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F. J. ELSER

1,957,327

MAGNETICALLY MODULATED VACUUM TUBE OSCILLATOR

Filed Sept. 28, 1932

Fig. 1.

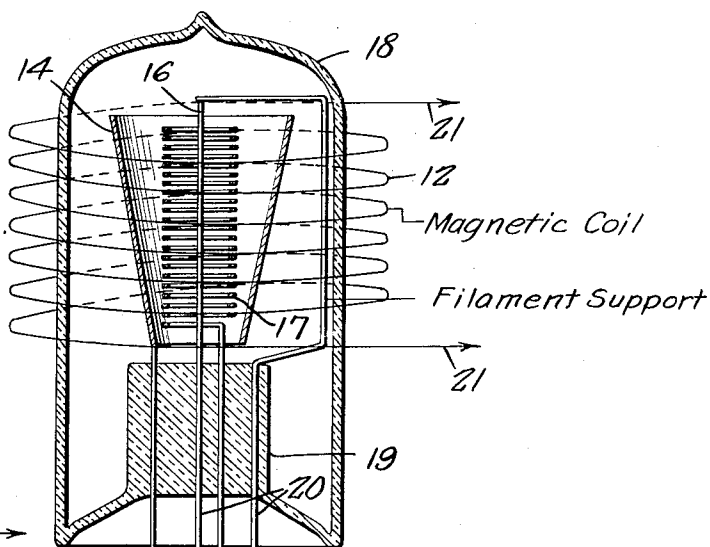


Fig. 3.

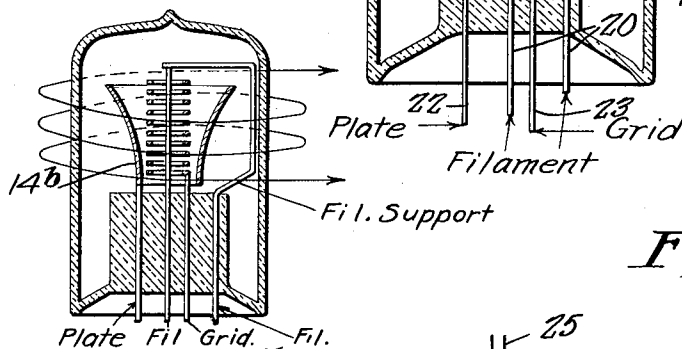
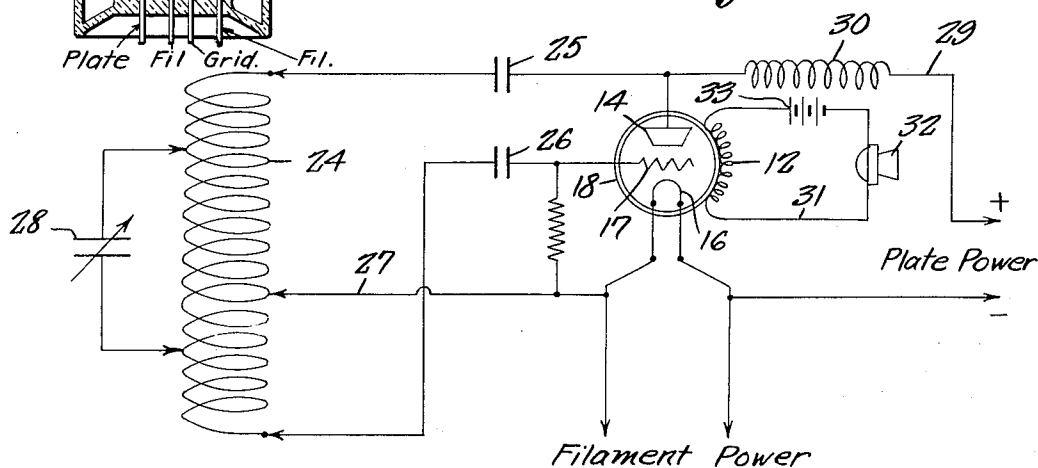


Fig. 2.



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WITNESS:

UNITED STATES PATENT OFFICE

1,957,327

MAGNETICALLY MODULATED VACUUM
TUBE OSCILLATOR

Fred J. Elser, Carlsbad, Calif.

