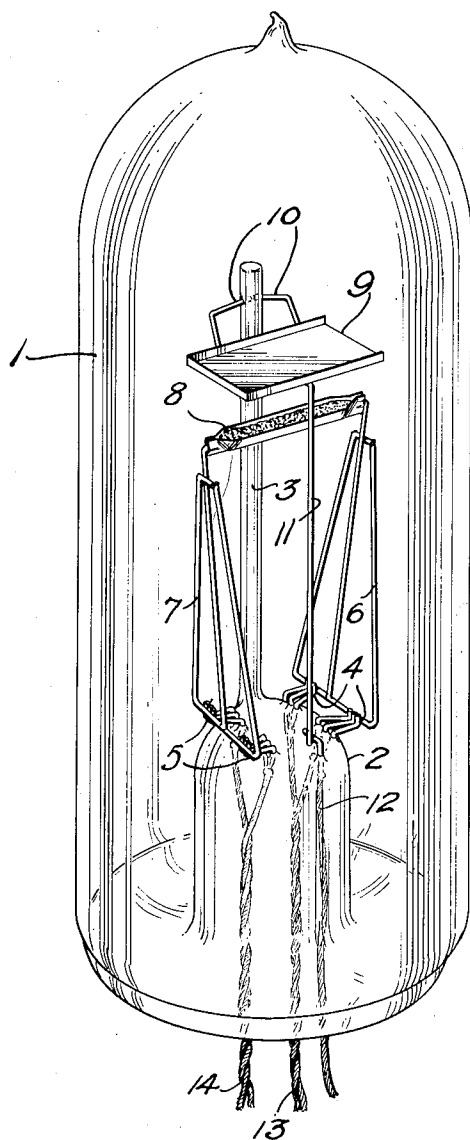


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J. E. HARRIS
ELECTRON DISCHARGE DEVICE

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Inventor:
James E. Harris

by C. C. Sprague. Att'y.

UNITED STATES PATENT OFFICE.

JAMES E. HARRIS, OF NEWARK, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRON-DISCHARGE DEVICE.

Application filed November 19, 1921. Serial No. 516,297.

This invention relates to electric discharge devices and more especially to discharge devices employing thermionic cathodes.

An object of the invention is to produce an electron discharge device the cathode of which has a high degree of thermionic activity. This object is attained by utilizing in the cathode of an electron discharge device an alloy known by the commercial name of mischmetal, or some one or more of the constituents of this substance. The principal constituents of this alloy are cerium, lanthanum, praseodymium and neodymium together with small amounts of the other rare earth metals.

Further objects of the invention will become apparent from the following specification and accompanying drawing, wherein is disclosed an electron discharge device embodying the invention.

The device comprises a glass bulb 1 having a reentrant stem 2 from which extends the rod 3. Sealed in the end of the stem 2 are the metallic members 4 and 5, from which are supported the frames 6 and 7 formed of wires, one of which projects beyond the top of each frame. A boat or vessel 8 preferably of molybdenum is electrically connected and supported by the wires projecting beyond the ends of the frames 6 and 7. A plate 9 is supported directly above the boat 8 by means of the wires 10 fused in the rod 3. This plate is slightly spaced from the body 8 and is connected by means of the wire 11 to the lead wire 12. Lead wires 13 and 14 are connected with the members 4 and 5 respectively. In the boat 8 is provided a supply of finely powdered material known by the commercial name of mischmetal.

In the operation of this device the lead wires 13 and 14 are connected to the opposite sides of a source of direct electrical energy and the lead wire 12 is connected to the negative one of the leads 13 and 14 through a second source of direct electrical energy in the well-known manner. Electric current passing through the boat and the mischmetal causes the emanation therefrom of electrons

and the potential difference between the plate 9 and the mischmetal produces a space current between these two elements.

Instead of using powdered mischmetal as the cathode, a filament may be used of an alloy of platinum and mischmetal in which the mischmetal content is only a very small percentage of the alloy. A filament containing 1% of mischmetal and 99% of platinum has been satisfactorily used as an electron emitting cathode.

Mischmetal is an alloy formed from the residue in the manufacture of Welsbach mantels. The raw material used in the manufacture of Welsbach mantels is monazite sand from which thorium and cerium used in the mantels are extracted. Monazite sand contains the following elements:

scandium	samarium	
yttrium	terbium	
lanthanum	neoytterbium	70
cerium	lutecium	
dysprosium	celtium	
europium	erbiun	
gadolinium	holmium	75
neodymium	thulium	
praseodymium	thorium	

and it is believed that mischmetal contains all of the above enumerated elements with the exception of thorium.

What is claimed is:

1. In an electron discharge device, a cathode composed of mischmetal.

2. In an electron discharge device, a cathode containing cerium, lanthanum and praseodymium.

3. An electron discharge device having a cathode containing cerium, lanthanum, praseodymium and neodymium.

4. In an electron discharge device, a cathode containing cerium, lanthanum, praseodymium, neodymium and samarium.

5. In an electron discharge device, a cathode containing neodymium.

In witness whereof, I hereunto subscribe my name this 4th day of November A. D., 1921.

JAMES E. HARRIS.