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2,791,679

DISCHARGE LAMP

Filed July 17, 1953

Fig. 1.

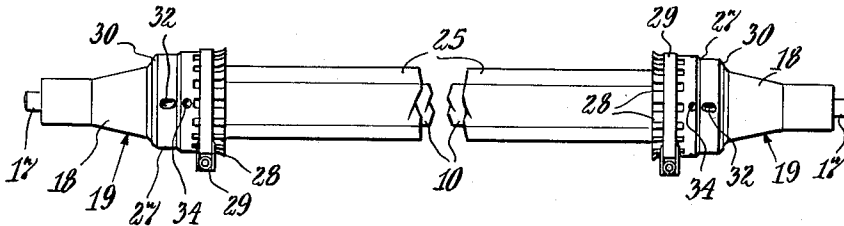


Fig. 2.

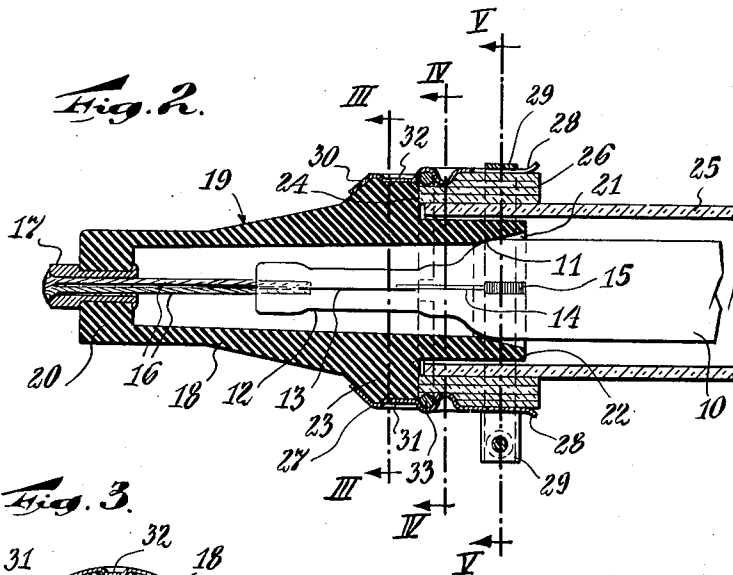


Fig. 3.

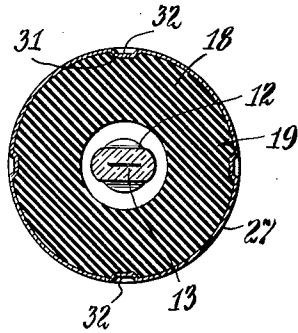


Fig. 4.

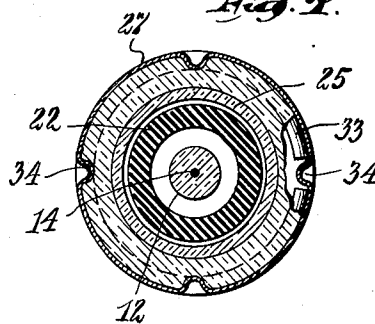
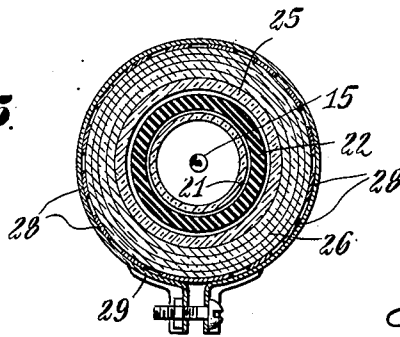


Fig. 5.



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DISCHARGE LAMP

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5 Claims. (Cl. 240—11.4)

This invention relates to discharge lamps and, more particularly, to the base construction for a double-wall discharge lamp.

Difficulties have been experienced with double-wall discharge lamps of the prior art due partly to mechanical and chemical considerations and partly to thermal effects. The cost factor likewise has to be taken into account, and if for no other reason, would rule out any thought of integrally formed double walls. Efforts have been made to utilize separately formed tubular walls with spacing washers therebetween, but this again has proved unsatisfactory due largely to differentials in expansion resulting in cracked tubes, and also to chemical reactions occurring between the glass of the quartz inner tube and the heat-resisting type of washer material necessarily employed.

In its general aspect, the present invention contemplates a construction overcoming the prior art difficulties.

