

April 14, 1942.

G. A. FREEMAN

2,279,818

METHOD OF MAKING SEALS

Filed July 15, 1939

Fig. 1.

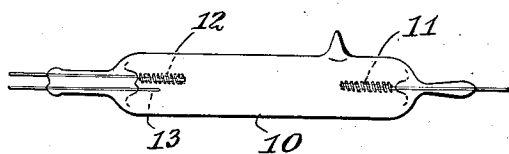


Fig. 2.



Fig. 3.



Fig. 4.

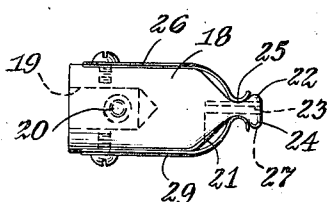


Fig. 5.

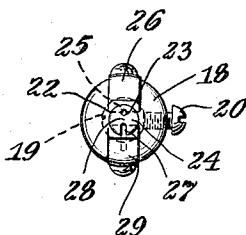


Fig. 6.

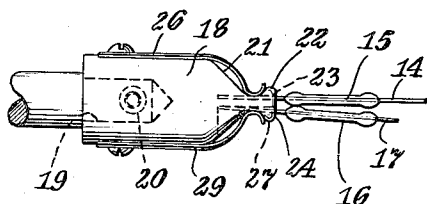


Fig. 7.

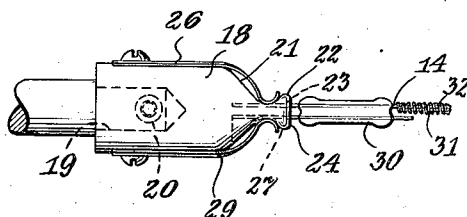


Fig. 8.

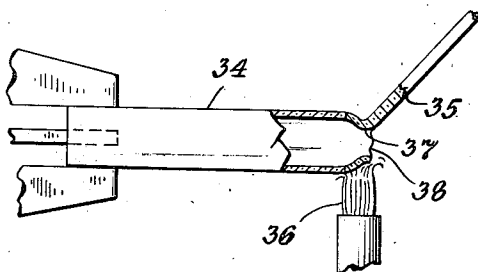


Fig. 9.

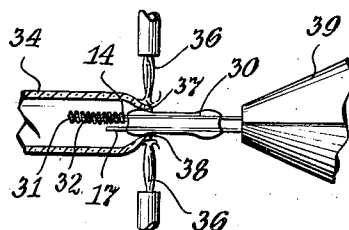
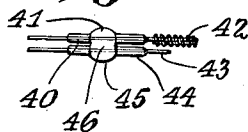


Fig. 10.



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2,279,818

METHOD OF MAKING SEALS

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Application July 15, 1939, Serial No. 284,575

6 Claims. (Cl. 49—81)

My invention relates to quartz lamps and especially to sealing of the conductors to a quartz container.

An object of my invention is to provide an electrode that will be accurately positioned through the container of a quartz lamp.

Another object is to provide an electrode that lends itself to easy sealing by machine, particularly where a starting electrode is employed.

Another object of my invention is to accurately space a starting electrode from the adjacent main electrode in a quartz lamp.

A still further object of my invention is to provide a method of sealing a double seal through quartz lamps that does not require a special skilled technique by the operator.

Other objects and advantages of the invention will be apparent from the following description and drawing in which:

Fig. 1 is a cross-sectional view through a quartz lamp embodying the invention.

Figs. 2 and 3 are elevational views of the conductors and their glass beads.

Fig. 4 is a side view and Fig. 5 an end view of a special chuck that I have developed for holding the conductors.

Figs. 6 and 7 are elevational views of the conductors in the chuck of Fig. 4.

Figs. 8 and 9 are elevational views of steps in the process of sealing the conductors in one end of a quartz container.

Fig. 10 is an elevational view of a modification of the double seal in Fig. 7.

The method of making a quartz lamp generally involves a highly specialized technique on the part of the artisan. The conductors are sealed individually by hand into the various parts of the quartz container. The glass from that in contact with the conductor to the quartz that is the major portion of the container, is generally graduated in its percentage of quartz. The result of this individual hand sealing of the electrodes in the quartz lamp brings about a variation between the various lamps so constructed.

In case a starting electrode is utilized, the individual sealing-in of the main electrode and then the starting electrode makes a further variation and lack of uniformity between the various lamps. Furthermore, the sealing-in of a main electrode and then a starting electrode in one end of the quartz lamp involves a highly specialized technique.

It is an object of my invention to simplify the method of making double seals on quartz lamps, and especially to provide a method where-

by the accurate spacing of the main electrode from the starting electrode will be secured without the exercise of highly specialized technique.

In Fig. 1 I have illustrated a quartz lamp that is utilized for brilliant and efficient illumination. This quartz lamp has a container 10 with a main electrode 11, sealed in one end and another main electrode 12 and a starting electrode or tip 13 sealed at the other end.

In particular, my invention concerns the easy assemblage and accurate spacing of the main electrode 12 and the starting electrode 13 in one end of the quartz container.

In Fig. 2 I have illustrated the conductor 14 of this main electrode 12, and on this conductor is sealed an elongated cylindrical bead 15 of glass, known as flux glass. This glass preferably contains approximately 80 to 85% quartz. One glass I have found especially suitable contains approximately 83% quartz (SiO_2), 13% boric oxide and 4% aluminum oxide.

