Jan. 10, 1928. 1,655,619

H. E. METCALF

VACUUM TUBE

Filed Jan. 21, 1925

Fig. 1.

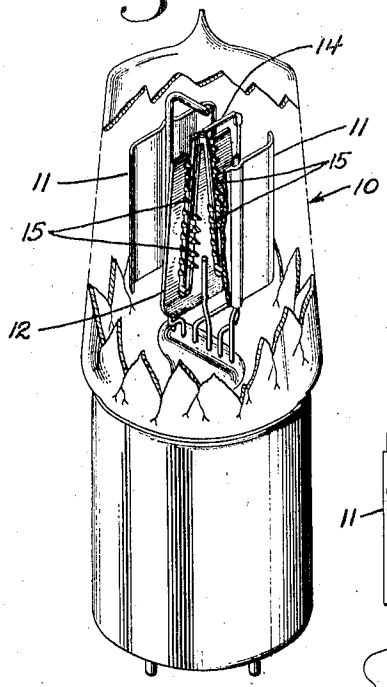
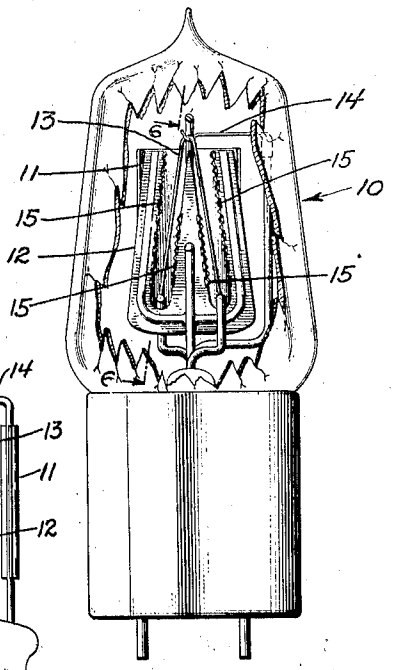


Fig. 2.



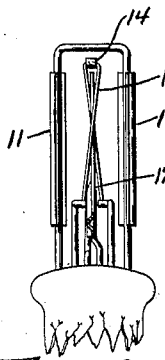


Fig. 6.

Fig. 4.

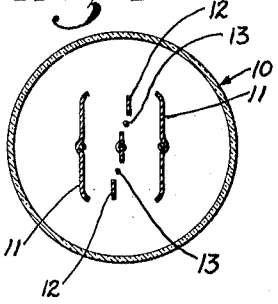


Fig. 3.

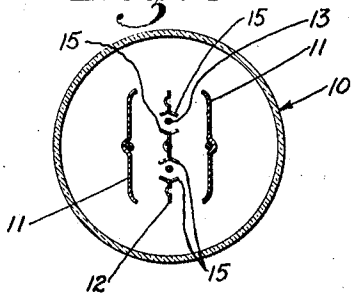
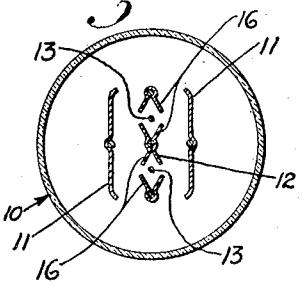


Fig. 5.



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UNITED STATES PATENT OFFICE.

HERBERT E. METCALF, OF SAN LEANDRO, CALIFORNIA, ASSIGNOR TO THE MAGNAVOX CO., OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF ARIZONA.

VACUUM TUBE.

Application filed January 21, 1925. Serial No. 3,772.

This invention relates to vacuum tubes of the three-electrode type. In principle the present tube resembles that of a prior application filed by me July 23, 1924, Serial Number 727,708, in that use is made of a control electrode which does not obstruct the flow of electrons between the filament and the plate. In said prior application I employed a control electrode in the form of a thin plate having slots with straight edges disposed at opposite sides of the filament. In practice the current output was not as great as is desirable for many purposes, owing to the fact that the electron discharge from the control electrode to the filament was concentrated in a thin field and acted to choke off the flow of electrons from the filament to the anode.

I find that by forming one or both edges of this control electrode with teeth or indentations this condition is eliminated and the same amplification is maintained, but the current output is enormously increased. In other words, the teeth will concentrate on the filament and the spaces between the teeth will allow for free passage of electrons from the filament to the anode. Also a somewhat wider field of electron discharge is obtained by the use of these teeth, and this field can be considerably widened by spreading the teeth laterally apart and therefore the difficulty of aligning the filament and electrode is considerably minimized.

In the accompanying drawings,

Fig. 1 is a perspective view of a preferred form of my invention;

Fig. 2 is a side elevation of the same;

Fig. 3 is a cross-section of the preferred form of tube;

Fig. 4 is a diagrammatic view of a modified arrangement; and

Fig. 5 shows a still further modification of the control electrode.

Fig. 6 shows a sectional view taken on the line 6—6 of Fig. 2.

Referring in detail to the accompanying drawings, I show a sealed vessel or tube 10 containing anodes 11 of any desired form, but preferaby in the form of special plates. Between these plates is a control electrode 12 in the form of a thin plate arranged midway between the anode plates and parallel therewith. This control electrode has a V-shaped slot in which is arranged a filament 13. The filament is looped over a spring metal arm 14 which will yield to accommodate elongation of the filament when the latter is heated. The filament occupies the position shown in Fig. 2 when cold, but when heated it will be substantially equidistant from the edges of the slots.

These slots are formed with teeth or indentations 15 for the purpose above mentioned, and preferably, but not necessarily, these teeth are spread apart in a lateral direction so as to form a broader field of electron discharge and minimize the difficulty of aligning the filament with the edges of the slots. In other words the filament is looped over a relatively wide spring and the strands are not in the same plane. By spreading the teeth laterally or by spreading the legs of the plate apart as shown in Fig. 4, the field of action of the control electrode can be concentrated to better advantage on the filament.

In the modification of Fig. 5 I show two rows of teeth 16 at either side of the filament. The action is the same as in the preceding forms, except that a wider field is afforded.

To a certain extent these teeth function somewhat after the manner of the strands of the odinary grid, but unlike the grid, no obstruction is placed in the path of the electron discharge between the filament and anode.

This tube has a lower internal capacity than prior tubes, and is admirably adapted to radio frequency and detector purposes. The construction and assembly of such a tube is considerably less expensive than where the ordinary form of grid is employed. The present control electrode can be stamped out in a single operation and from a single piece of metal, and the work of assembly is simplified by reason of the fact that the fila-

ment need not be fished through the strands of the grid as in prior devices.

It will be understood that many changes in the construction and arrangement of the several parts herein shown and described may be made without departing from the spirit of my invention as disclosed in the appended claim.

What I claim as new and desire to secure by Letters Patent is:

A control electrode for vacuum tubes comprising a plate-like member formed with a substantially V-shaped slot to receive the filament, the edges of the slot being provided with indentations.

HERBERT E. METCALF.