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CYLINDRICAL DISPENSER CATHODE FOR MAGNETRONS

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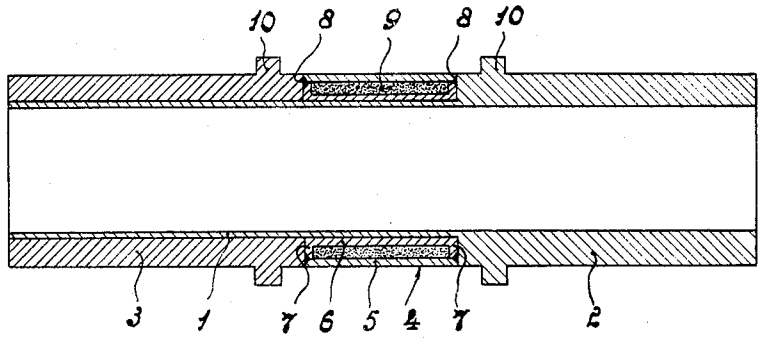

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CYLINDRICAL DISPENSER CATHODE FOR MAGNETRONS

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This invention relates to cylindrical cathodes, of which the electron-emitting part comprises a porous tungsten body which closes a chamber containing a supply of alkaline-earth metal compounds which during the operation of the cathode supplies alkaline-earth metal to the porous surface of the cathode. The invention also relates to magnetrons comprising such cathodes.

In a known cathode of the above-mentioned kind an annular tungsten body tightly surrounds a molybdenum tube which under the tungsten body has a smaller outer diameter such that a supply chamber is formed between this part and the porous tungsten body. The porous tungsten body is enclosed in the axial direction between two heavy molybdenum rings pressed on the tube.

A difficulty in the known cathode type is that leaks are liable to occur between the rings and the tungsten body due to the different coefficients of expansion of tungsten and molybdenum. Due to these leaks, an amount of alkaline-earth metal emerges such that part of the rings may also start to emit electrons, either primary or secondary electrons. This emission causes a materially decreased efficiency more particularly in magnetrons.

The object of the invention is to provide a cathode construction in which the above-mentioned disadvantages are avoided.

According to the invention in a cylindrical cathode, of which the electron-emitting part comprises a porous tungsten body which closes a room containing a supply of alkaline-earth metal compounds which during the operation of the cathode supplies alkaline-earth metal to the porous surface of the cathode, a cylindrical annular supply chamber is formed between two porous cylindrical tungsten rings of different diameters, of which at least one comprises flanges directed towards the other, which flanges are intimately connected by welding seams to the terminal surfaces of the flanges of the other ring. The said porous tungsten body is slipped on a molybdenum tube so as to tightly fit thereon and is enclosed between the molybdenum rings having outer diameters equal to that of the porous tungsten body. One of the said rings may be manufactured in one piece with the tube.

The construction according to the invention affords the advantage that the welding seam is located inside the cathode body instead of at its surface, so that unnecessary unevennesses thereon are avoided. The inner wall of the supply chamber in itself need not be porous, but solid tungsten is difficult to work. Diffusion of barium in the direction of the heating filament of the cathode is avoided by the molybdenum tube carrying the tungsten body.

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In order that the invention may be readily carried into effect, it will now be described with reference, by way of example, to the accompanying drawing showing an axial cross-section of a cathode for a magnetron according to the invention.

In the figure, reference numeral 1 indicates a molybdenum tube, one extremity of which merges into a thicker portion 2. A molybdenum tube 3 having an outer diameter equal to that of the thicker portion 2 is slipped on the molybdenum tube 1. Pinched between the thicker portion 2 and the tube 3 is a tungsten body 4 comprising a cylindrical outer ring 5 and a cylindrical inner ring 6 comprising two small flanges 7. The flanges 7 and the ring 5 are intimately connected together by means of two annular welding seams 8. The room between the rings 5 and 6 contains a certain amount of barium-strontium carbonate 9 which is disintegrated into oxides after the cathode has been incorporated in the tube. The heating filament of the cathode (not shown) is arranged inside the tube 1. Provided on the tube 3 and the thicker portion 2 are rings 10 for focusing the electron current in the magnetron. When used in a magnetron, the porous tungsten body 5 only is electron-emitting and any appreciable so-called final emission does not occur.

What is claimed is:

1. A cathode assembly comprising a molybdenum tube having spaced apart ring-like portions, a pair of porous tungsten rings of different diameters securely positioned between said ring-like portions of the molybdenum tube and defining a cavity containing a supply of alkaline earth compounds capable of furnishing alkaline earth metal to an emissive surface, the diameter of the larger ring being equal to the outer diameter of the ring-like portions of the molybdenum tube, one of said tungsten rings being provided with flanges having terminal surface portions secured to abutting surface portions of the other ring by internal welded seams.

2. A cathode assembly as claimed in claim 1 in which one of said ring-like portions is an integral portion of the molybdenum tube.

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