

Dec. 23, 1924.

1,520,640

G. L. GEISEY

THERMIONIC DEVICE

Filed Nov. 20, 1922

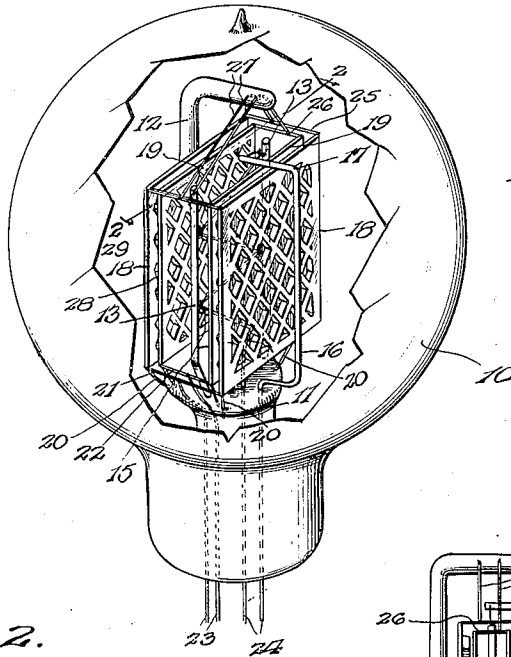


Fig. 1.

Fig. 2.

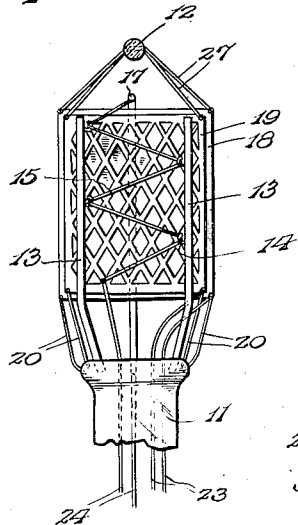


Fig. 3.

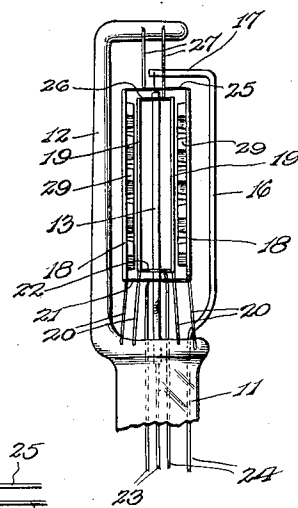
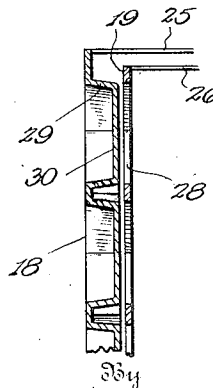


Fig. 4.



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UNITED STATES PATENT OFFICE.

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THERMIONIC DEVICE.

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To all whom it may concern:

Be it known that I, GEORGE L. GEISEY, citizen of the United States, residing at Steubenville, in the county of Jefferson and State of Ohio, have invented certain new and useful Improvements in Thermionic Devices, of which the following is a specification.

This invention relates to an improved thermionic device and seeks, among other objects, to provide a device of this character which, in operation, will be markedly free from mechanical noise and which will have a high current and voltage output.

As is known, the energy output of devices of the present nature is influenced, among other factors, by the distance between the filamentary cathode and the anode or output electrodes of the vacuum tube and the present invention, therefore, seeks to increase such output by disposing the working surfaces of the output electrodes closer than heretofore to the filamentary cathode while retaining the input electrodes of the tube between the cathode and the output electrodes. By such close spacing, the electrons leaving the cathode will not, due to the short flight thereof, be permitted to scatter appreciably before striking the output electrodes with the result that mechanical noise otherwise caused by such scattering will be minimized. Furthermore, in disposing the working surfaces of the output electrodes closer to the filamentary cathode, less negative biasing voltage on the input electrodes will be required.

In the drawings:

Figure 1 is a perspective view of a thermionic device embodying my invention, the containing vessel employed being broken away,

Figure 2 is a detailed sectional view on the line 2—2 of Figure 1, looking in the direction of the arrows,

Figure 3 is an edge elevation of the electrodes of the device and the associated parts, and

Figure 4 is an enlarged detail sectional view showing the plate and grid structure of the device.

Referring to the drawings, the numeral 10 indicates an evacuated containing vessel into which rises a stem 11 and upstanding from the stem is an arbor 12 integrally formed therewith. Embedded at their lower ends in the stem are upstanding paral-

lel posts 13 on which are mounted staggered hooks 14, and zig-zagged back and forth between said hooks is a filamentary cathode 15 connected at its upper end to a supporting member 16 upstanding from the stem 11 in a plane midway between said posts and provided at its upper end with a horizontal portion 17 to which the cathode is attached.

