

UNITED STATES PATENT OFFICE

JAMES R. WILSON, OF MOUNTAIN LAKES, AND CHARLES M. BLACKBURN, OF EAST ORANGE, NEW JERSEY, ASSIGNORS TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

PROCESS OF COATING THERMIONIC CATHODES

No Drawing.

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This invention relates to electron emitters, and more particularly to the manufacture of thermionically active cathodes for electron discharge devices.

5 An object of the invention is to simplify the coating process of cathode cores to produce an adherent layer of active material thereon.

10 In accordance with this invention metals suitable for cathode cores may be immersed in a molten bath of alkaline earth pure salts, such as nitrates, to form an adherent glossy coating on the cores. The coated core may then be heated at a suitable temperature to
15 cause the reaction of the alkaline earth nitrates with the core material, to produce a thermionically active oxide coating.

20 In the preferred form of the invention a bath of molten barium nitrate or molten strontium nitrate or a mixture of barium and strontium nitrates is prepared by melting one or more of these pure salts in a vessel and heating the same to a temperature from about 550 to 800 degrees centigrade. At the
25 higher temperatures the molten bath decomposes slightly, but this decomposition is very slow and does not substantially affect the results of the coating process. It has been found that by this particular process any
30 metal suitable for a cathode core may be coated with a uniform layer or layers of nitrates which form a smooth glossy coating on the core. This coating is subsequently converted to barium and strontium oxides by
35 simply heating in an atmosphere of air or oxygen, or even in a neutral atmosphere, such as nitrogen or vacuum, in which the nitrates decompose and the oxides react with the core.

40 In this process of coating the bath of molten nitrate salts, such as barium and strontium nitrates, is heated in a vessel to about 700 degrees centigrade and a metallic core or ribbon suitable for a cathode, such as a filamentary ribbon of platinum cobalt
45 alloy, is passed through a molten bath at such a rate that a thin layer of nitrates adheres to the ribbon. After cooling a glossy surface of barium and strontium nitrates is present and uniformly distributed over the
50 ribbon. Any number of layers of nitrates

may be superposed on the first layer by repeatedly passing the ribbon through the molten bath of nitrates to form a desirable thickness of coating on the core. The coated ribbon is then heated sufficiently in an oxidizing atmosphere, such as air or oxygen or
55 a neutral atmosphere, such as nitrogen or vacuum, to cause the decomposition of the barium and strontium nitrates to the corresponding oxides which are thermionically active. The temperature of the oxidation heating will depend on the constituents of the cathode core, for example, the coated
60 platinum cobalt ribbon may be heated to a temperature of approximately 850 degrees centigrade, to cause the necessary reaction of the nitrate coating with the core material to form the thermionically active oxides. The resulting oxide coating is firmly adherent to the cathode core and does not dis-
70 integrate rapidly during the operation of the device in which it is used. It is found that by using the molten nitrates bath in this particular process, the thickness of the layers of nitrate on the cathode core and the proportions of the oxides formed on the core may be
75 more easily controlled. Furthermore, due to the use of pure nitrate salts no deleterious liquids or other foreign matter are introduced in the molten bath.

80 What is claimed is:

1. The process of manufacturing thermionically active cathodes, which comprises immersing a metal suitable for a cathode core in a molten alkaline earth nitrate.

2. The process of manufacturing thermionically active cathodes, which comprises immersing a metal suitable for a cathode core in a molten bath of alkaline earth nitrates.

3. The process of manufacturing thermionically active cathodes, which comprises heating a quantity of alkaline earth nitrates in a vessel to a molten state, and then passing the cathode core through the molten nitrates.

4. The process of manufacturing thermionically active cathodes, which comprises heating a molten bath of barium nitrate to a temperature of approximately 700° centigrade, and passing a metallic core through said molten bath.

5. The process of manufacturing thermionically active cathodes, which comprises heating a molten bath of barium and strontium nitrates to a temperature from 550 to 800° centigrade, passing a metallic core through said bath to form a coating of nitrates thereon, and heating said coating to change the nitrates to oxides.

6. The process of manufacturing thermionically active cathodes, which comprises heating a molten bath of barium and strontium nitrates to a temperature between 550 to 800° centigrade, passing a metallic core through said bath to form a coating of nitrates thereon, and heating the coated cathode in an oxidizing atmosphere at a temperature to decompose said nitrates to oxides.

7. The process of manufacturing thermionically active cathodes, which comprises heating alkaline earth nitrates in a vessel to a temperature of approximately 700° centigrade to form a molten bath, passing a metallic core through said bath to produce a coating of nitrates thereon, cooling said coated core, and then heating said core at a temperature of approximately 850° centigrade to change the coating to oxides.

In witness whereof, we hereunto subscribe our names this 29th day of November, A. D. 1927.

JAMES R. WILSON.
CHARLES M. BLACKBURN.

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