

Dec. 18, 1928.

1,696,103

G. SEIBT

ELECTRIC DISCHARGE TUBE

Original Filed Aug. 26, 1921 2 Sheets-Sheet 1

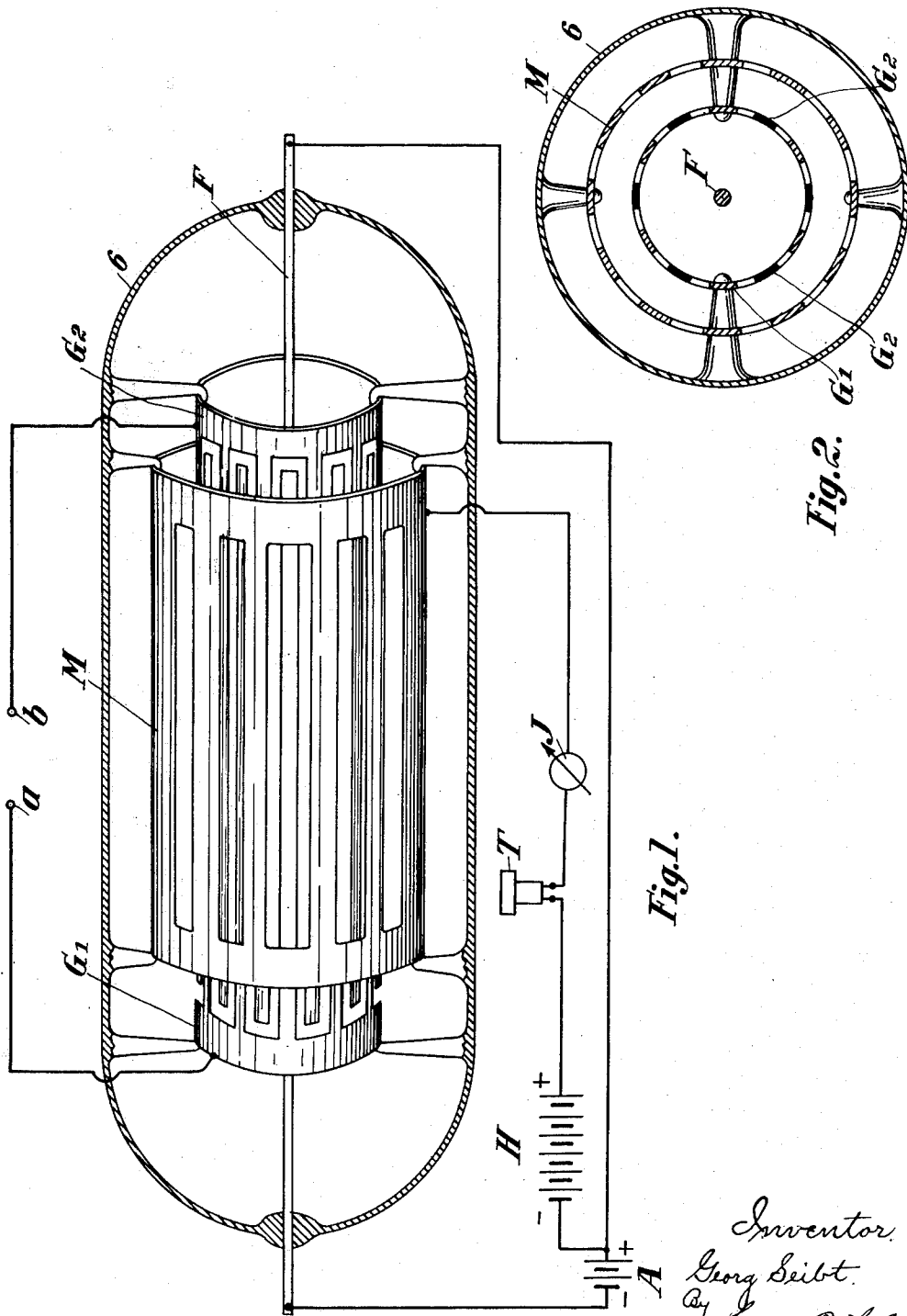


Fig. 2.

Fig. 1.

