Dec. 6, 1949 J. H. VAN DER BERGE ET AL 2,490,177

ELECTRIC DISCHARGE TUBE WITH IMPROVED ELECTRODE SYSTEM

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Fig. 1.

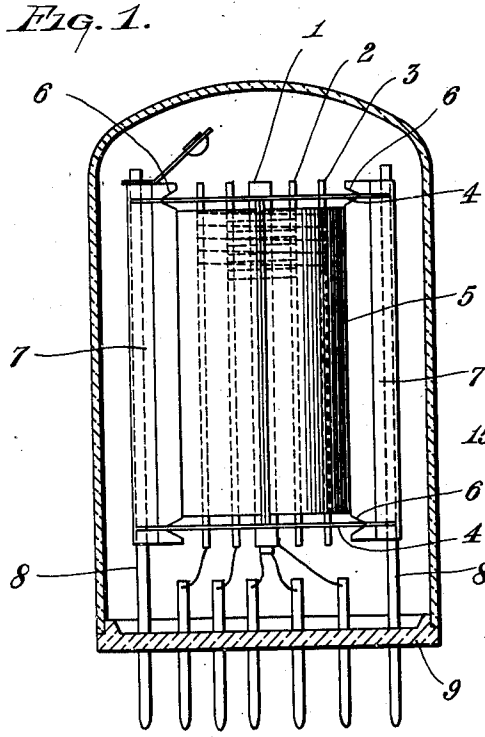


Fig. 3.

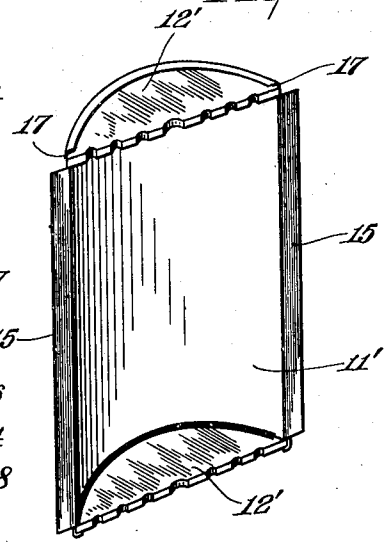


Fig. 2.

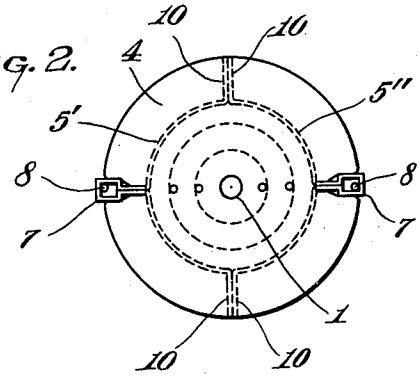
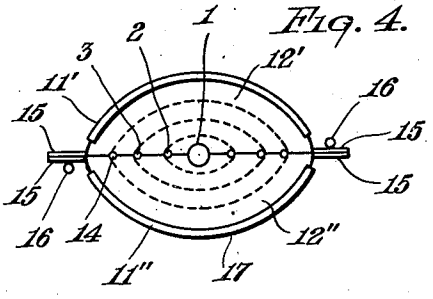


Fig. 4.



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ELECTRIC DISCHARGE TUBE WITH IMPROVED ELECTRODE SYSTEM

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3 Claims. (Cl. 250—27.5)

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This invention relates to electric discharge tubes and, more particularly, to the construction of the electrode system of such tubes.

In general an electrode system comprises a cathode, an anode and, as the case may be, one or more intermediate auxiliary electrodes, the various electrodes being kept centered relatively to one another by means of insulating centering members, for example mica discs, provided at the ends of the system. The cathode and the auxiliary electrodes are supported by the centering members which in themselves are secured in the tube by means of supporting rods. The centering members may have such a size and shape as to engage the wall of the tube at a constricted part of the bulb, thus supporting the electrode system from the wall. In assembling the system the ends of the electrodes are provided with centering members. These centering members may be interconnected, by means of supporting rods, the anode surrounding the system being secured to these supporting rods or directly to the centering members. Then the system with the said supporting rods is either secured to a plurality of supporting terminals sealed into the bottom of the tube, or such terminals are passed through separate apertures in the centering members and secured thereto. The anode may be provided with tags which are adapted to be secured to the centering members, so that displacement over the supporting rods is avoided.

In these known constructions the whole system is substantially supported by the centering members, so that the latter are subjected to great mechanical forces, which is harmful to the strength of the construction. Also for this reason it is desirable that such systems should be supported from the wall of the tube. Particularly, if supporting terminals or stay rods are subsequently required to be secured to the centering members, there is a great risk of deforming or damaging these members, whereby the centering of the electrodes is affected. Moreover, the centering of the electrodes located inside the anode is easily liable to displacement with respect to the anode, since it is not effected directly but through the intermediary of a stay rod.

