Oct. 6, 1936. L. J. BUTTOLPH 2,056,157

SUPPORTING BASE FOR ELECTRIC DISCHARGE DEVICES

Filed March 21, 1931

Fig. 1

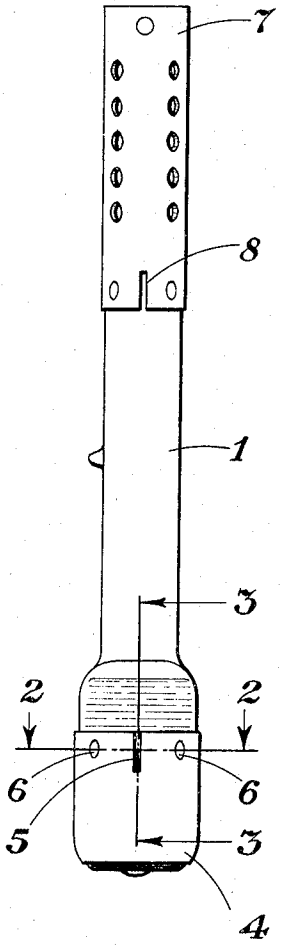


Fig. 2

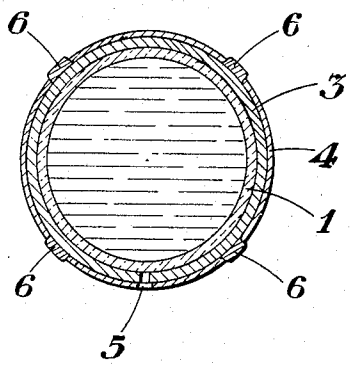
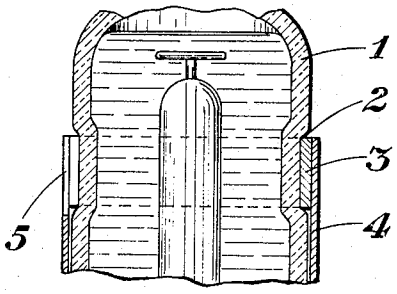


Fig. 3



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Patented Oct. 6, 1936 2,056,157

UNITED STATES PATENT OFFICE

2,056,157

SUPPORTING BASE FOR ELECTRIC DISCHARGE DEVICES

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Application March 21, 1931, Serial No. 524,391

8 Claims. (Cl. 176—50)

The present invention relates to supports for vitreous articles, and particularly to a support or base for lamps or other devices formed of fused silica or the like which are designed to operate at very high temperatures, and constitutes improvements on the methods and apparatus and devices of my pending application Serial Number 397,808, filed October 7, 1929.

A particular object of the invention is to provide a simple supporting means for a vitreous article such as a fused silica lamp. Another object of the invention is to provide a support which will firmly grip said vitreous article at all temperatures to which it is normally subjected. Still another object of the invention is to provide a support which will not damage the vitreous article. A further object of the invention is to provide a novel method of assembling such a support. Other objects and advantages of the invention will appear from the following detailed description or from an inspection of the accompanying drawing.

The invention consists in a new and novel supporting means, and in the method of producing the same, as hereinafter set forth and claimed.

In the manufacture of high intensity light sources and accessory apparatus, where the operating temperatures are so high as to be destructive of basing cements and above the melting point of ordinary solder, the attachment of guards or bases has been a problem of long standing. This has been particularly true of fused silica mercury vapor arc devices, in which the operating temperatures are exceedingly high. I have now discovered that these bases or guards may be attached to such articles in an extremely simple manner by forming the vitreous articles with an irregularity such as annular depression, indentations or bosses, therein at the point at which the guard or base is to be attached, placing a split ring in said depression, and then silver-soldering or otherwise attaching a sleeve, which preferably has a greater coefficient of expansion than said vitreous article, to said split ring. This sleeve, which serves as a guard or base for the lamp or other article, being snugly adjusted on said article at the melting point of the silver solder, obviously is under tension at all lower temperatures. In some cases, where the coefficients of expansion of the sleeve and of the vitreous article are widely divergent, the tension thus produced after solder ing and recooling to room temperature is so great that I have found it essential to modify the sleeve, as by slitting it through a portion of its length, in order to increase the elasticity thereof. Such a slit, of course, very positively limits the compressive force which can be exerted on the vitreous body by said sleeve, so that it is now possible to have a snugly fitting sleeve without any danger of destroying the vitreous article by excessive compression thereof. This new method of attaching a base member to the vitreous body, in addition to being very simple, thus results in a supporting means which will not damage the body, despite the fact that it is rigidly fixed thereon at all operating temperatures. My new supporting means is also relatively inexpensive.

