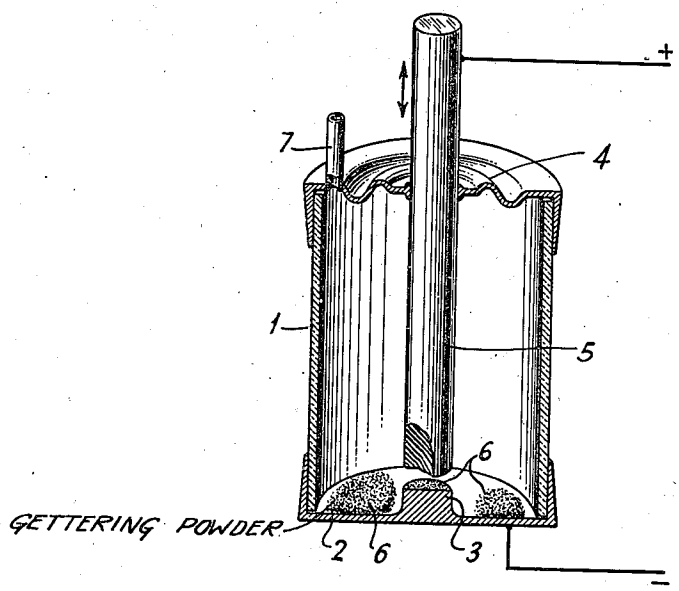
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METHOD FOR GETTERING VACUUM TUBES

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METHOD FOR GETTERING VACUUM TUBES

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4 Claims. (Cl. 200—144)

It is known in the radio art that a vacuum in an envelope may be improved by the evaporation of getter substances in the envelope. Magnesium as well as alkaline earth metals are the better known getters and are usually evaporated in the envelope during the manufacture of the tube by eddy current heating after evacuation by exhaust pumps. This process may be used if the temperature arising in the tube are relatively low. If this known method, however, is employed in the manufacture of vacuum vessels that are subject to a high temperature during operation, such as for instance in some electron discharge devices and vacuum switches, a strong evaporation of the getter substance occurs and the generated metal vapor is ionized causing the formation of an arc which may lead to the destruction of the discharge devices or vacuum switches.

The usual getter is impractical in the manufacture of metallic-ceramic discharge vessels where the metallic and ceramic parts are brazed together at very high temperatures in an electric oven. The temperatures involved in such manufacturing methods are considerably higher than the evaporating temperature of the usual getter substances used in the art.

According to this invention a getter is employed which has a vapor pressure between that of magnesium and that of molybdenum, and may be introduced in powder form into the envelope. Copper powder has been found to be particularly suitable.

The characteristic features of this invention may be advantageously employed in a conventional vacuum switch such as shown in the drawing comprising a ceramic cylindrical envelope 1 closed at one end with a metal header 2 carrying a fixed contact 3, and closed at the other end by a flexible diaphragm 4 carrying a movable contact 5. The individual metal and ceramic parts are soldered together with the fixed and movable contact electrodes in registry and after the vessel is ready for the pumping operation, a definite amount of copper powder 6 is introduced into the envelope through the exhaust tube 7, and the envelope may be shaken to dust the surface of the switch contacts with some of the powder. The envelope is then exhausted to a reasonably low pressure in the usual manner and sealed. If now the two contacts of the switch are connected to a potential and are parted from each other a break spark will occur. This spark will evaporate a portion of the deposited copper powder on the contact of the switch, the arc usually forming fine points of the copper powder on the switch contacts and because of the low thermal inertia of the loose copper particles the heat of the arc quickly liberates copper vapor.

It is obvious that a thin film of loose powdered metal deposited or dusted on any electrode in an evacuated device to which an arc or similar discharge may be started will vaporize and getter the device. Copper vapor has great affinity at the high temperatures such as 3000° C. to the base gases in an envelope with the result that an excellent gettering action is insured. Thus, by simply making and breaking an arc discharge a few times, a high vacuum in the envelope is obtained, and by shaking the tube part of the superfluous powder in the envelope may be returned to the electrodes. This process may be repeated after longer operation when the vacuum might be decreased due for instance to overloading and heating.

It has been observed in practice that the powdery copper does not form conducting bridges between electrodes so that the insulating properties of the vacuum vessel are maintained throughout its life.

Aluminum in powder form may be used with good results for the purpose here described since it has a relatively low vapor pressure in cold state and its oxides, produced during the gettering process, are not conducting so that no conducting bridges occur.

I claim:

1. The method of gettering vacuum switch envelopes containing two switch contacts comprising depositing a thin film of powdered vaporizable metal on at least one of the contacts, applying a voltage to said contacts and moving said contacts together to start an arc discharge to the point of the contact covered by the film of metal.

2. The method of gettering vacuum switch envelopes containing two switch contacts sealed gas-tight in the envelope comprising depositing a thin film of powdered vaporizable metal on one of the contacts, establishing a potential difference between said contacts and making and breaking electrical contact between said switch contacts to produce an arc discharge between the contacts through the particles of powdered metal on the contacts.

3. A vacuum switch comprising an evacuated envelope, two registering switch contacts sealed gas-tight in the envelope, means for moving one contact with respect to the other and into engagement therewith, and a mass of loose metal powder in said envelope, a portion of which is dusted in a thin film over the surface of one of said contacts to be vaporized by an arc discharge produced by a voltage between the contacts.

4. A vacuum switch, according to claim 3 in which said mass comprises a metal powder of the group consisting of copper and aluminum.

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