The said disadvantages are completely obviated, if, according to the invention, in an electric discharge tube comprising an electrode system, the anode is composed of at least two parts and surrounds, at least in part, the other electrodes, the electrodes are centered by means of centering members which are clamped by the anode parts

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at each end of the anode and, together with the other electrodes, are supported only by the anode, and the anode alone is supported by terminals within the tube. The clamping of the centering members may be effected by providing at each end of the anode parts an incision into which the centering members are clamped after assemblage of these anode parts. A very tight clamping of the centering members is obtained, when the anode parts are provided with a groove at their ends, in which the centering members which themselves may be divided into two or more parts, are clamped. This has the advantage that each of the anode parts may previously be provided, with a corresponding part of a centering member, so that after assemblage of these anode parts, the centering members will serve to clamp the ends of the remaining electrodes that may be secured in a jig. This offers the great advantage that introduction of the stay rod ends into the apertures of the centering members in assembling the system is superfluous.

In order that the invention may be more clearly understood and readily carried into effect, it will now be explained more fully with reference to the accompanying drawing, in which

Figs. 1 and 2 are a side-view and a cross-section respectively of an electrode system for a tube according to the invention.

Figs. 3 and 4 are similar views of an alternative construction according to the invention.

In Figs. 1 and 2 a cathode 1 and grids 2 and 3 are secured and centered in a two-part anode 5 by means of a centering member 4 which is clamped in incisions 6 at the ends of the anode halves 5' and 5''. Each anode half 5', 5'' is provided with a passage 7 by means of which the anode is slipped over the supporting terminals 8 and welded thereto. The diameter of the passages 7 exceeds that of the terminals 8, in order to reduce the transfer of heat from the anode to these supporting terminals and, consequently, to the seals of these terminals in the bottom 9 of the tube. The anode halves are welded together by means of strips 10. As appears from the drawing, the centering members 4 and, consequently, the electrodes located inside the anode are supported only by the anode. Thus a very accurate centering of the electrodes is ensured, since the electrode system constitutes a very strong assembly, and the centering members which usually consist of mica, are subjected to smaller forces. Moreover, these members need no longer be slipped over supporting terminals and secured thereto after assemblage of the sys-

tem, so that deformation of and damage to these members resulting in centering inaccuracy is avoided.

A very great simplification in mounting is obtained in the construction shown in Figs. 3 and 4. In this case the ends of the anode halves 11' and 11'' are provided with a groove 17 in which are clamped parts 12' and 12'' of the centering members. At the juncture of parts 12' and 12'' are formed the apertures for the electrode stays. After properly spacing and fixing the cathode 1 and grids 2, 3, 14, for example by means of a jig, the anode halves 11' and 11'' comprising the halves of the centering member 12' and 12'' are joined sideways, so that the ends of the cathode and grid stays are clamped between the parts 12' and 12'' of the centering members. The anode halves 11' and 11'' are welded together by means of strips 15, thus obtaining a very strong electrode assembly. Then the anode is connected through the said strips 15 to the supporting terminals 16, preferably by welding, so that no further forces are exerted on the centering member.

This centering member need not consist of mica. It may, as an alternative, be made from ceramic material or be constituted by a metal plate coated with an insulating layer. Various other anode forms fall within the scope of the present invention. Thus, for example, the anode need not form a complete cylinder, but may be provided with apertures and have a rectangular or other cross-section. Furthermore, the invention is of particular importance to diode systems which require very accurate centering of the cathode relatively to the anode, notably in the case of a very small cathode-anode spacing. It is, furthermore, desirable that the size of the centering members should be larger than the aperture of the smallest cross-section of the anode, in order to prevent these members from slipping through the anode. Displacement of the centering members in a longitudinal direction of the electrode-system can thus be avoided in a simple manner.

What we claim is:

1. An electric discharge tube wherein the electrode system comprises an anode that is composed of at least two parts and surrounds, at least in part, the remaining electrodes, the electrodes of said electrode system being centered by means of centering members which are clamped by the anode parts at each end of the anode and, together with the remaining electrodes, are supported only by the anode, the anode alone being supported by terminals within the tube.

2. An electric discharge tube as claimed in claim 1, wherein the anode is composed of two halves, each of which is provided at the ends with an incision in which the centering members are clamped.

3. An electric discharge tube wherein the electrode system comprises an anode that is composed of two halves and surrounds, at least in part, the remaining electrodes, the electrodes of said electrode system being centered by means of centering members each composed of two halves and each clamped within a groove at each end of a corresponding anode half, the remaining electrodes being clamped between the halves of each of the centering members, and the anode alone being supported by terminals sealed into the bottom of the tube.

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