For the purpose of illustrating my invention I have shown a preferred embodiment thereof in the accompanying drawing, in which

Fig. 1 is an elevational view of a fused silica mercury vapor lamp having anode and cathode guards attached thereto according to my new invention,

Fig. 2 is a sectional view of said lamp, taken on the line 2—2 of Fig. 1, and

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 1.

In this drawing there is shown a mercury vapor arc lamp having the fused silica envelope 1, said envelope having an annular depression 2 formed in the wall forming the cathode chamber, as shown in Fig. 3, and a similar depression (not shown) formed in the wall about the anode. A split ring 3 of nickel or the like is slipped over the end of the envelope 1 and placed in said depression 2, said ring snugly fitting in said depression. A sleeve 4, of nickel or the like, which just fits over the ring 3 is then placed in position thereon, said sleeve preferably having a slot 5 in the edge thereof which registers with the joint in said split ring 3. Said sleeve 4 has a plurality of holes near the edge thereof which give access to the split ring beneath, drops of silver-solder 6 being dropped through each of these holes, whereby said sleeve and said ring are united, and the assembly thus locked in position. The sleeve 7 is similarly mounted about the anode, this sleeve likewise having a slot 8 in the edge thereof by means of which excessive strains are avoided. Each of the sleeves 4 and 7 serves to support the vitreous envelope, and likewise serves as a current collector for the associated electrode. In addition these sleeves serve as guards about each of the seals.

In the assembly of this support according to by new method the split ring 3 is slipped into position in the depression 2, said ring preferably having such a curvature that it is held tightly in said depression by its own elasticity. The

sleeve 4 is then slipped over said ring with the slot 5 in registry with, or at least adjacent to, the joint in the ring. The ring and the adjacent part of the sleeve 4 are then heated, as by means of a blow torch, to substantially the melting point of silver-solder, the silver-solder 6 then being dropped through the holes near the edge of the sleeve. During this heating of the ring and sleeve the fused silica envelope 1 is also heated, but due to its extremely low coefficient of expansion does not appreciably increase its diameter. While the split ring 3 does tend to expand under the influence of the heat, this tendency merely reduces the elastic pressure which the ring exerts on the envelope 1 without resulting in any change in diameter. Expansion of the sleeve 4, however, causes an appreciable increase in the diameter thereof, with the result that an increased space is left between said sleeve and the split ring 3, into which a film of the solder 6 flows. Upon cooling the sleeve 4 tends to contract again, but the intervening solder film prevents it from regaining its original position. The sleeve is, therefore, under considerable tension when it reaches room temperature. The slot 5 in this sleeve allows the sleeve 4 to slightly change its curvature, thereby utilizing the elasticity of said sleeve to prevent the exertion of a crushing force on the fused silica envelope 1. The amount of pressure exerted is obviously controlled by the depth of the slot 5. As a result of this new structure and the novel assembly thereof I am enabled to produce a support which will be snug at the operating temperature of the lamp, which is of the order of 400° C., and yet will not crush the envelope when cold. The sleeve 7 is of course, held in position in the same manner, so that a detailed description of this assembly is unnecessary.

While my invention has been illustrated and described by reference to fused silica devices which are to operate at exceedingly high temperatures, above the melting point of ordinary basing cements, it is obvious that it may also be employed in mounting any other type of vitreous device.

