

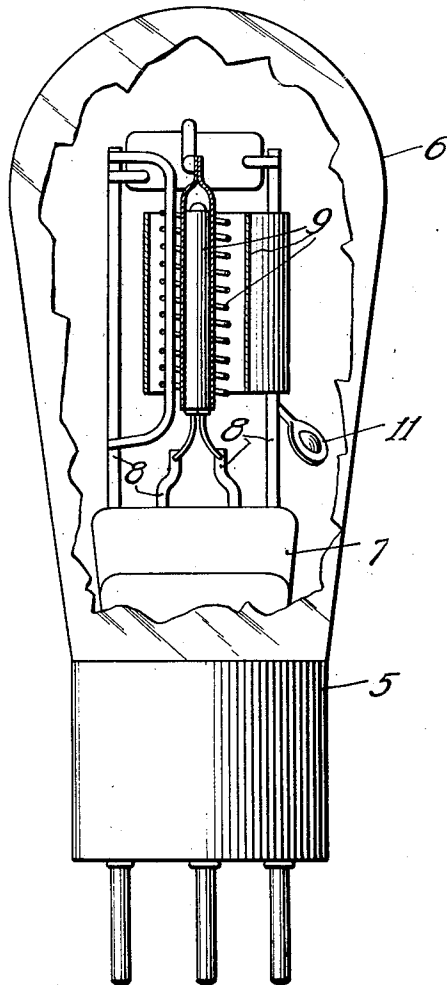
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CLEANING AND REGENERATING COMPOUND FOR ELECTRONIC TUBES

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CLEANING AND REGENERATING COM-
POUND FOR ELECTRONIC TUBES

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2 Claims. (Cl. 250—27.5)

My invention relates to a cleaning and regenerating compound for electronic tubes.

There is considerable evidence tending to show that in the operation of devices having electron emissive surfaces, the emissive discharge is due largely to a thin film of metallic alkali or alkaline earth metal. For instance, when a barium or strontium oxide coating is used it appears that there is what has been termed a monatomic film of metallic barium or strontium on the surface of the cathode which is responsible for the high emissivity of such a coating. However, the presence of too large a quantity of the metal upon the oxide destroys the emissive properties of the coating.

In the production of vacuum tubes by the well known methods as by the conversion of carbonates to oxides on the cathode, there is sufficient free metallic alkali or alkaline earth metal to produce satisfactory emission. But after the tube has been used for sometime the film of metal is gradually dispersed, and at the same time gases are liberated from the tube elements due to heating and the constant vacuum to which they are subjected.

An object of my invention is to provide means for replenishing the metallic film on cathode surfaces.

A further object is to provide means for cleaning up the gases of a tube which are liberated from the elements.

A further object is to provide a new regenerating alloy.

A further object is to provide a new regenerating and cleaning alloy.

Other objects and advantages will appear as the description proceeds.

Referring to the drawing:

The single figure is an elevational view of an ordinary vacuum tube having a base 5, and an envelope 6 mounted thereon.

Within the envelope is a stem 7 carrying a plurality of supports 8 upon which elements 9 are mounted. The invention is applicable to a variety of tubes such as vacuum tubes, gas glow discharge tubes, photo-electric cells, etc. The particular type of tube illustrated is a radio audion having an oxide coated cathode such as is well known in the art. The emitting surface upon the cathode is formed by converting a carbonate to an oxide by the application of heat liberating carbon dioxide, which is exhausted from the tube by means of a vacuum pump. The heating of the elements also causes occluded gases to be expelled from the envelope. It ap-

pears that in the formation of the oxide coating, where the coating is formed by converting a carbonate of an alkaline earth metal to an oxide of the metal, a thin adsorbed film of the metal remains on the surface of the oxide, and this film acts as the emitting agent. After the tube has been in use for some time, the film becomes dispersed and the efficiency of the tube is lowered. Another factor contributing to the deterioration of the tube is the liberation of gases from the elements under the heating and vacuum of the tube while in use. I have found that by providing a pellet of a barium magnesium tin alloy within the tube the emissive surface may be reactivated, and the gases cleaned up in the tube. This pellet preferably consists of an alloy containing 4.29 percent of barium, 7.36 percent of magnesium, and 88.35 percent of tin, these percentages may be varied to some extent between limits of barium 3-12%, magnesium 6-20% and tin 70-91%. A pellet 11 of this alloy may be secured within the tube in such a position that the pellet may be heated inductively, independently of the elements. Thus, when the tube is being exhausted the elements are inductively heated while the pellet remains comparatively cool, and when the pellet is inductively heated, the elements remain comparatively cool. I have shown the pellet secured to one end of the electrode supports 8 in a position where it may be heated independently of the elements. In order to regenerate the tube, the pellet is inductively heated, liberating barium and magnesium. A portion of the barium is deposited on the oxide coating of the cathode, and the magnesium acts as a getter to scavenge the gases within the envelope.

It will, of course, be understood, that other getter materials may be used in the alloy, or that the alloy may be used without a getter. The tin, which forms the base or main constituent of the alloy, liberates the barium or alkaline earth metal, and the getter in the required minute quantity.

In cases where an alkaline earth metal is liberated from one of its salts by reaction with another compound upon the application of heat, the amount of alkaline earth metal liberated is invariably too large, and means must be provided for removing the excess of the metal from the tube.

The invention provides a convenient method of regenerating tubes, and may obviously be employed to liberate a quantity of alkaline earth metal to form the original deposit upon a cath-

ode, as in the practice of manufacturing photo-electric cells.

What I claim is new and desire to protect by Letters Patent of the United States is:

- 5 1. A vacuum tube comprising an exhausted envelope, electrodes including a cathode having a coating of alkaline earth oxide, a pellet in said tube consisting of an alloy of tin, barium and magnesium for scavenging and rejuvenating the
10 tube.

2. A vacuum tube comprising an exhausted envelope, electrodes including a cathode having a coating of alkaline earth oxide, a pellet in said tube consisting of an alloy of tin, barium and magnesium for scavenging and rejuvenating the tube, said pellet being disposed so that it may be independently inductively heated without inductively heating the cathode.

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