The invention also proposes an improved commercial lamp that will be adequately rugged to withstand all ordinary shipping and handling usages as well as long periods of use in its intended place.

More specifically, an object of the invention is to provide a base which will receive and support both tubes without need for or introduction of intervening washers between the tubes.

Another object of the invention is to allow for differential expansion of the tubes and avoid application of pressure from expansion of one tube upon the other.

A further object of the invention is to provide a base and assembly with the tubes and discharge electrode conducive to retention of the heat and to improve the vaporization and ionization within the lamp.

Other objects of the invention will appear to persons skilled in the art to which it appertains as the description proceeds, both by direct reference thereto and by implication from the context.

Referring to the accompanying drawing in which like numerals of reference indicate similar parts throughout the several views:

Figure 1 is an elevational view of a discharge lamp embodying our invention;

Figure 2 is a longitudinal sectional view of one end portion of said lamp, and

Figures 3, 4 and 5 are cross-sectional views on lines III—III, IV—IV and V—V respectively of Fig. 2.

In the specific embodiment of the invention illustrated in said drawing, the reference numeral 10 designates in general the inner tube which is sealed and constitutes the discharge envelope, and is preferably made of quartz glass or the like. As both ends are made the same, it suffices to describe the showing in Fig. 2 as illustrative of both ends of the lamp. It will be observed that the end portion of said inner tube is provided with a rounded shoulder 11 in transition from the general maximum outside size of the tube down to a terminating stem 12 of

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smaller outside size. The stem is pressed into sealing engagement with a lead-in element 13 in accordance with usual lamp practice, said element and glass press being chosen to have substantially the same coefficients of expansion for maintaining the seal under varying temperatures. The inner end of the lead-in element 13 is welded or otherwise made fast to an electrode post 14 projecting coaxially into the end of the tube and mounting an emissive electrode 15 within said tube at about the region surrounded by said shoulder 11. Attached to the other end of the lead-in element 13 are a pair of flexible wires 16 extending to a contact member 17 protruding at the far end of the body 18 of the base 19 hereinafter more fully described. Said flexible wires are soldered or otherwise secured to said contact member and with it and said element 13 and post 14 constitute a lead-in connection for the electrode 15.

The body 18 of base 19 is preferably a hollow body of revolution with an end wall 20 having a central passageway for the flexible wires 16 and for a shank portion of contact member 17. The other end of the hollow of said base provides a flaring mouth 21 of appropriate dimension to engage against rounded shoulder 11 of the glass tube 10, thereby limiting inward position of the base and holding said base coaxial to the tube in assembled position. The said body 18 is preferably of lava or equivalent material which is non-conductive electrically and which is low in heat conductivity. The fact that the engagement between the rounded lamp shoulder 11 and the flare of mouth 21 is substantially only a line contact, and that the body is a poor heat conductor, heat from the lamp is not dissipated through the base.

The exterior of the body 18 of the base around the flared mouth 21 is in the form of a coaxial longitudinal or annular neck portion 22 at the rear end of which is a peripheral protruding enlargement 23 the forward face of which is in a diametric plane thereby providing a transverse seat 24. An outer or enclosing glass tube 25 surrounds inner tube 10 and has an inner diameter enabling said outer tube to be positioned upon said neck portion 22. The end edge of the outer tube is proximate to said seat 24 and accordingly retained in longitudinal disposition thereby. The seat 24 projects radially farther than the wall thickness of said outer tube, and next thereto and around the end margin of said tube are wrappings 26 of asbestos or other suitable heat-resistant material.

A metallic ferrule or skirt 27 is applied over said wrappings 26 and over the enlargement 23, said ferrule having a compressible end portion comprising a circular series of fingers 28 substantially parallel to the axis of the ferrule and directed toward the opposite end of the lamp. A clamp ring 29 is applied over the said series of fingers and compresses the same into tight clamping engagement with the wrappings 26 which are thereby caused to grip the glass outer tube 25 very securely for holding the base in assembled engagement with the inner tube 10. Said ferrule 27 may be slid into place from the far end of the body 18 and has a tapered end flange 30 for engagement against a correspondingly tapered portion of the enlargement as a limiting factor. Prearranged indentations 31 are provided in the periphery of the enlargement and the metal of the ferrule is correspondingly dented at 32 to engage therein for keeping the ferrule from rotating on the body. A resilient snap ring 33 is provided within the ferrule and engageable against the forward edge of seat 24 to keep the ferrule from withdrawing, the ferrule having another series of dents or inward protuberances 34 for the snap ring to seat behind. Said ferrule 27, with its snap ring 33, and clamping ring 29 in association with said body 18 constitute the base 19.

