Sept. 30, 1952 G. A. BONADIO 2,612,618

ELECTRONIC DISCHARGE TUBE CONTROL

Filed July 11, 1950

Fig. 1.

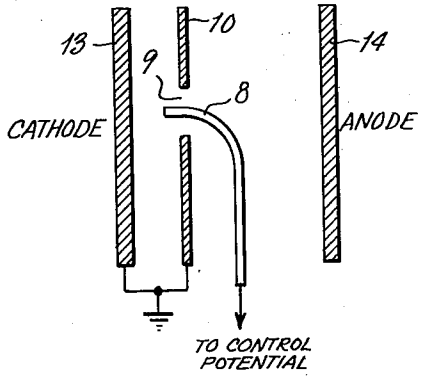
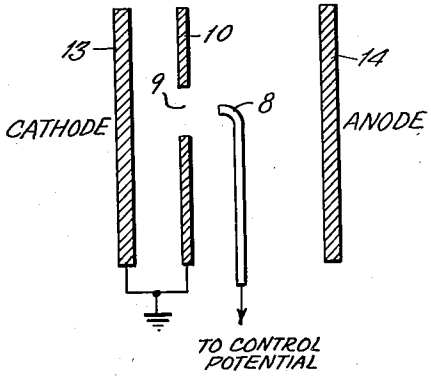


Fig. 2.



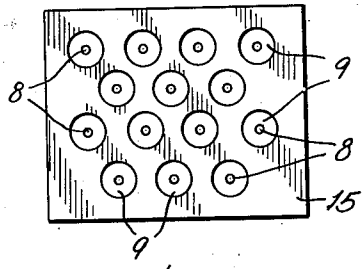


Fig. 3.

Fig. 4.

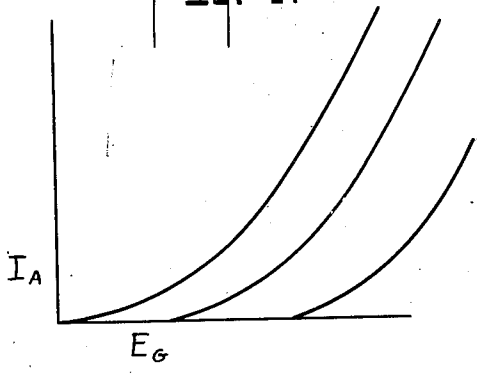
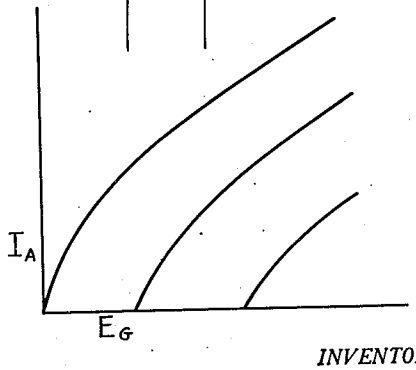


Fig. 5.



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ELECTRONIC DISCHARGE TUBE CONTROL

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5 Claims. (Cl. 313—303)

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This invention relates to electronic discharge apparatus of the type wherein a foraminous electrode is utilized to control the passage of electrons through the apertures. More particularly, this invention relates to a new and improved structure for a grid electrode for thermionic type tubes or valves.

This application is a continuation in part of my application Serial No. 123,074, filed October 22, 1949, wherein was broadly disclosed a control electrode of a novel type arranged to afford more efficient control of an electronic valve.

One purpose of this invention is to provide a control electrode which will act upon an electron stream in a more uniform fashion than the type of control electrode which has been hitherto almost universally employed.

While my application above identified showed a pointed wire situated in the center of an aperture in a plate, it was therein shown that the end of this wire terminated in the plane of the aperture.

It has been found that good control, of the same general type as described in my prior application, can be obtained when the end of the wire is situated outside of this plane, i. e. when the wire terminates short of, or beyond the plate.

This allows greater manufacturing tolerance, and is shown and claimed in the instant application.

