

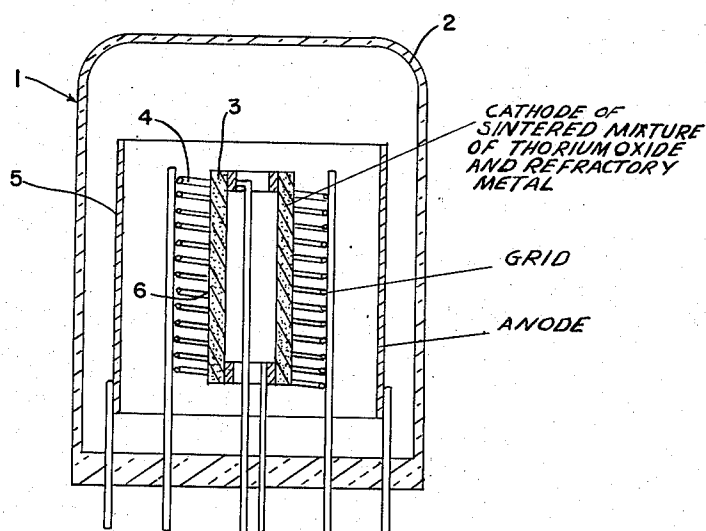
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THERMIONIC CATHODE

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THERMIONIC CATHODE

Robert Loosjes and Antonius Josephus v.
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3 Claims. (Cl. 117—33.28)

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This invention relates to cathodes the emission properties of which are determined by thorium oxide, the cathode body consisting of a sintered mixture of thorium oxide and a refractory metal such as tungsten.

The aforementioned type of cathodes have already been used in gaseous discharge lamps in which they are heated by the discharge. If the mixture is pressed at a sufficiently high pressure and sintered at a sufficiently high temperature, the cathode body has great mechanical rigidity. A disadvantage is that the oxide-metal mixture is black so that the radiation has a comparatively high value. Furthermore, the specific emission is comparatively low.

The object of the invention is to provide an improvement in the above-mentioned cathode.

According to the invention, a cathode the emission properties of which are determined by thorium oxide, and the cathode body of which consists of a mixture of thorium oxide and a refractory metal such as tungsten which mixture is pressed at high pressure and subsequently sintered, is covered with a thin layer of thorium oxide which is secured by sintering to the cathode body. Since thorium oxide is white, the thermal radiation is comparatively small, whilst the specific electron emission of thorium oxide is materially higher than that of the mixture of thorium-oxide metal. Activation of the cathode is not required, since the cathode is capable of emitting electrons directly after incorporation in a tube. The invention will now be described with reference to the accompanying drawing in which the sole figure is a view, in cross-section, of an electric discharge tube comprising one form of cathode in accordance with the invention.

Referring to the figure, an electric discharge tube 1 comprises an envelope 2 enclosing a cathode 3, a control grid 4 and an anode 5. The cathode 3 comprises a body of a sintered mixture of thorium oxide and a refractory metal, e. g., tungsten, which body has a thin layer 6 of thorium oxide sintered thereto. The composition of the cathode will now be explained more fully by reference to the following example.

A mixture consisting of equal amounts by weight of thorium oxide and of tungsten is pressed at high pressure to form a cylindrical

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tube having an outer diameter of 2.5 mms., and an inner diameter of 1.5 mms. and sintered in hydrogen at 1900° C. Subsequently, a layer of thorium oxide of 50 microns thick is provided which is likewise secured by sintering at 1900° C. With the use of a mixture consisting of molybdenum powder and ammonium molybdate, molybdenum caps may be produced at the extremities of the said tube and secured by sintering to molybdenum poles. The cathode obtained has great mechanical rigidity and is not deformed at temperatures up to 2300° C. The heating of the cathode takes place evenly due to the intimate mixture of the tungsten and the thorium oxide. If the cathode is operated by pulses, the specific emission may be up to 50 amps./cm.² at a temperature of 2200° K. The period of life is very long.

What we claim is:

1. A cathode comprising a body composed of a sintered mixture of thorium oxide and a refractory metal, and a discrete thin layer of given thickness of thorium oxide covering said mixture of thorium oxide and refractory metal and sintered to said body.

2. A cathode comprising a body composed of a sintered mixture of thorium oxide and tungsten, and a discrete thin layer of given thickness of thorium oxide covering said mixture of thorium oxide and refractory metal and sintered to said body.

3. A cathode comprising a body composed of a sintered mixture of equal weights of thorium oxide and tungsten, and a layer of thorium oxide having a thickness of approximately 50 microns sintered to said body.

ROBERT LOOSJES.
ANTONIUS JOSEPHUS v. GENUCHTEN.

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The following references are of record in the file of this patent:

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