It is now opportune to point out that the discharge tube relies upon a gas content to be operative, and inasmuch as mercury is preferred for that purpose in conjunction with some other gas, such as argon, it is important to maintain the inner tube during operation at a constant temperature above that at which mercury vaporizes. The outer tube 25 encloses the inner tube and provides a dead air space therearound for that purpose, and since support of the inner tube is in the region of the electrode, it is especially important to avoid cooling that region. The substantially line contact and the low heat conductivity characteristic of the base 19 with the inner tube 10 at its rounded shoulder 11 gains this desideratum. Furthermore, the desired result is obtained with the inner tube completely sealed without having to be sealed to the base and without having to include any packing in contact with the inner tube. This last-mentioned feature is of great importance, since it has been found that with asbestos, requiring a binder, interposed in contact with a hot quartz tube and a base, that a deleterious chemical reaction takes place which ultimately adversely affects the quartz glass rendering it porous. The invention consequently has overcome the serious problems encountered and provides a base and lamp of improved character beneficially attaining efficient operation and long life.

We claim:

1. A lamp comprising an inner envelope of light-transmitting material terminated by a rounded shoulder portion and a constricted stem portion, electrodes in said envelope between which a discharge occurs during operation of said lamp, an ionizable medium enclosed within said inner envelope, means sealed through said stem portion and projecting into said inner envelope and connected to said electrodes for transmitting electrical energy thereto, an outer envelope of light-transmitting material surrounding said inner envelope in spaced relation thereto, a hollow base of electrically non-conductive and low heat conductive material enclosing and extending beyond the stem portion of said inner envelope and having a neck portion interposed between said envelopes in supporting engagement with the inner envelope at the rounded shoulder portion thereof, means encircling a portion of said base clamping the base to the outer envelope and holding the mouth of said neck portion in tight engagement with the inner envelope, and means carried by the end of said base opposite said neck portion and electrically joined to said sealed means for connecting the lamp with a source of electrical energy, the mouth of said neck portion being flared and proportioned to accommodate the rounded shoulder portion of the inner envelope in substantially line contact when said base and envelopes are assembled in normally operative relation.

2. A lamp comprising an inner tubular envelope of light-transmitting material having an ionizable medium therein and a pair of electrodes between which a discharge occurs during operation of said lamp, means sealed through said envelope for transmitting electrical energy to said electrodes, an outer tubular envelope of light-transmitting material surrounding the said inner envelope, each end of the said inner envelope terminating in a rounded shoulder portion and a constricted stem portion, and bases at each end of said lamp holding said inner and outer envelopes in predetermined spaced relation, each of said bases comprising a hollow body of electrically non-conductive and low heat conductive material having an annular neck portion interposed between said envelopes, the mouth of said neck portion being flared and proportioned to accommodate the rounded shoulder portion of the inner envelope in substantially line contact, a metallic skirt secured to said body and clamped to the adjacent end portion of the outer envelope holding the mouth of said neck portion in tight engagement with the rounded shoulder portion of the inner envelopes, and a contact member carried by the end of said body opposite said neck portion and electrically joined to the said sealed

means in the inner envelope for connecting the lamp with a source of electrical energy.

3. A lamp comprising an inner tubular envelope of light-transmitting material having an ionizable medium therein and a pair of electrodes between which a discharge occurs during operation of said lamp, means sealed through said envelope for transmitting electrical energy to said electrodes, an outer tubular envelope of light-transmitting material surrounding the said inner envelope, each end of the said inner envelope terminating in a rounded shoulder portion and constricted stem portion, and bases at each end of said lamp holding said inner and outer envelopes in predetermined coaxial spaced relation, each of said bases being of circular cross-section and comprising a hollow body of electrically non-conductive and low heat conductive material enclosing and extending beyond the stem portion of said inner envelope and having a peripheral enlargement terminated on a substantially diametric plane to provide a transverse seat disposed toward said envelopes, an annular neck portion projecting from said seat toward the inner and outer envelopes and in interposed relation therewith, the mouth of said neck portion being flared and proportioned to accommodate the rounded shoulder portion of the inner envelope in substantially line contact and the end edge of the outer envelope being proximate to said seat and longitudinally retained thereby, a metallic skirt secured to said body and clamped around the adjacent end portion of the outer envelope holding the mouth of said neck portion in tight engagement with the rounded shoulder portion of the inner envelope, and a contact member carried by the end portion of said body opposite said neck portion and electrically joined to the said sealed means in the inner envelope for connecting the lamp with a source of electrical energy.