Application September 28, 1932, Serial No. 635,291

3 Claims. (Cl. 250—27.5)

The object of the invention is to provide a vacuum tube in which is incorporated a magnetic type of control adapted to decrease gradually the flow of electrons from cathode to anode whereby amplitude modulation of the electron stream can be accomplished, as contradistinguished from the mere switching action of present known devices; to provide a vacuum tube in which the anode and cathode are not uniformly spaced from each other throughout their extent but are subjected to the effect of a permanent magnetic field, the variation of the strength of which affects differently the electron streams passing from cathode to anode at different points on the same; to provide a vacuum tube in which the magnetic control element is incorporated with the tube as an element thereof; and generally to provide a device of this character which is of simple form and susceptible of cheap manufacture.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing but to which embodiment the invention is not to be restricted. Continued use in practice may dictate certain changes or alterations and the right is claimed to make any which fall within the scope of the annexed claims.

In the drawing:

Figure 1 is a central vertical sectional view of a tube constructed in accordance with the invention.

Figure 2 is a diagrammatic view of an oscillating circuit in which the invention is incorporated as the oscillation producing medium.

Figure 3 is a view similar to Figure 1 but showing a modified form of plate or anode.

The vital element of the invention is the control coil 12. This control element is disposed in surrounding relation to the anode 14 which is of generally frusto-conical form but inverted, so that the larger base of the frustum is above.

The cathode consists of the linear filament 16 in surrounding relation to which the plate or anode 14 is disposed. The grid 17 is of the customary form and interposed between the filament and the plate.

The whole set of elements with the exception of the control element are enclosed in an evacuated envelope 18 carried by a base 19 through which the terminals of the several elements pass, the filament terminals being indicated at 20 and the plate and grid terminals at 22 and 23. The control element terminals are indicated at 21.

In use, the tube is connected in circuit in the

usual way, the plate and grid being coupled together through an inductance 24 through condensers 25 and 26, connection being made with the filament or cathode at an intermediate point on the inductance as indicated at 27. The inductance is in parallel with a tuning condenser 28, while the plate power circuit 29, which includes a choke coil 30, is connected with the plate and filament.

The control element 12 is included in a local circuit 31 which also includes the microphone 32 and an energizing source 33.

When the microphone is inactive, a constant magnetic field is projected by the coil 12 across the path of electron discharge from the filament to the plate, but this electron discharge is not uniform throughout the area of the plate, since its distance from the filament varies at different points, so that the velocity of the electron discharge is lowest at the farthest separated points between the filament and plate and highest at the least separated points. For a low degree of magnetization of the coil 12, the electron discharge between the widely separated points will be choked or stopped and for a high degree of magnetization the electron discharge at the least separated points will be similarly affected. The coil 12, therefore, permits control of the electron discharge over a wide range of magnetization and makes possible a variation of the amplitude of oscillations produced by the tube directly proportional to the degree of magnetization that may be attained. This is a highly desirable condition in radio telephony, as it prevents distortion.

It is necessary to have this peculiar arrangement of anode with relation to cathode in order to obtain this linear variation between magnetizing force and amplitude of oscillations.

In the modified form illustrated in Figure 3, the same general principles applicable to the form in Figure 1 obtain. The modification consists, however, in making the plate 14^b in the form of a logarithmic curve.

The invention having been described, what is claimed as new and useful is:

1. A vacuum tube comprising anode, filament and grid of which the first is in surrounding relation to the second and the third interposed between the two, the spacing between the filament and the anode varying at different points on the same, and a control element projecting a magnetic field across the path of electronic discharge from the filament to the anode.

2. A vacuum tube comprising anode, filament

and grid of which the first is in surrounding relation to the second and the third interposed between the two, the spacing between the filament and the anode varying at different points on the same, and a control element for projecting a magnetic field across the path of electronic discharge from the filament to the anode, said control element consisting of a magnetizing coil disposed in surrounding relation to the anode.

5 3. A vacuum tube comprising anode, filament and grid of which the first is in surrounding relation to the second and the third interposed between the two, the spacing between the filament and the anode varying at different points on the same, and a control element for projecting a magnetic field across the path of electronic discharge from the filament to the plate, said anode being of inverted frusto-conical form and said control element comprising a magnetizing coil disposed in surrounding relation to but spaced from the anode.

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FRED J. ELSEY.

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25	100
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35	110
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65	140
70	145
75	150