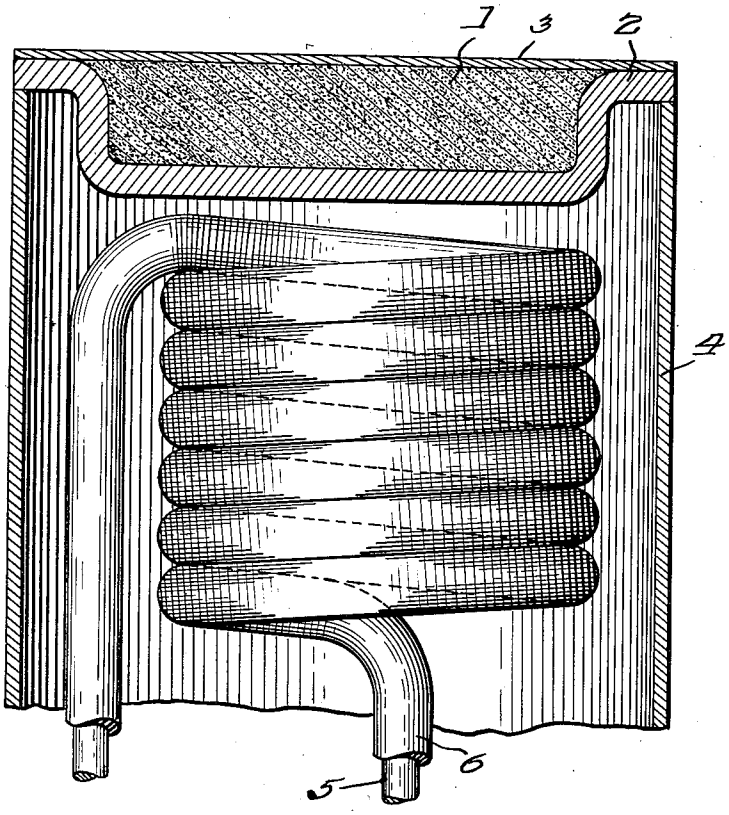
Oct. 1, 1957 H. KATZ ET AL 2,808,531

CATHODE FOR ELECTRICAL DISCHARGE TUBES

Filed March 10, 1953



Inventors.
Helmut Katz, &
Siegfried Costa

By

Atty.

United States Patent Office

2,808,531

Patented Oct. 1, 1957

2,808,531

CATHODE FOR ELECTRICAL DISCHARGE TUBES

Helmut Katz and Siegfried Costa, Munich, Germany, assignors to Siemens & Halske Aktiengesellschaft, Munich and Berlin, Germany, a German corporation

Application March 10, 1953, Serial No. 341,514

Claims priority, application Germany March 24, 1952

4 Claims. (Cl. 313—346)

This invention is concerned with a dispenser type cathode for electrical discharge tubes.

In known cathodes of this type, the emissive material migrates in operation through a retaining wall forming the emitting surface. Such wall has in known cathodes of this kind a porous structure or is otherwise provided with fine passages. Sintered tungsten or molybdenum bodies are oftentimes used. Barium or thorium compositions or alloys made of such substances diffuse through the pores or fine passages of the corresponding wall and migrate thus to the emitting surface formed thereby for distribution thereon.

It has now been discovered that metallic thorium can diffuse through a dense metallic sheet, the term "dense" being used in the customary sense, meaning a sheet having a dense or compact structure substantially free of pores or fissures. The invention recognizes this discovery and proposes to provide a cathode of the dispenser type comprising a receptacle containing thorium as an emissive material, and having a retaining wall made of a relatively dense sheet of molybdenum or similar high melting metal. The emissive thorium material diffuses through the dense sheet of the retaining wall to the emitting surface formed thereby. The sheet may be up to several tenths of a millimeter thick, even more, if correspondingly long times for forming and high forming temperatures can be provided for or tolerated.

An example of the invention is illustrated in the accompanying drawing.

Referring now to the drawing, the cathode diagrammatically shown therein is a flat indirectly heated cathode. The emissive material **1**, which may be thorium or a known thorium composition or alloy, is disposed inside of a pot-shaped receptacle having a retaining wall **2** and closed on top by a thin metallic sheet **3** of dense structure, such sheet forming the emitting surface. The thickness of the sheet will depend on the size and geometric form thereof, which may of course vary, and amounts at the most to several tenths of a millimeter, that is, in any case less than one millimeter. The sheet **3** may be made of molybdenum or a similar metal of high melting point. The emissive thorium-containing substance **1** diffuses in the operation of the cathode through the dense sheet **3**, thus migrating to the emitting surface formed thereby. The retaining wall **2** of the pot-shaped receptacle is thicker than the sheet **3** so as to inhibit as much as possible diffusion of the emissive substance therethrough.

The cathode is mounted on a tubular member **4** which also serves as a heat radiation shield.

The cathode is heated by a heater coil **5** which is in usual manner provided with an insulating layer **6**.

Changes may be made within the scope and spirit of the appended claims.

We claim:

1. An indirectly heated dispenser type cathode for electrical discharge tubes having a receptacle for holding a normally migratory emissive material of the class of thorium, said receptacle comprising a metallic retaining wall and a cover sheet made of high melting metallic material of relatively dense structure substantially free of pores and fissures, said cover sheet being less than one millimeter thick and forming with said retaining wall which is thicker than said sheet an interiorly unobstructed cavity containing said emissive material, the outside of said cover sheet forming the emitting surface of said cathode, diffusion of said emissive material through said retaining wall being substantially inhibited by the thickness thereof to confine migration of such material during the operation of said cathode substantially through said cover sheet to the emitting surface formed thereby.

2. A cathode according to claim 1, wherein said cover sheet is made of a material of the class of molybdenum.

3. A cathode according to claim 1, wherein said cover sheet is made of a material of the class of molybdenum, the thickness of said sheet being on the order of several tenths of one millimeter.

4. A cathode according to claim 3, comprising a tubular holder extending from said retaining wall, and a heater disposed within said holder for heating said receptacle to heat said emissive material so as to cause migration thereof through said cover sheet to the emitting surface formed thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

2,175,345	Gaidies	Oct. 10, 1939
2,452,075	Smith	Oct. 26, 1948
2,460,739	Francis	Feb. 1, 1949
2,640,949	Cook	June 2, 1953
2,640,950	Cook	June 2, 1953
2,647,216	Brown	July 28, 1953
2,673,277	Lemmens et al.	Mar. 23, 1954
2,687,489	Anderson et al.	Aug. 24, 1954