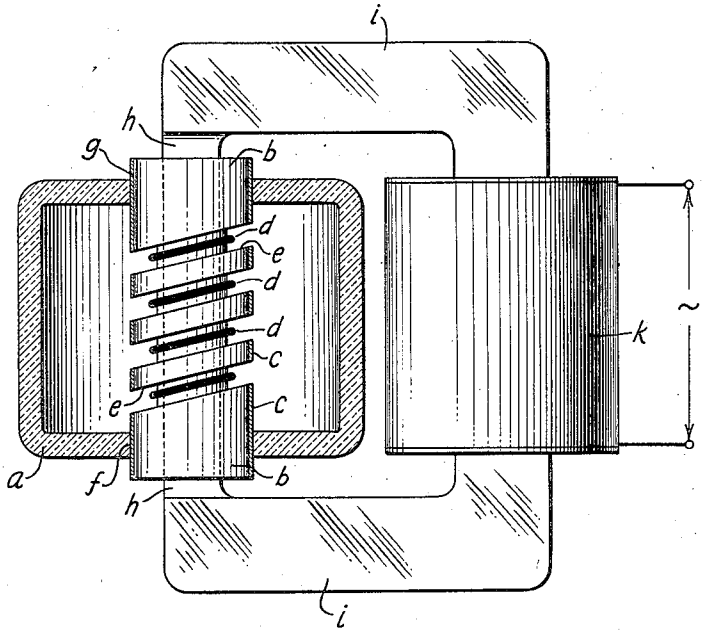
Oct. 26, 1937. G. PASSARGE 2,097,302

CATHODE FOR DISCHARGE DEVICES

Filed Dec. 5, 1936



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Patented Oct. 26, 1937

2,097,302

UNITED STATES PATENT OFFICE

2,097,302

CATHODE FOR DISCHARGE DEVICES

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Application December 5, 1936, Serial No. 114,384
In Germany November 9, 1935

6 Claims. (Cl. 250—27.5)

This invention is directed to cathodes. Cathodes are known in the prior art which are heated by currents induced in the heating element by an alternating magnetic field from a winding outside the envelope. These types of cathodes have the disadvantage of changes in shape and size under the influence of heat which in short-wave tubes materially affects interelectrode capacities.

According to this invention the cathode is so constructed that the heating element, such as a wire or ribbon, is embedded in a body of refractory material such as ceramic. To render ineffective changes in capacity between the hot wire and other electrodes a static screen is provided on the body outside the wire.

One embodiment of this invention is illustrated in the drawing. The vacuum vessel is designated by *a* consisting of glass or of a suitable ceramic material. The cathode for the tube chosen for illustration is of the inductively heated type and may conveniently comprise a ceramic tube *b* run coaxially through the vacuum vessel and attached vacuum-tight at *f* and *g* to the envelope. The exterior of tube *b* as shown contains spiral groove *e* wherein is placed heating wire *d*. Other electrodes are omitted for the sake of clarity. The ends of hot wire *d* may either be connected with each other to function as a short circuited secondary of a transformer for inductive heating, or they may be connected to a source of current for direct heating. Instead of a short-circuited coil there may be several short-circuited rings in spaced grooves in tube *b*. In case the heating element is inductively heated, an iron core *h* closing yoke *i* of a transformer may be inserted in tube *b*. The primary is marked *k* and is connected to an alternating current source.

The hot wire *d* could, if desired, be embedded in an insulating material, such as magnesium oxide, in the grooves, the surface of the oxide being sensitized with electron emitting material. Since iron core *h* is disposed inside the cathode, the danger of stray magnetic lines of force entering the discharge space is minimized.

The surface of tube *b* between grooves *e* is according to this invention coated with a metallic layer *c*, applied for example by burning on. This metal layer may be connected through a lead-in wire to ground or any desired potential source. This metallic layer determines the effective capacity between the cathode and the other electrodes, the influence of hot wire *d* being negligible. There is little displacement of the ceramic body and its metal coating *c* during temperature changes which is of particular importance in short-wave tubes wherein the electrode capacities and effective electrode spacings materially affect the working frequency of the tube. But for the novel shielding means at *c*, shifts in the position of the hot wire would greatly influence the interelectrode capacities and operation of the tube. Apparently the disposition of electron emitting material in grooves *e* produces a virtual electron source, the outer limit of the space charge of which appears at surface *c*. In case an oxide coating of emissive material is employed a discharge with saturation properties may be insured.

I claim:

1. A cathode for an electron discharge device comprising a cylindrical member of insulating material with circumferential grooves, a heating wire and electron emitting material in said grooves, and a layer of metal radially outward from said wire on the surface of said member between said grooves.

2. A cathode for electron discharge devices comprising a ceramic rod, a spiral groove in the surface of said rod, a heating element and electron emitting material in said groove, and a shield for said heating element comprising a metal coating on the ridges of the rod radially outward from said heating element and between the convolutions of said groove.

3. A discharge device comprising an envelope, a cathode assembly in said envelope comprising a ceramic tube sealed at its ends in the walls of said envelope, an iron core extending through said tube and through the turns of an alternating current winding, a short-circuited heating wire embedded in the wall of said tube and surrounding said core, and electron emitting material on said tube.

4. A discharge device according to claim 3 with the characteristic feature of an electric screening surface on said tube between the turns of said heating wire to minimize changes in interelectrode capacities due to movement of said wire.

5. A discharge device according to claim 3 with this characteristic feature that the ceramic tube is provided with grooves wherein is placed the heating wire.

6. A discharge device according to claim 3 with this characteristic feature that the surface of the ceramic tube between the grooves is metallized.

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