Nov. 28, 1933. G. F. MURPHY 1,937,355

ELECTRON DISCHARGE APPARATUS

Filed Dec. 15, 1928

Fig. 1.

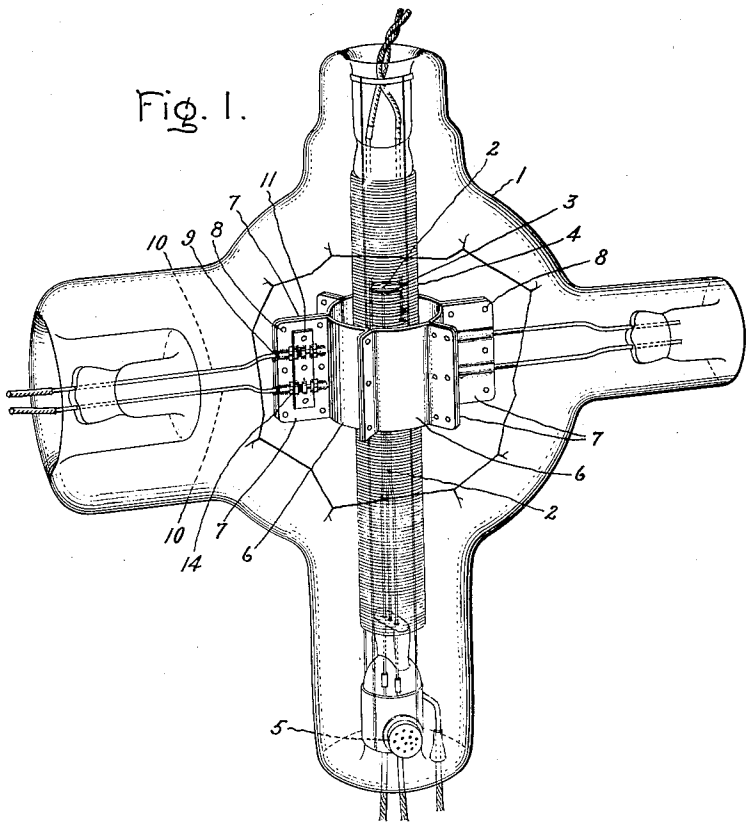


Fig. 2.

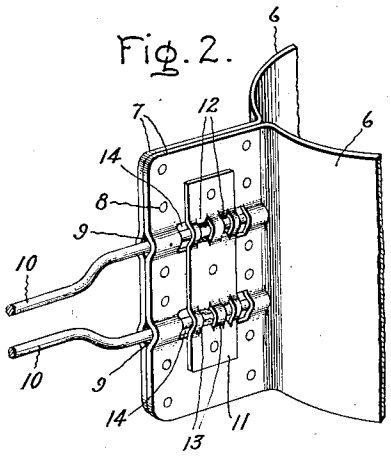
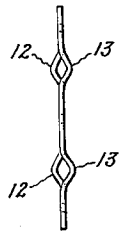


Fig. 3.



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Patented Nov. 28, 1933

1,937,355

UNITED STATES PATENT OFFICE

1,937,355

ELECTRON DISCHARGE APPARATUS

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Application December 15, 1928
Serial No. 326,224

1 Claim. (Cl. 250—27.5)

The present invention relates to electron discharge apparatus and more particularly to tubes of the power type which may be utilized for radio transmitting purposes.

In the construction of tubes intended to control a large amount of power, it has been the practice heretofore to provide an anode with a series of radially extending heat dissipating vanes and to position the anode within the tube by means of support wires which are affixed in the stem at one end and are welded or otherwise secured directly to one of the vanes at the other end. In the event that the joint between the support wires and the anode should fail for any reason or it should be desired to break the joint, as for example, for the purpose of withdrawing the anode from the envelope for repair, it is extremely difficult to detach the wire from the anode vane without injury to the electrode or other parts of the tube. This procedure, therefore, entails considerable expense and delay in repairing a thermionic device of this character. One of the objects of my invention is to overcome this disadvantage. In carrying out my invention, I accomplish this object by providing a novel form of joint between the anode and support wires, formed in such a manner that when it becomes necessary to separate the anode from the support wires, the operation may be done readily and new wires may readily be affixed if desired, without injury to the anode structure. In brief, this desirable result is accomplished by forming the joint between the anode and its supporting wires on a detachable strip or plate which is riveted to one of the anode vanes.

