R. D. MAILEY.

SEAL FOR VAPOR ELECTRIC APPARATUS.

APPLICATION FILED MAR. 6, 1913.

1,118,905. Patented Nov. 24, 1914.

Fig. 1.

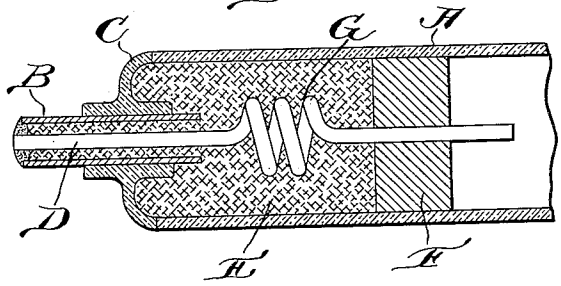
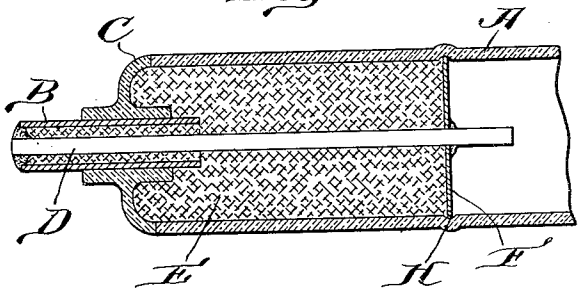


Fig. 2.



Witnesses:

Josephine H. Ryan

Charles J. Woodbury

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Attys.

UNITED STATES PATENT OFFICE.

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SEAL FOR VAPOR ELECTRIC APPARATUS.

1,118,905. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed March 6, 1913. Serial No. 752,307.

To all whom it may concern:

Be it known that I, ROY D. MAILEY, a citizen of the United States, and resident of Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Seals for Vapor Electric Apparatus, of which the following is a specification.

My invention relates to the construction of seals for vapor electric apparatus and its object is the construction of seals possessing a greater degree of reliability than those heretofore employed.

In certain types of vapor electric apparatus, such as quartz (fused silica) mercury arc lamps for example, the production of an effective gas-tight seal is of much importance. In lamps of this type the seals, together with the rest of the lamp are operated at high temperature. Seals in which the current is introduced by means of ground and fitted metal plugs reinforced on the outside by mercury are not sufficiently reliable. A new type of seal has recently been developed by Charles A. Kraus and is described in his application for patent filed April 5, 1912, Serial No. 688,815. In this seal a relatively thin, tubular, metallic member is fused through the container wall which consists of material having a coefficient of expansion much lower than that of the tubular metallic member. If the temperature of operation of the vapor apparatus is not carried too high, this seal is effective, but in the case of seals into a quartz mercury arc lamp intended for operation at elevated temperatures, in which platinum tubes are employed according to the said invention of Charles A. Kraus, the metal alloys with the mercury. This impairs and eventually destroys the plasticity or ductility of the metallic tube which is an essential condition for the stability of the structure of this seal. In a co-pending application, Serial No. 752,316, filed concurrently with this application, Frederick G. Keyes describes certain improvements in the structure of the said Kraus seal which enhance its stability. To prevent alloying of the metallic tube by mercury or other contained metal, Keyes interposes between the tubular member and the interior of the container, a barrier of yielding material which intercepts the metallic vapor and so prevents the alloying of the metallic tube. Keyes recommends for use as the barrier a pulverulent material such as iron oxid. To retain this barrier material in place, a diaphragm is introduced through which a lead passes into the interior of the container. In order to prevent the development of a stress between the lead and the thin metallic tube to which it is joined, the diaphragm is provided with an opening into and through which the lead passes. I find that the same freedom from stress as between the lead and the tube may be realized by employing a lead of flexible material so shaped that the stress in question is kept within safe limits, although the lead is engaged by the diaphragm in a permanent and intimate manner.

My invention will be better understood by reference to the accompanying figures illustrating the practice of my invention in which: Figure 1 represents a sectional view of a seal embodying my invention; and Fig. 2 represents a sectional view of another seal embodying my invention.

In the figures the same letters are employed for corresponding parts.

Referring now to Fig. 1, A is a tube of vitreous or other non-conducting material which in this instance may be assumed to be fused silica for purposes of illustration. B is a thin, metallic tube, of platinum for example, which is sealed through the walls of the container by means of a vitreous member C which is fused to the platinum tube B on the one hand and to the fused silica tube A on the other. The member C may be constructed of a composition of matter comprising silica (SiO_2) and boric acid (B_2O_3) as its essential constituents. (This composition forms the subject matter of an accompanying application filed by the said Keyes and Kraus concurrently herewith.) D is a lead welded or soldered to the tube B at one end and extending into the interior of the container on the other. Between the tube B and the interior of the container, which contains mercury, for example, is interposed a barrier E of yielding material of pulverulent nature. In order to retain the pulverulent material in place a diaphragm is provided. The lead passes through the diaphragm and is engaged thereby. The lead D in general possesses a much higher coefficient of thermal expansion than the container material A. Any temperature change, therefore, introduces a stress between the lead D and the

tube B. The oft repeated stressing of the seal in this manner is liable to injure the integrity of the seal. I therefore provide for such a degree of flexibility as between the lead D and the diaphragm F engaging it that the stress between the lead D and the tube B is always kept within safe limits. I may accomplish this in a variety of ways. In Fig. 1, for example, this flexibility is attained by shaping a portion of the lead in the form of a helical spring as shown at G. Another method of securing the same object is shown in Fig. 2, where the flexibility is obtained by constructing the diaphragm of such form as to secure the necessary flexibility. The lead D in this case is engaged by the diaphragm F, which is constructed of a disk of thin sheet metal held in position in an annular groove H in the tube A. This sheet of metal thus serves the double purpose of acting as a diaphragm for retaining the barrier material E and for adding flexibility to the lead and diaphragm system.

What I claim and desire to secure by Letters Patent is:

1. In a vapor electric apparatus of the general character described, a container, a seal comprising a metallic member sealed through the container wall, a lead forming a continuation of said metallic member and extending into the container, barrier material covering the seal, a diaphragm to retain the barrier material in place, said diaphragm firmly joined to the lead, the structure composed of the diaphragm and lead being characterized by flexibility.

2. In a vapor electric apparatus of the general character described, a container, a seal comprising a metallic member sealed through the container wall, a lead forming a continuation of said metallic member and extending into the container, barrier material covering the seal, a diaphragm to retain the barrier material in place, said diaphragm firmly joined to the lead, the lead being yielding between the diaphragm and the seal.

3. In a vapor electric apparatus of the general character described, a container, a seal comprising a metallic member sealed through the container wall, a lead forming a continuation of said metallic member and extending into the container, pulverulent barrier material covering the seal, a diaphragm to retain the barrier material in place, said diaphragm firmly joined to the lead, the structure composed of the diaphragm and lead being characterized by flexibility.

4. In a vapor electric apparatus of the general character described, a container, a seal comprising a metallic member sealed through the container wall, a lead forming a continuation of said metallic member and extending into the container, pulverulent barrier material covering the seal, a diaphragm to retain the barrier material in place, said diaphragm firmly joined to the lead, the lead being yielding between the diaphragm and the seal.

Signed by me at Boston, Massachusetts, this twenty-fifth day of February, 1913.

ROY D. MAILEY.

Witnesses:

ODIN ROBERTS,

FLORENCE A. COLLINS.