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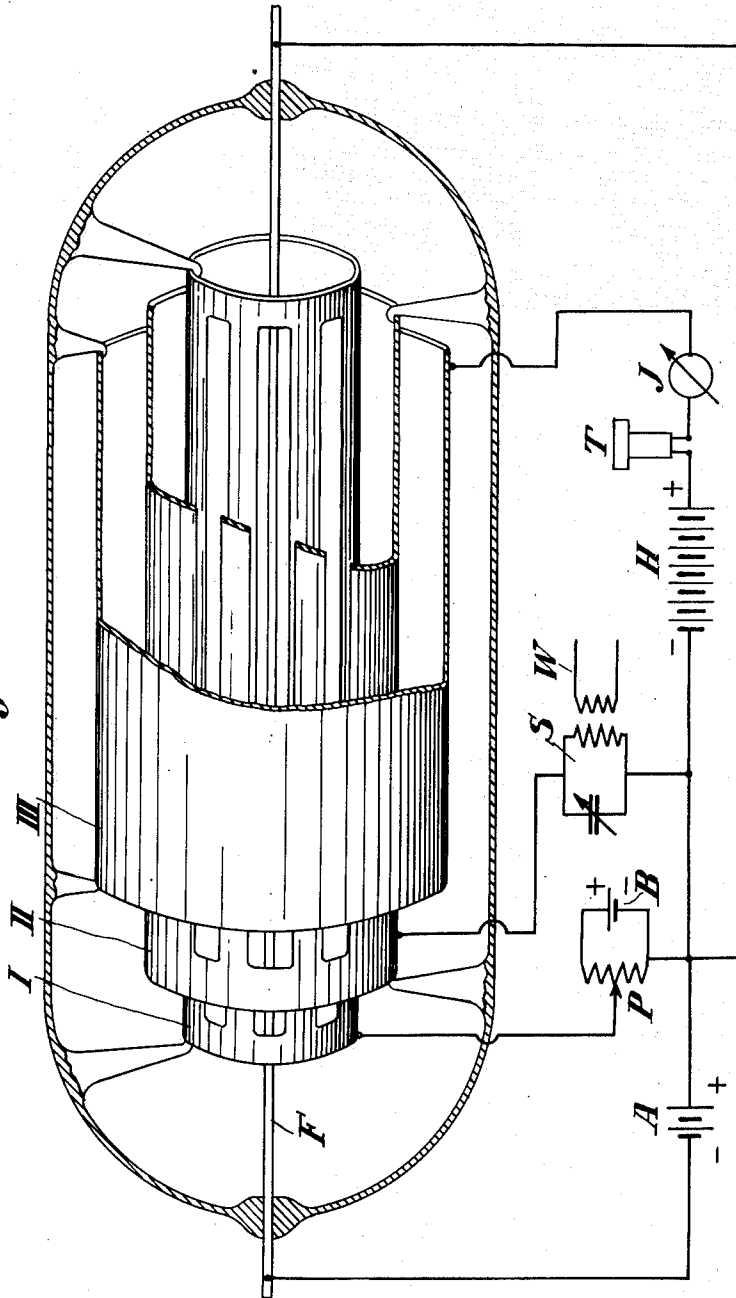
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Fig. 3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC DISCHARGE TUBE.

Original application filed August 26, 1921, Serial No. 495,504, and in Germany October 24, 1913. Divided and this application filed September 25, 1924. Serial No. 739,882.

This invention relates to electric discharge tubes or thermionic tubes for detecting, amplifying or generating alternating currents, the said tubes being of the kind comprising a heated filament acting as a cathode which emits electrons, an anode to which a positive potential is imparted by its being connected to the positive pole of a local source of direct current and on which the electrons emitted by the cathode impinge, and a controlling electrode or grid to which the currents to be controlled are applied and which under the influence of the latter currents varies the flow of the electrons from the cathode to the anode.

According to the invention forming the subject matter of the present application, which is a division of my application Serial No. 495,504, filed August 26, 1921, both the anode and the grid of an electric discharge tube of the kind above referred to are constructed in such a manner that the entire stream of electrons passing from the cathode and radiating in all directions is utilized. This is attained by surrounding a heated cathode by a grid and placing an anode around the said grid, the latter being so constructed as to allow the stream of electrons to pass all round from the cathode to the anode.