Associated with the cathode is a double output anode comprising parallel plates 18 arranged at opposite sides of the cathode, and lying between said plates and the cathode is a double input or control electrode comprising grids 19 arranged in spaced parallel relation to said plates. Rising from the stem 11 are pedestal wires 20 attached to the lower corners of the plates and grids insulatingly supporting these members. Extending between the lower corners of the plates are conductors 21, Similar conductors 22 extend between the lower corners of the grids and connected to said conductors are leads 23. Similar leads 24 are connected one to the supporting member 16 and the other to the lower end of the filamentary cathode 15. Extending between the upper corners of the plates are conductors 25. Similar conductors 26 extend between the upper corners of the grids and attached to said conductors are hanger strands 27 extending through the horizontal arm at the upper end of the arbor 12 insulatingly suspending the plates and grids.

The grids are throughout the area thereof checkered with spaced openings 28. These openings may be of any approved shape but in the present instance I have shown said openings as of diamond shape so that the grids resemble diamond latticed grilles. The plates 18 are mounted in planes close to the grids but to decrease the distance between the effective or working surfaces of the plates and the filamentary cathode 15, the plates are, as particularly illustrated in Figure 4, checkered with stamped or embossed inwardly extending projections or protrusions 29 corresponding in shape to the openings 28 and registering therewith. In the present instance, I have shown the openings 28 uniformly spaced and likewise have shown the projections 29 uniformly spaced. However, I do not wish to be limited in this respect and the term "checkered" as used herein is not to be so construed nor as a term restricting me as to the shape of said openings or

said projections. These projections are formed with flat end walls or tops 30 which are but slightly spaced from the grids at the openings 28 parallel to the grids and form the working or effective surfaces of the plates. The distance between such surfaces and the filamentary cathode is thus decreased an amount equal to the height of said projections with a resultant corresponding increase in the energy output of the device. It is to be noted, however, that the capacity coupling between the plates and grids is not substantially increased since the ineffective base surfaces of the plates, from which base surfaces the projections rise, are not brought closer to the grids but, due to the presence of the projections, are distanced from the grids substantially corresponding to the height of said projections. Furthermore, the flight of the electrons from the cathode to the effective surfaces of the plates is shortened in such degree that the velocity of the electrons will be sufficient to carry the electrons in a straight path from the cathode to the plates with the result that the device will be particularly quiet in operation.

Having thus described the invention, what is claimed as new is:

1. A thermionic device including a cathode, anode and grid therebetween, said grid being checkered with spaced openings and said anode being checkered with corresponding raised portions which extend toward the cathode adjacent said openings respectively.

2. A thermionic device including a cathode, anode and grid therebetween, the grid being formed with spaced openings and the anode being provided with corresponding protrusions which extend toward the cathode opposite said openings respectively whereby to decrease the distance between the effective surface of said anode and the cathode.

3. A thermionic device including a cathode, anode and grid therebetween, the grid being formed with spaced openings and the anode being checkered with embossed portions which extend toward the cathode opposite said openings respectively.

4. A thermionic device including a cathode, anode and grid therebetween, the anode being checkered with spaced raised portions extending toward the cathode whereby to reduce the distance between the effective surface of the anode and said cathode and the grid having crossed intersecting por-

tions lying opposite the spaces between said raised portions of the anode and defining intervening openings disposed opposite said raised portions respectively.

5. A thermionic device including a cathode, anode and grid therebetween, the grid comprising a sheet metal plate provided with spaced openings and the anode comprising a parallel sheet metal plate formed with spaced flat-topped raised portions which extend toward the cathode opposite said openings respectively.

6. A thermionic device including a cathode, anode and grid therebetween, the grid being formed with spaced openings and the anode being provided with corresponding raised portions which extend toward the cathode opposite said openings whereby the distance between the effective surface of the anode and the cathode is reduced while the capacity coupling between the anode and grid is not substantially increased.

7. A thermionic device comprising a grid having spaced openings and a plurality of electrodes including a cathode and anode at opposite sides of the grid, and means associated with said openings whereby the distance between the effective surface of the anode and the cathode is reduced while the capacity coupling between the anode and grid is not substantially increased, said means including portions on one of said electrodes extending toward the other of said electrodes.

8. A thermionic device including a cathode, anode and grid therebetween having spaced openings, and means on said anode associated with said openings whereby the distance between the effective surface of the anode and the cathode is reduced while the capacity coupling between the anode and grid is not substantially increased.

9. A thermionic device including a cathode, anode and grid therebetween having spaced openings, and means on said anode associated with said openings whereby the distance between the effective surface of the anode and the cathode is reduced while the capacity coupling between the anode and grid is not substantially increased, said means including a wall on the anode spaced toward the cathode whereby the ineffective base surface of the anode is located away from the grid.

In testimony whereof I affix my signature.

GEORGE L. GEISEY. [L. s.]