While I have described the sleeve 4 as being attached to the ring 3 by silver-solder, it is obvious that ordinary solder may be used in some cases, especially where the device is not to be operated at particularly high temperatures. It is also obvious that the sleeve may be affixed to the split ring in other ways, as by frictional engagement, or by providing each with a threaded portion and screwing the sleeve onto the ring, one of these threaded portions preferably being tapered so that the sleeve may be put under considerable tension at room temperature, the sleeve and ring then being interlocked by indenting, soldering or upsetting the parts at any desired point therein.

It is furthermore to be understood that the slot 5 and the joint in the split ring 3 need not be in exact registry in order to provide the needed resilience, it being sufficient if they are both between any two solder points 6, so that the slot 5 will be free to open without stretching any portion of the ring 3, and that the term "registry", as used in the specification, is to be given this latitude.

Various other omissions, substitutions and changes, within the scope of the appended claims may likewise be made in the structure or in the method without departing from the spirit of my invention.

I claim as my invention:

1. The method of attaching a support to a vitreous body which comprises forming an annular depression in said body, forming an elastic split ring of slightly smaller diameter than that of said body at said depression, placing said ring in said depression, slipping a close-fitting sleeve over said ring, and soldering said sleeve to said ring at a point where the circumference of the latter is discontinuous.

2. The method of attaching a support to a vitreous body which comprises forming an annular depression in said body, forming an elastic split ring of slightly smaller diameter than that of said body at said depression, placing said ring in said depression, slipping a close-fitting sleeve over said ring with an open-ended slot in said sleeve in registry with the joint in said ring, and soldering said sleeve to said ring at a point where the circumference of the latter is discontinuous.

3. In combination a vitreous body having an irregularity in the surface thereof, a split ring engaging said irregularity, said ring having an open joint between the ends thereof and a close-fitting sleeve extending about said ring and soldered thereto, said sleeve having an open-ended slot therein in registry with the joint in said ring.

4. In combination a fused silica lamp having an annular depression therein, a split ring in said depression, said ring having an open joint between the ends thereof, and a close-fitting sleeve extending about said ring and soldered thereto, said sleeve having an open-ended slot in registry with the joint in said ring.

5. In combination, a vitreous body having an irregularity in the surface thereof, a split ring engaging said irregularity, said ring having an open joint between the ends thereof, and a close-fitting sleeve extending about said ring and affixed thereto, said sleeve having an open ended slot therein, said slot being so disposed with respect to the joint in said ring that they both lie between the same adjacent points of fixation between said ring and sleeve, whereby said slot and said joint cooperate to permit elastic yielding of both members to limit the force exerted thereby on said vitreous body.

6. In combination, a vitreous body having an irregularity in the surface thereof, a split ring engaging said irregularity, said ring having an open joint between the ends thereof, and a close-fitting sleeve extending about said ring and affixed thereto, said sleeve having an open ended slot extending therein to a point which is farther from the edge of said sleeve than the points where it is affixed to said ring said slot being so disposed with respect to the joint in said ring that they both lie between the same adjacent points of fixation between said ring and sleeve, whereby said slot and said joint cooperate to permit elastic yielding of both members to limit the force exerted thereby on said vitreous body.

7. The method of attaching and producing tension in a support for a vitreous body which comprises forming an elastic split ring of slightly smaller diameter than that of said body, placing said ring on said body, slipping a close-fitting sleeve having a higher coefficient of expansion than said body over said ring, heating said sleeve to a temperature in excess of that at which said body is to be operated whereby a space is opened between said sleeve and said ring and causing solder to flow into the space opened by said heating between the heated sleeve and said ring,

whereby said sleeve is under tension at lower temperatures.

8. The method of attaching a support to a vitreous body which comprises forming a surface irregularity in said body, forming an elastic split ring of slightly smaller diameter than that of said body at said irregularity, placing said ring on said body in registry with said irregularity whereby it is fixed in position, slipping a close-fitting sleeve having a higher coefficient of expansion than said body over said ring, and soldering said sleeve to said ring at a point where the circumference of the latter is discontinuous whereby said sleeve is under tension at lower temperatures.

LEROY J. BUTTOLPH.