A similar bead 16 of flux glass is sealed around the conductor of the starting electrode 17. In Fig. 4 I have illustrated a special chuck which I have devised for the purpose of accurately spacing the main electrode and the starting electrode from each other. This chuck comprises a main body 18 with a central hollow portion 19, shown in dotted lines, and a set screw 20 extending therein for the purpose of securing it to any desired support. The front part of the chuck is conical at 21 and then expands slightly into a truncated portion 22. A hole 23 is drilled from the front face 24 so that it is slightly exposed at the portion 25 of the conical face 21. A spring 26 is secured to the side of the chuck and is bent downward to engage the exposed portion of the hole 23. A slot 27 is cut on the other side of the chuck and this slot has its trough accurately spaced at 28 from the opening 23 the distance that is desired to space the starting electrode from the main electrode. A spring 29 is secured to the side of the chuck and exerts a pressure towards the trough of the slot 27.

One of the conductors 14 with its bead 15, is inserted in the opening 23 as illustrated in Fig. 6, and the other conductor 17 is placed in the trough 27 under the resilient pressure of the spring 29, as likewise illustrated in Fig. 6. The two beads 15 and 16 space these conductors further apart than the desired distance. As can be seen in Fig. 6, the reason for this is that the overall radius of each bead is larger than half the desired distance between the two conductors

in Fig. 7. A gas flame or other heating means is then applied to the glass beads 15 and 16.

The chuck, conductors and beads are preferably revolved and the two beads are melted together in the unified glass mass 30, around the tube conductors 14 and 17. When the glass of the two beads becomes plastic, the pressure exerted by the spring 28 against the conductor 17 will move this conductor towards the conductor 14 until the conductor 17 rests in the trough of the slot 27 and is stopped by this trough at the distance 28 from the conductor 14. The glass 30 is then allowed to cool and it is preferable, at this time, to complete the main electrode for the preferred embodiment of the invention by placing a piece of thorium 31 adjacent the active end of the conductor 14 and surrounding it with a tungsten spring 32.

In Fig. 8 I have illustrated the quartz cylinder 34, and at one end a flux glass rod 35 is being melted by means of flame 36, to shape a closing end 37 on the quartz cylinder. This flux glass is preferably the same glass as for beads previously described. The glass from the quartz cylinder to the conductors may be two or more kinds to bridge the difference in expansion between the quartz cylinder and the conductors instead of being just an intermediate glass. A central opening 38 is left at this end of the quartz container.

In Fig. 9 I have disclosed the assemblage of a main electrode, starting electrode and unified glass bead 30 held in a convenient chuck or other means 39 and the glass container 34 brought towards it with its opening 38 positioned at the intermediate side of the unified glass bead 30. The flame 36 provides the means for sealing the quartz container to the intermediate side of the bead 30. An inert gaseous atmosphere is preferably applied to the interior of the container 34. The single main electrode 11 can be sealed in the opposite end.

Throughout the description of Figs. 2 through 9 I have disclosed an elongated bead on the conducting wires. These elongated beads are suitable for substantially 15 mil wire. In case it is desired to utilize larger diameter wire such as 30 mil wire, the elongated cylindrical bead is not desirable. With this larger wire, I prefer to coat only an elongated film 40, illustrated in Fig. 10, on these wires and have a round bead 41 at an intermediate portion of this film of glass.

Fig. 10 illustrates a main electrode 42 and starting electrode 43 having the films 40 and 44 thereon, and having round beads 41 and 45 sealed into a unified mass 46 by the apparatus and method illustrated in Figs. 6 and 7, with the elongated cylindrical beads.

Although I have shown and described a specific embodiment of my invention, I do not desire to be limited thereto, as various other modifications of the same may be made without departing from the spirit and scope of the appended claims.

I claim:

1. The method of sealing an electrode and starting electrode in a quartz tube which comprises melting a bead on the electrode lead-in, melting another bead on the starting electrode

lead-in, placing the two bead units adjacent each other, exerting lateral pressure on a bead unit in the direction of the other bead unit, melting said beads into a joint bead and sealing the joint bead in a quartz container.

2. The method of sealing two conductors through a glass bead which comprises melting a glass bead on each of said conductors, securing one of said conductors in position, pressing the other conductor and bead laterally so that the two beads are in contact, and directing heat on the beads until they are united.

3. The method of sealing two conductors through a glass bead which comprises melting a glass bead on each of said conductors, securing one of said conductors in position, placing said second conductor and bead adjacent said first conductor and bead with the beads in contact, exerting lateral pressure against said second conductor towards said first conductor, limiting the minimum spacing between said conductors under said pressure, melting said beads to permit the second conductor to move to the said minimum spacing and letting the beads cool into a unified mass.

4. The method of sealing the conductors of an electrode and starting electrode in a quartz tube which comprises melting a glass bead on each of said conductors, securing one of said conductors in position, placing said second conductor and bead adjacent said first conductor and bead with the beads in contact, exerting lateral pressure against said second conductor towards said first conductor, limiting the minimum spacing between said conductors under said pressure, melting said beads to permit the second conductor to move to the said minimum spacing and letting the beads cool into a unified mass, and sealing the unified mass in a quartz container.

5. The method of sealing and spacing two conductors in a glass bead which comprises melting on each of said conductors a glass bead having portions with a radius larger than half the desired distance between the two conductors, placing said portions in contact, melting the portions into an integral bead and exerting lateral pressure on one of said conductors until it occupies the desired position in the melted integral bead, and cooling the bead.

6. The method of sealing and spacing two conductors in a glass bead which comprises melting on each of said conductors a glass bead having portions with a radius larger than half the desired distance between the two conductors, securing one of said conductors in substantially fixed position, juxtaposing the other conductor to the fixed conductor as close as permitted by said beads and with the second of said conductors movable toward the fixed conductor as the beads soften, exerting pressure on said movable conductor toward the fixed conductor, melting the beads until the pressure moves the second conductor laterally toward the fixed conductor, stopping the movable conductor a predetermined distance from the fixed conductor while the beads are in a melted condition, and cooling the beads into an integral bead about the two conductors.

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