It is to be understood that throughout this specification the word "grid" is intended to cover a controlling electrode to which the currents to be controlled are applied and which allows a stream of electrons to pass through it, and the term "anode" to cover an electrode which is always connected to the positive pole of a local source of direct current so as to receive a positive potential.

Referring to the drawings in which like parts are similarly designated:

Figure 1 is a perspective view of one form of my invention;

Figure 2 is a cross section thereof;

Figure 3 is a modification of Fig. 1, with parts broken away.

In Fig. 1 I have shown an evacuated glass tube 6 containing a stretched filament F capable of being heated by a battery A and in lieu of a flat grid, I have shown a cylindrical grid G_1, G_2 surrounding the filament F and in lieu of a flat metal plate I have shown a cylindrical metal plate M surrounding the grid G_1, G_2 . This gives the advantage that the entire stream of electrons passing from the

heated body or filament F and radiating in all directions is utilized. The grid or inner tube consists of two systems or sets of metal strips G_1 and G_2 , the strips of one set alternating with those of the other set, insulated from one another and forming a cylinder. The anode or outer tube M is a metal cylinder slotted axially.

The connections and method of operation are as follows:

The filament F is heated by a small battery A. The filament emits electrons which traverse the cylindrical grid G_1, G_2 , before reaching the outer tubes or anode M. T is a telephone, J a galvanometer and H an auxiliary battery, the positive pole of which is connected to the anode M. The wires a, b connected to the grid G_1, G_2 lead to the circuit whose oscillation is to be detected or amplified. The outer tube M has in it slots which correspond to the spaces between the two combs G_1 and G_2 .

In considering the action of the construction shown in Figs. 1 and 2 I must distinguish between the case in which the spaces between the two sets of strips or combs G_1 and G_2 are opposite the slots in the tube M and the case in which they are opposite the strips of the tube M.

In the first case on excitation of the combs G_1 and G_2 the stream of electrons which reaches the tube M decreases and in the second case it increases. It is in general better to work with a decrease of the stream of electrons. The sensitiveness of the arrangement can under some circumstances be considerably increased if an auxiliary potential is applied to the combs G_1 and G_2 .

In Fig. 3 I have shown a modification. Between the filament F and the outer metallic cylindrical tube III which acts as anode are arranged two concentric grids I and II insulated from one another. At the one of the two grids, the grid I, is applied an auxiliary potential. The potential is produced by the element B and may be varied by means of a contact sliding on a resistance. The auxiliary potential may also be applied at the grid II in lieu of the grid I. It is also possible to apply the auxiliary potential at both grids. In the example shown in Fig. 3 the alternating current to be detected or amplified is applied at the grid II. The high frequency current passing a coil W is

c. g. induced to the oscillating circuit S connected to the grid. II. A is the battery for heating the filament F, H the anode battery, T the telephone and I a galvanometer.

5 I claim:—

1. A thermionic tube having a heatable cathode capable of emitting a stream of electrons, a plurality of perforated grids surrounding the said cathode and capable of
10 allowing the stream of electrons to pass through them in substantially all radial directions and of controlling it, and an anode surrounding the said grids for the purpose
15 of utilizing the entire stream of electrons emitted by the cathode in all radial directions.

2. A thermionic tube having a heatable cathode capable of emitting a stream of electrons, two concentric cylindrical grids surrounding the said cathode having openings to
20 allow the stream of electrons to pass through them in substantially all radial directions,

and a cylindrical anode surrounding the said cylindrical grids.

3. A thermionic tube having a heatable cathode capable of emitting a stream of electrons, two concentric cylindrical grids surrounding the said cathode having slots, the slots of the one grid being opposite and parallel to the slots in the other grid and a cylindrical anode surrounding the said cylindrical grids for the purpose of utilizing the entire stream of electrons emitted by the cathode in all radial directions.

4. An electron discharge device having an electron emitting cathode, a control electrode, an anode, and a cylindrical electrode made up of conducting slats said electrode being interposed between said cathode and said anode.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

GEORG SEIBT.

CERTIFICATE OF CORRECTION.

Patent No. 1,696,103.

Granted December 18, 1928, to

GEORG SEIBT.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the heading to the printed specification after line 6, insert "Granted under the Provisions of the Act of March 3, 1921, 41 Stat. L., 1313."; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of December, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.