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UNITED STATES PATENT OFFICE.

EARLE E. SCHUMACHER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PROCESS OF COATING.

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To all whom it may concern:

Be it known that I, EARLE E. SCHUMACHER, 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, of which the following is a full, clear, concise, and exact description.

This invention relates to electron discharge devices and pertains especially to the manufacture of thermionic cathodes therefor.

The object of this invention is a process of coating alkaline earth oxides on a core of oxidizable metal.

This invention provides for a coating of base metal cores with thermionic material without an appreciable oxidation of the core. The process of coating comprises the preparation of a molten bath of an alkaline earth compound or a mixture of alkaline earth compounds at a moderate temperature, and the dipping of the material to be coated for an instant in this bath. The coating is thus applied to the core in the absence of air and the oxidation of the surface of the core is prevented. When the coating is heated it breaks down into the alkaline earth oxides which are highly active thermionically.

In the preferred form of the invention a bath of molten barium hydroxide or a mixture of barium hydroxide with strontium or calcium hydroxide is prepared by mixing one or more of these substances in suitable quantities in a vessel and heating the same to a temperature from about 450 to 750 degrees centigrade. At this temperature the substances have become melted in their water of crystallization and the material to be coated is then merely dipped into this bath whereupon a firmly adherent coating is formed on the surface of the metal. It is found that, by this particular process, base metals may be coated with a firm coating in the absence of air without the necessity of any electrolytic action.

In this method of dipping the filament in a bath of molten hydroxide, it is probable that a very small and negligible amount of the stable compounds above mentioned are formed; yet, since the filament is not heated in the air, there is a large excess of uncombined alkaline earth oxides present in the coat and it is to these uncombined oxides that the filament owes its activity.

A small amount of oxidation of the core is desirable in a dipping process in that it imparts a rough surface to the metal to which the alkaline earth oxides will adhere more firmly. This partial oxidation may be brought about by either of two methods: the filament may be oxidized by a previous heating in the air or, the bath may be heated up to a temperature sufficiently high such as 600° centigrade so that it becomes an oxidizing medium in itself due to the formation of a certain amount of barium peroxide.

By the above process thermionically active filaments have been made of cores of iron, tungsten, molybdenum, carbon and alloys of chromium or tantalum with various combinations of the other metals.

What is claimed is:

1. A process of coating which comprises dipping a base metal core to be coated in a molten bath of alkaline earth hydroxide.

2. A process of coating which comprises heating a quantity of alkaline earth hydroxide in a vessel to a temperature where it becomes melted in its water of crystallization and then dipping the material to be coated in the bath.

3. A process of coating which comprises heating a bath of barium hydroxide to a temperature from about 450° to 750° centigrade and then dipping a base metal core into the bath.

4. A process of coating which comprises heating a mixture of alkaline earth hydroxides to a temperature from about 450° to 750° centigrade and then dipping a base metal core into the bath.

5. A process of coating which comprises dipping an electrode to be coated in a molten bath of alkaline earth hydroxide.

6. A process of coating which comprises dipping a filament to be coated in a molten bath of alkaline earth hydroxide.

7. A process of coating which comprises heating an alkaline earth hydroxide to a temperature from about 450° to 750° centigrade and then dipping a base metal electrode therein.

In witness whereof, I hereunto subscribe my name this 10th day of March, A. D. 1920.

EARLE E. SCHUMACHER.