May 10, 1938. W. WEHNERT 2,116,719

AMPLIFIER

Original Filed Aug. 6, 1931

Fig. 1

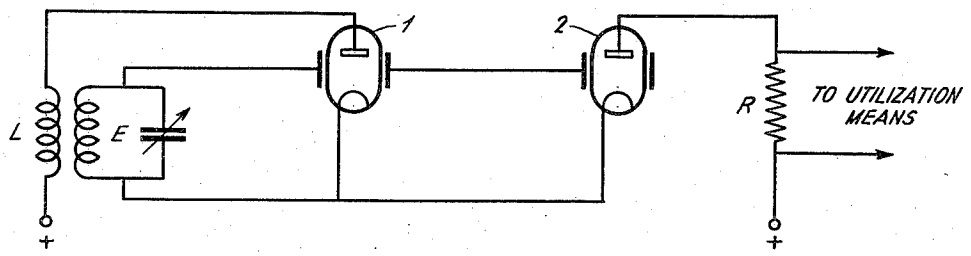


Fig. 2

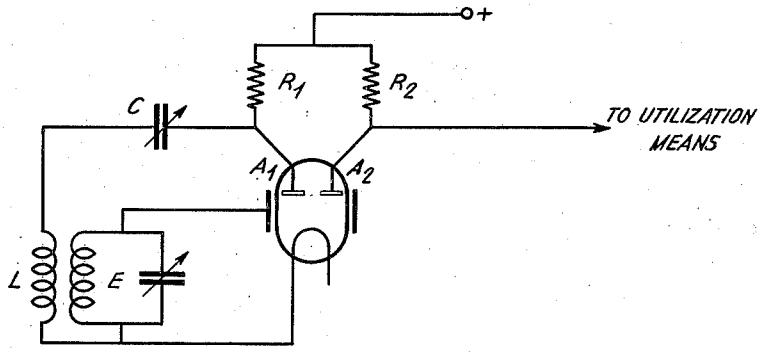
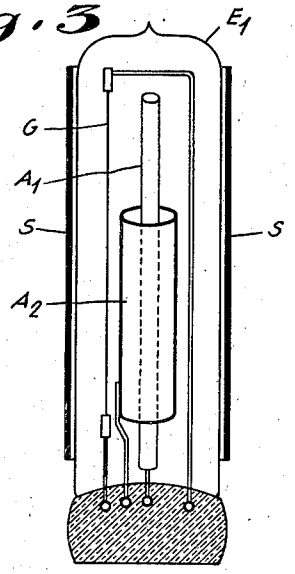


Fig. 3



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UNITED STATES PATENT OFFICE

2,116,719

AMPLIFIER

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Original application August 6, 1931, Serial No. 555,448. Divided and this application October 17, 1934, Serial No. 748,635. In Germany January 30, 1931

4 Claims. (Cl. 250—27.5)

This application is a division of my copending application Serial Number 555,448 filed August 6, 1931.

The present invention relates to arrangements comprising resistance coupled, external control electrode tubes.

In resistance coupled circuit schemes the two chief objects are optimum regeneration, and optimum amplification of the modulated radio frequency waves. These two objects are incompatible, or militate against each other, inasmuch as good back-feed is predicated upon a maximum of slope of the plate current characteristic of the tubes, a requirement that militates against the desirability of insuring high audio amplification with the use of high ohm resistances. Hence, a compromise has heretofore been sought in that maximum gain was often abandoned to a point where just satisfactory regeneration could be obtained.

According to this invention independent tubes are employed for regeneration and amplification, whereby these tubes may be designed, and adapted respectively, to insure optimum conditions in their uses and purposes looked at from the viewpoint of slope and conductance.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically several circuit arrangements whereby my invention may be carried into effect.

Fig. 1 shows two external control electrode amplifier tubes 1 and 2 which, for instance, for the object of suppressing troublesome noise in the case of supply line heating may be filled with a gas atmosphere. The cathodes, as well as the control electrodes, therefore are united with one and the same tunable input oscillation circuit E, whereas the anodes are connected with circuit elements independent of each other.

For example, the anode circuit of tube 2 is connected with the rest of the cascade through a coupling resistance R, whereas the anode circuit of tube 1 is connected through a feed-back coupling coil L with the positive pole of the anode potential source. However, it is also feasible to provide in the anode circuit of the tube 1 a suitably proportioned resistance whence energy for back-feed is derived in a convenient manner.

For some purposes it has proved advantageous to use tubes containing two discharge systems in cooperation with a hot filament, and a control electrode, as diagrammatically illustrated in Fig. 2. In this arrangement, E is the input circuit, L the back-feed, or tickler, coil to which energy is supplied from the anode A_1 through a variable condenser C. The anode circuit of electrode A_1 contains a high ohm resistance R_1, while a resistance R_2 contained in the circuit of anode A_2 serves for establishing coupling relations with the rest of the amplifier cascade. It has proved advantageous to give the system serving for rectification and audio amplification an anode conductance of less than five per cent, and to make the anode conductance of the other system more than five per cent. This latter system most suitably has a slope of over 0.1 milliampere per volt.

A tube particularly suited for circuit schemes of this kind is illustrated in its constructional details in Fig. 3, where A_1, A_2 are the anodes, and G the cathode. This tube is of the external control electrode type having a flattened cross-sectional shape, of rod-like form. The two anodes A_1 and A_2 being electrically separated present dissimilar distances from the heated cathode, and as a result, also, the control electrode S surrounding the discharge vessel E_1 on the outside produces a conductance of different value upon the discharge systems.

While I have indicated and described systems for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organizations shown and described, but that many modifications may be made without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. A space discharge device comprising a sealed envelope, a cathode, an anode extending parallel with and substantially along the entire length of said cathode, a second anode interposed between the first anode and said cathode for a portion of the length of said first anode only, and a control electrode surrounding said envelope and extending along the entire length of said cathode.

2. A thermionic device comprising a tubular anode, a second anode located within said tubular anode and concentric therewith, a straight filamentary cathode located without said tubular anode and parallel therewith, and a control electrode surrounding said anodes and said cathode.

3. A vacuum tube comprising an envelope and a first anode electrode mounted therein, a tubular electrode concentrically mounted with respect to said first electrode and extending for only a portion of the length of said first electrode, a straight filamentary cathode supported exterior to and parallel to said electrodes, and a control grid electrode concentrically mounted with respect to the first mentioned electrode.

4. A thermionic device comprising a rod-like anode, a cathode spaced from said anode, the axes of said cathode and said anode extending along parallel lines, an electrode interposed between said cathode and said anode for a part only of their length, and an electrode surrounding said cathode, anode and interposed electrode.

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