Fig. 1 shows, in side elevation, in cross section, a single element of the control electrode of the present invention, positioned in a valve.

Fig. 2 is a side elevation, also in cross section, of an alternative form of the control electrode of Fig. 1, as combined with the other electrodes of a valve.

Fig. 3 is a front elevation of a multiple element grid, constructed according to the present invention.

Fig. 4 shows a typical family of curves of a conventional electronic tube.

Fig. 5 shows a typical family of curves of the tube of this invention.

Reference is now made to Fig. 1, wherein the control electrode effectively takes the form of a pointed wire-like member 8 passing through the center of an aperture 9 located in a metallic plate 10, but terminating beyond this plate. In this case, the lines of force, produced by the charged grid are entirely symmetrical and an electron stream passing through the aperture will be of a generally circular cross section. The elements of Fig. 1 are there shown as assembled relative to a cathode 13 and an anode 14.

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The metal plate 10 is connected to the grounded cathode, so that the full potential existing between the control grid 8 and the plate 10, will be at a maximum. The anode is shown schematically, and may be of any convenient type.

In Fig. 2, the only difference from the embodiment shown in Fig. 1, is that the end of the wire terminates short of the plate.

Reference is now made to Fig. 3, wherein is shown a metallic plate 15 having therein a plurality of apertures 9, through the center of each of which, but stopping short of the plate, or passing beyond it, is located a control grid 8. If this multiple plate be employed with a suitably shaped cathode, there will effectively be produced a plurality of circular electron streams, passing through the control plate. It is to be understood that such multiple element control electrode may take on any configuration suitable to the cathode and anode with which it is employed, and this invention is not limited to a flat plate type control electrode.

Referring now to Fig. 5, there is here illustrated the general type of amplification curve produced by an electronic tube employing a control grid according to the invention here disclosed. It will be noted that this family of curves have non-linear distorting characteristics in the opposite direction from the curves shown in Fig. 4. It will therefore be evident that if a conventional type tube be cascaded, or otherwise connected, with a tube according to this invention, the distortion effects of the two tubes will tend to cancel out, thereby yielding an overall amplification curve which will be substantially linear.

A still more practical method of securing this same cancellation of distortion is by utilizing both types of control grids within a single envelope, i. e. as portions of a single tube structure.

While I have shown and described certain embodiments of this invention, it is to be understood that many changes of detail, especially as to the relative size and shape of the constituent elements, may be made without departure from the spirit of the invention, as defined in the following claims.

Having now shown and described my invention, what I particularly claim and desire to secure by Letters Patent of the United States of America is as follows:

1. An electronic valve of the pure electron discharge type and having as functioning elements at least a cathode, an anode and a control elec-

trode, characterized in that said control electrode comprises a metallic shield formed as a plate and provided with at least one substantially circular aperture therein, and a relatively small and substantially pointed control member proper pointed substantially at the center of said aperture, but insulated from said metallic shield and terminating upon a predetermined side thereof, outside the plane of said shield, the area of said plate in said plane being many times greater than the area of said aperture, and said metallic shield being positioned adjacent the cathode, and being metallically connected thereto, so as to be equipotential therewith.

2. A grid control electrode according to claim 1, in which said metallic shielding plate is provided with a plurality of circular apertures, symmetrically disposed therethrough, each aperture being provided with a centrally pointed control member, terminating at one side of said shield.

3. In an electronic valve, a control element located between the cathode and the anode of said valve, comprising a foraminous grounded metallic plate, having pointed at the center of each aperture thereof a pointed control member proper, insulated from said plate and terminating without the plane of said shield.

4. A structure according to claim 3, in which said apertures are substantially circular and said pointed control members pass substantially through the centers of the respective apertures.

5. In an electronic valve, a control electrode structure comprising a grounded metallic shield having a substantially circular aperture, and a relatively small diameter wire insulated from said shield, pointed at the center of said aperture, but terminating before reaching the plane of said shield.

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The following references are of record in the file of this patent:

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Number	Name	Date
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