Oct. 19, 1937. F. BREYER 2,096,156

ELECTRIC DISCHARGE TUBE

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Fig. 1a

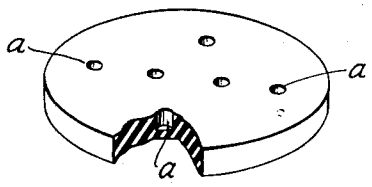


Fig. 1b

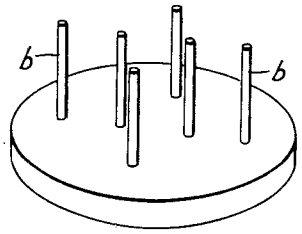


Fig. 1c

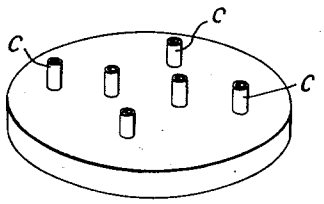
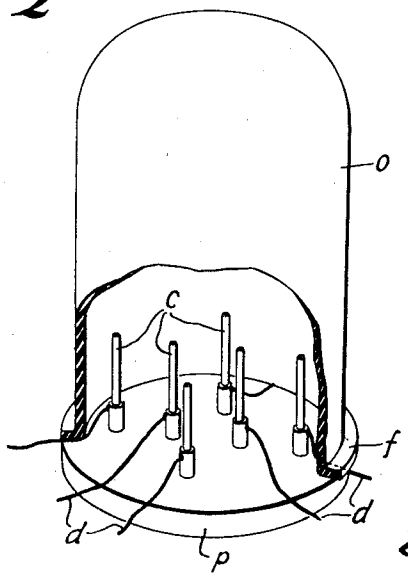


Fig. 2



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ELECTRIC DISCHARGE TUBE

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3 Claims. (Cl. 250—27.5)

This invention relates to the construction of discharge tubes particularly to the support for the electrode system and the arrangement of the electrode leads.

One known vacuum vessel consists of a glass bulb and a re-entrant stem welded thereto. The stem is usually closed at its inner end upon the supporting bars and leads for the various electrodes of the system. For special purposes the prior art has developed a thimble-like discharge envelope whose open end is closed by a flat cover or header. For the electrode supports and leads two different arrangements were chosen, in one of which the lead-in conductors pass perpendicularly through the cover and are welded therein, and in the other case the leads, constructed correspondingly rigid, are used for supporting electrode elements and their ends, bent at right angle, are sealed between the connecting surfaces of the cover and the thimble-like part of the vessel. In the first example the closely adjacent lead-in wires are apt to cause sealing and vacuum trouble, and the leakage resistances and capacities between leads are high. These tubes fail in high frequency operation, particularly in short wave work. In the second example certain difficulties of assembling the electrode system appear which are not present in manufacturing tubes with the conventional press.

In accordance with this invention a cup-shaped envelope of insulating material, such as ceramic or glass, is closed by an insulating flat press or plate, and devices are provided for assembling and supporting the electrode system, comprising pins or pipe nipples cemented or cast in the plate. The current leads for the individual electrodes are connected to said pins or nipples and are sealed between the edge of the plate and the rim of the cup-shaped portion of the envelope.

Figures 1*a*, 1*b* and 1*c* show three embodiments of a header or plate for supporting the electrode system and for closing the bulb, its material being any insulating substance, for instance glass or a ceramic material, and Figure 2 shows in perspective an envelope embodying this invention.

According to Figure 1*a* the plate has a circular disc and is provided with holes or borings *a* which extend only part way through the plate. The holes may be either molded or drilled in the plate and may be so distributed over the face of the plate as to most advantageously support electrodes in the envelope upon short spuds or supporting rods cemented or fused in the holes.

Figure 1*b* shows pins *b*, which may be of conductive material or of insulating material such as ceramic, set in and cemented in the plate. An alternative consists in casting pin-like projections in the plate. The electrodes may be attached to these pins either by welding or by clamps comprising sleeve-like elements pushed over the pins and electrode side rod ends.

In Figure 1*c* is shown another embodiment differing from the previous one in that hollow tubes or nipples *c* are inserted in the plate in place of pins. The supporting rods for the electrodes are fixed therein by welding or clamping.

Current lead-in conductors for the electrodes are shown in Figure 2. Base plate or header *p* of insulating material is shown with nipples and pins *c* attached thereto for mechanically supporting the electrodes. To the nipples are attached the lead condutcors *d*, for instance by soldering or welding. The lead-in conductors are sealed into the envelope preferably by laying the conductors over the edge of the plate at spaced points. Shell or housing *o*, of insulating material, such as glass or ceramic with flange *f* at the lower end, is placed on the plate and the flange and the edge of the plate are fused together hermetically, sealing the conductors in place. Sealing may be facilitated by coating the rim of the shell and the periphery of the plate with a fusing mass or flux before the two parts are pressed together and fused. If the plate and upper part of the vessel and its flange consist of glass, the joining of the two parts may be done by any of the usual press operations.

By providing electrode support means separate from the electrode lead-in conductors, the manufacture of a discharge tube such as shown here closed by a header plate is greatly facilitated. It is possible to assemble the electrode system accurately and conveniently and the necessity of passing the leads through the insulating cover is avoided. By disposing the current leads on the circumference of the tube, the maximum possible distance between lead-in conductors is provided with a correspondingly good insulation and low capacity. The simultaneous welding-in of the current leads and joining of the parts of the envelope materially simplifies manufacture.

I claim:

1. An electric discharge tube with an envelope comprising a cup-shaped member, and an insulating plate sealed to the rim of said member provided on the inside with inwardly projecting pins embedded into the plate for supporting

the electrode system and electrode leads sealed between the edge of the plate and the rim of said member.

2. A tube according to claim 1 with this characteristic feature that said pins consist of metal, and the electrode leads are connected to said devices.

3. An electric discharge tube comprising a cup-shaped shell of insulating material, an insulating plate joined along its periphery to the rim of said shell, supporting metal pins for electrodes attached to the inner surface of said plate, and a plurality of spaced lead-in conductors sealed gas tight in the junction between said shell and plate and electrically connected at their inner ends to separate pins.

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