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PROCESS OF COATING ELECTRODES.

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To all whom it may concern:

Be it known that I, JAMES E. HARRIS, a citizen of the United States, residing at East Orange, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Processes of Coating Electrodes, of which the following is a full, clear, concise, and exact description.

This invention relates to a process of coating and has particular reference to the coating of filamentary material with a substance capable of thermionic activity for use in vacuum tubes.

An object of the invention is to provide a process whereby base metal cores may be coated with thermionic material without oxidation.

Another object is to provide a process whereby substantially all metals may be coated with thermionic material by means of a simple and economical process involving a bath and electrolytic action.

In the older processes which involved baking on the coating in air, it was necessary to use as cores metals such as platinum and other of the noble metals which did not oxidize in air. If certain metal cores such as tungsten, iron, molybdenum, chromium or alloys thereof are used and the coating is baked in air, it is found that the core metal oxidizes and the oxide forms with the alkaline earth metal compound a stable compound which does not break down into the oxide of the alkaline earth metal when heated in the vacuum bulb. Consequently no thermionic action ensues.

My present process involves introducing the material to be coated as an electrode in a heated bath of a molten compound or mixture of compounds of the alkaline earth metals, the anode consisting of some material such as carbon which is not readily attacked by the electrolyte. The coating is thus applied in the absence of air giving the core metal no opportunity to oxidize except under certain regulated cases.

Specifically the process comprises placing suitable quantities of such materials as anhydrous barium chloride, barium nitrate, hydrated barium oxide, and corresponding compounds of strontium in a vessel. If both barium and strontium compounds are used at the same time, equal parts are used. The material is then melted and heated to about 600 degrees C. and a current is passed through the bath using the filamentary material to be coated as the cathode, with an anode of a bath-resisting material such as carbon. There is deposited on the filament an alkaline earth metal coating of a composition such that upon exposure to air, it is convertible, in part at least, to alkaline earth metal oxide. It has been found that a current density of about 3.6 amperes per sq. cm. gives very good results especially when platinum is coated in a bath consisting of anhydrous barium chloride.

It has been found that such metals as iron, nickel, tungsten, molybdenum, and alloys of the same can by this process be coated without the formation of oxides of the metal of the core and the formation of stable compounds thereof with the alkaline earth metals. This arises from the fact that the coating takes place in the absence of air. Any compound of the alkaline earth metals may be used as a bath, providing it has a melting point sufficiently low for convenience.

What is claimed is:

1. The method of applying an alkaline earth metal oxide coating to a metal, the oxide of which is combinable with alkaline earth metal compounds to form compounds not reducible to alkaline earth metal oxide upon heating in vacuum, said method comprising preparing an electrolyte composed of an alkaline earth metal compound, arranging in said electrolyte a filament of the metal to be coated and electrolytically depositing on said filament an alkaline earth metal coating which is convertible, in part at least, to alkaline earth metal oxide upon exposure to air.

2. The method of applying an alkaline earth metal oxide coating to a tungsten filament, said method comprising preparing an electrolyte composed of an alkaline earth metal compound, arranging the tungsten filament in said electrolyte, and electrolytically depositing on said filament an alkaline earth metal coating which is convertible, in part at least, to alkaline earth metal oxide upon exposure to air.

3. The method of applying a coating of

barium oxide and strontium oxide to a tungsten filament, said method comprising preparing an electrolyte composed of a barium compound and a strontium compound, arranging said tungsten filament in said electrolyte and electrolytically depositing on said tungsten filament a coating which is convertible, in part at least, to barium oxide and strontium oxide upon exposure to air.

In witness whereof, I hereunto subscribe my name this 27th day of February A. D., 1920.

JAMES E. HARRIS.