METHOD OF MAKING GAS DISCHARGE TUBE AND RECTIFIER


No Drawing. Application May 1, 1952, Serial No. 285,562

Claims priority, application Great Britain May 3, 1951

4 Claims. (Cl. 117—224)

This invention relates to a method of preparing thermionic cathodes, the cathode base, generally a metal such as tungsten or nickel, being coated with a mixture of alkaline earth carbonates and a compound of a metal of good conductivity, said compound being decomposed during the conversion of the carbonates to oxide and the subsequent electroforming of the cathode in a manner such that finely divided metal is left in the oxide layer of the cathode. In addition, the invention relates to a thermionic valve comprising a cathode made by the said method.

It has been suggested before to use nickel oxide for the purpose above indicated but there is a limitation in that nickel oxide is not always wholly decomposed to metallic nickel, occlusions of oxides being left.

The object of the invention is to improve the above method so that the added compound is decomposed to metal as far as possible. According to the invention, in a method of preparing a thermionic cathode which is coated with a mixture consisting of one or more alkaline earth carbonates and a compound of a metal of good conductivity which compound during the decomposition of the carbonates to oxide and the subsequent formation of the cathode is converted into a finely divided metal of good conductivity contained in the oxide layer, the added compound is constituted by the oxides of tungsten or nickel, preferably tungsten, molybdenum, platinum, iridium, osmium, palladium, rhodium and ruthenium. However, use is preferably made of nickel and the added quantity of metal compound may be from 10 mol. percent to 90 mol. percent, preferably from 20 mol. percent to 60 mol. percent measured on the added metal and the alkaline earth metals.

The quantity of added metal depends on the manner of coating the cathode with the carbonates and upon the purpose for which the metal (a vacuum or gas discharge valve, a valve for pulsatory or for continuous operation) is required. One advantage of the addition of metal to the oxide layer of the cathode resides inter alia in that it mitigates against the formation of silicate layers of high resistance between the oxide grains.

In order that the invention may be clearly understood and readily carried into effect, it will now be described in detail with reference to two examples of mixtures for costing cathodes.

Example 1

This example relates to a paste in which cathodes are oxide-coated by dipping. The paste consists of:

- 205 parts by weight barium-strontium carbonate (50 mol. percent BaCO₃)
- 45 parts by weight nickel formate (anhydrous)
- 250 parts by weight binder A
- 480 parts by volume butyl acetate

where binder A contains
- 50 parts by weight nitrocellulose
- 130 parts by volume diethyl oxide
- 530 parts by volume amyl acetate
- 60 parts by volume ethyl alcohol.

This mixture is milled for 48 hours with porcelain balls, thus being ready to be used. The cathodes prepared therewith contain 20 mol. percent nickel in the oxide layer.

Example 2

This example relates to a paste required to be applied to the cathode by spraying. The paste consists of:

- 21 parts by weight nickel formate
- 95 parts by weight barium-strontium carbonate (50 mol. percent BaCO₃)
- 60 parts by volume nitrocellulose binder (obtained from 66 parts by weight nitrocellulose and 1,000 parts by volume amyl acetate)
- 30 parts by volume diethyl oxide
- 65 parts by volume methyl alcohol

The milling operation is effected in the same manner as in Example 1. What we claim is:

1. In the method of manufacturing a thermionic cathode the steps of, coating a refractory metal base with a layer of a mixture of at least one alkaline earth carbonate and a formate of a refractory metal of good conductivity, and reducing the alkaline earth carbonate to a layer of the corresponding oxide.

2. A method as claimed in claim 1, in which the added quantity of metal formate is from 10 mol. percent to 90 mol. percent measured on the basis of the refractory metal and the alkaline earth metal.

3. A method as claimed in claim 1 in which the quantity of the metal formate is between 20 and 60 mol. percent measured on the basis of the refractory metal and the alkaline earth metal.

4. A method as claimed in claim 3 in which the formate is nickel formate.

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