4. A lamp comprising an inner tubular envelope of light-transmitting material having an ionizable medium therein and a pair of electrodes between which a discharge occurs during operation of said lamp, means sealed through said envelope for transmitting electrical energy to said electrodes, an outer tubular envelope of light-transmitting material surrounding the said inner envelope, each end of the said inner envelope terminating in a rounded shoulder portion and a constricted stem portion, and bases at each end of said lamp holding said inner and outer envelopes in predetermined coaxial spaced relation, each of said bases being of circular cross-section and comprising a hollow body of electrically non-conductive and low heat conductive material enclosing and extending beyond the stem portion of said inner envelope and having a peripheral enlargement terminated on a substantially diametric plane to provide a transverse seat disposed toward said envelopes and of substantially greater depth than the wall thickness of said outer envelope, an annular neck portion projecting from said seat toward the inner and outer envelopes and in interposed relation therewith, the mouth of said neck portion being flared and proportioned to accommodate the rounded shoulder portion of the inner envelope in substantially line contact and the end edge of the outer envelope being proximate to said seat and longitudinally retained thereby, a wrapping of heat-resistant material around the end portion of said outer envelope adjacent said seat providing a filling thereat which is substantially flush with the exposed surface of the said peripheral enlargement, a compressible metallic skirt secured to said body and encasing the adjacent end portion of the outer envelope and wrapping thereat, means compressing said skirt into tight clamping engagement with said wrapping and outer envelope and holding the mouth of said neck portion in tight engagement with the rounded shoulder portion of the inner envelope, and a contact member carried by the end portion of said body opposite said neck portion and electrically joined to the said sealed

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means in the inner envelope for connecting the lamp to a source of electrical energy.

5. A lamp comprising an inner tubular envelope of light-transmitting material having an ionizable medium therein and a pair of electrodes between which a discharge occurs during operation of said lamp, means sealed through said envelope for transmitting electrical energy to said electrodes, an outer tubular envelope of light-transmitting material surrounding the said inner envelope, each end of the said inner envelope terminating in a rounded shoulder portion and a constricted stem portion, and bases at each end of said lamp holding said inner and outer envelopes in predetermined coaxial spaced relation, each of said bases being of circular cross-section and comprising a hollow body of electrically non-conductive and low heat conductive material enclosing and extending beyond the stem portion of said inner envelope and having a peripheral enlargement terminated on a substantially diametric plane to provide a transverse seat disposed toward said envelopes and of substantially greater depth than the wall thickness of said outer envelope, an annular neck portion projecting from said seat toward the inner and outer envelopes and in interposed relation therewith, the mouth of said neck portion being flared and proportioned to accommodate the rounded shoulder portion of the inner envelope in substantially line contact and the end edge of the outer envelope being proximate to said seat and longitudinally retained thereby, a wrapping of heat-resistant material around the end portion of said outer envelope adjacent said seat providing a filling thereat which is substantially

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flush with the exposed surface of the said peripheral enlargement, a compressible metallic skirt encircling said body at said peripheral enlargement and the adjacent end portion of the outer envelope and wrapping thereat, said skirt being tapered inwardly at one end to form an end flange, a resilient snap ring provided within said skirt and retained therein by radially spaced protuberances in said skirt inward from said end flange to engage the forward edge of said transverse seat and maintain said end flange in tight engagement with the peripheral enlargement, a clamping ring encircling and compressing said skirt into tight engagement with the wrapping and the outer envelope and holding said neck portion in tight engagement with the rounded shoulder portion of the inner envelope and in spaced apart relation with the outer envelope, and a contact member carried by the end portion of said body opposite said neck portion and electrically joined to the said sealed means in the inner envelope for connecting the lamp with a source of electrical energy, said peripheral enlargement having a series of radially spaced indentations therein and said skirt being correspondingly dented and in registry therewith to prevent the skirt from rotating on said body.

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