Other objects and features will be apparent as the specification is perused in connection with the accompanying drawing. As an example of another feature there is disclosed but not claimed in this application a supporting means for the anode, additional to the one referred to hereinbefore, which accommodates the expansion of this electrode under operating conditions and also rigidly maintains its position with respect to the other electrodes.

Fig. 1 of the drawing is a view in perspective of a power tube including an anode joined to support wires in accordance with my invention; Fig. 2 is an enlarged fragmentary view of the improved joint; while Fig. 3 is an enlarged view taken along the edge of the strip which provides the joining surface.

Referring to the drawing, numeral 1 designates an evacuated envelop formed with two pairs of oppositely disposed reentrant stems. Between one pair of stems there is supported in any suitable manner a filamentary cathode 2, an electrostatic control grid 3 surrounding the cathode and a screen grid 4 surrounding the control grid. Attached to one of the reentrant stems there is a capsule 5 containing clean-up material for removing deleterious gases and other foreign matter. The anode is suspended between the other pair of stems and is shown as characterized by a number of arcuate strip members 6 terminating at each end in radially extending flanges 7. The flanges of the adjacent members are fitted and secured together by rivets 8 to form a cylindrical main portion with a plurality of vanes radiating from the exterior surface of the cylinder. These vanes serve to increase the heat dissipating area of the anode; as shown, each of one pair of diametrically arranged vanes contains two parallel grooves 9 of circular configuration and formed preferably by bending the metal to accommodate the support wires 10 which are sealed in the oppositely disposed stems. These grooves are of a size such as to allow a sliding but snug fit with respect to the support wires, the length of the latter being designed to terminate within the confines of the grooves. In one of the pair of vanes referred to there are cut two apertures 14 of an elongate rectangular shape the greater dimension being in the same direction as the grooves and having a width somewhat greater than the diameter of the support wire as shown. Secured to the apertured vane in any detachable manner, for example by riveting, there is positioned a rectangular strip 11 of such length as to overlap both of the apertures 14 leaving sufficient material for riveting and of a width a little less than the length of the aperture. The strip member 11 is formed with a series of depressed strap members 12 of substantially semicircular shape (see Figs. 2 and 3) intercalated between a plurality of projections 13 of similar shape, the configuration of the straps thus formed being such that the support rods 10 are encompassed and tightly grasped. The metal which constitutes the strip member depends upon the material of which the rods 10 are formed, which metal should be such that a rigid weld may be readily made. In the case of tungsten rods, I have found molybdenum to be satisfactory for the strip material.

It is apparent that the anode may be readily disengaged from the support rods by simply severing the depressed members 12 or the projections 13 at the welded place after which the rods 10 may be withdrawn from the circular openings 9.

When the rods are to be reinserted, it is necessary merely to remove the old strip 11 by filing off or otherwise removing the rivets and attaching a new strip to the anode to which the rods may be secured by welding as before. The operation of removing and reinserting the support wires does not mar the surface of the anode proper and hence the construction of the latter remains intact. Another advantage of forming a joint in a strip member separate from the anode is that a metal may be employed for the strip which provides a good weld with the support wires without regard to the metal which is utilized for the anode, except that these metals necessarily must have substantially the same coefficient of expansion on account of the rigidity of the joint.

It will also be evident that the sliding fit offered to the support rods by the openings 9 in that vane which is disposed diametrically opposite to the strip 11, allows the anode to extend in the proper direction without causing a distortion of its shape or a shift in its position with respect to the other electrodes or a bend of the support rods which are anchored at one end in the press. A pair of the support rods, preferably those which are rigidly secured to the anode, may advantageously serve together as a leading-in conductor, as shown in Fig. 1.

While I have explained my invention as pertaining to an anode construction, it is evident that the novel form of joint is adaptable to other electrodes provided the latter offer a surface to which the strip member may be attached.

What I claim as new and desire to secure by Letters Patent of the United States, is:

An electron discharge device including an envelope and a plurality of electrodes, means for supporting one of said electrodes from the envelope, said means comprising a wire secured to a flat strip which is attached to the electrode, said strip being provided with alternate depressions and projections whose contour conforms to the shape of the supporting wire.

GEORGE F. MURPHY.