent into an arch shape, as shown in FIG. 2. In the specific example, the angle formed by tubes 1 and 2 was 140°.

Next, a quartz tubulation 4 was attached to the center of arch shaped tube 3 after an opening had been made in the wall of tube 3 thereat, so that passage was provided from the interior of tube 3 to the interior of tubulation 4, as shown in FIG. 3. In the specific example, tubulation 4 had an inner diameter of 2 mm and an outer diameter of 3 mm.

Tubulation 4 was then bent into a shape so as to be in alignment with one of the extending tubes, say, tube 1. An electrode assembly comprising electrode 5 fastened to a thin molybdenum ribbon 6 fastened, in turn, to a lead-in wire 7 was then inserted through tube 1 so that electrode 5 extended into tube 3 while all of ribbon 6 was contained within tube 1. The open end of tube 2 had been sealed by melting.

The assembly was then placed in a suitable lathe, with tube 1 held within a chuck and tubulation 4 held within another chuck. Prior to this step, the end of tubulation 4 had been sealed by melting, so that vacuum exhaust could be effected through the open end of tube 1. Tube 1 was then sealed by heating an intermediate portion thereof to its softening point, while the assembly was rotated, and permitting the vacuum to collapse the walls of tube 1 to effect a hermetic seal. The hermetic seal region included the entire length of ribbon 6. After removal from the lathe, the excess length of tube 1 was removed, thereby permitting lead-in wire 7 to extend beyond the end of tube 1.

Tubulation 4 was then heated and bent to be in alignment with the other extending tubing, tube 2 and the tube 2 is opened. The assembly was then again mounted in the lathe, as shown in FIG. 4, with tube 2 held within chuck 8 and tubulation 4 held within chuck 9. Tube 2 was then hermetically sealed around ribbon 6 and the excess length removed, as before. FIG. 5 shows the arc tube with a straightened (or new) tubulation 4 ready for exhaustion, filling and final sealing of the arc tube. The filling usually includes mercury and an inert starting gas.

I claim:

1. In the manufacture of an arc tube for a high intensity arc discharge lamp, the steps which comprise: joining two lengths of quartz tubing to the ends of a larger diameter cylindrical quartz tube; bending the cylindrical quartz tube into an arch shape; forming an opening in the wall of the arch tube, said opening being substantially at the longitudinal center of the arch tube; joining an exhaust tube to the arch tube in alignment with said opening; bending the exhaust tube into axial alignment with one of the lengths of tubing; sealing the open end of said exhaust tube and the open end of the other length of tubing; inserting an electrode assembly including a molybdenum ribbon into said one length of tubing and vacuum sealing the tubing onto a molybdenum ribbon.

2. The process of claim 1 including the step of rebending the exhaust tube into axial alignment with the other length of tubing; opening the sealed end of said other tubing; and vacuum sealing an electrode assembly in said other tubing.

3. The process of claim 2 including the step of exhausting and filling the arc tube through the exhaust tube.

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