April 28, 1936. R. RECHNITZER 2,039,113

AMPLIFIER CIRCUITS

Filed Jan. 3, 1933

Fig. 1

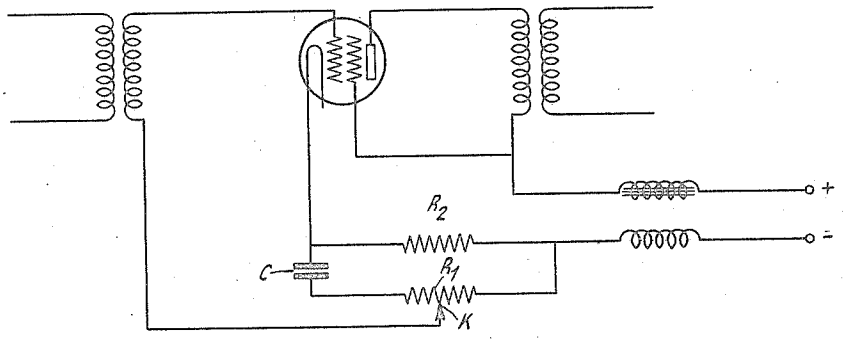


Fig. 2

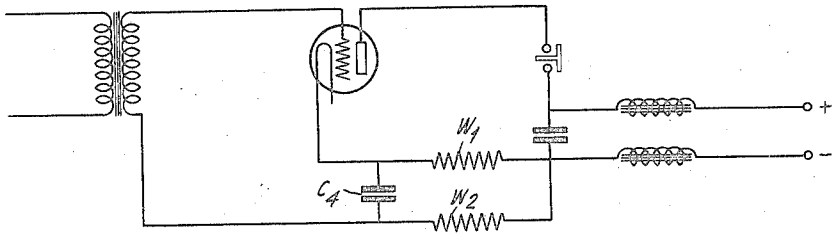
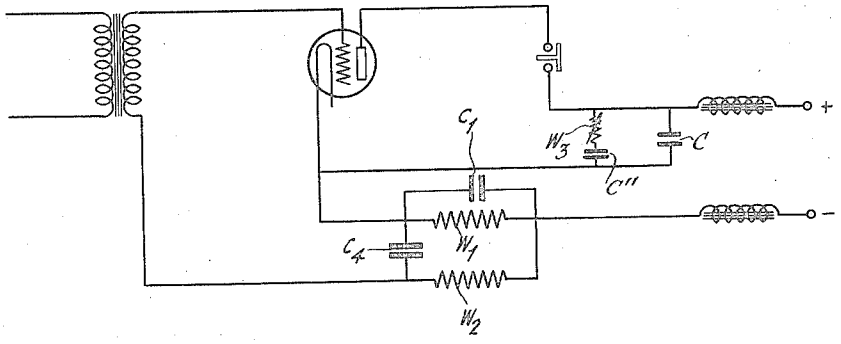


Fig. 3



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AMPLIFIER CIRCUITS

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Application January 3, 1933, Serial No. 649,887
In Germany December 1, 1931

3 Claims. (Cl. 250—27)

It is known in tube amplifiers, receiving its operating voltage from a varying D. C. source, to apply an A. C. potential at opposite phase to the grid electrode for compensating the effect of the varying anode voltage to the end of suppressing the hum note, caused by the voltage variation.

In the drawing,

Figure 1 illustrates certain features of the present invention in connection with multi-grid tubes;

Figures 2 illustrates a circuit arrangement of use in connection with the description of the present invention; and,

Figure 3 illustrates a preferred embodiment of the invention wherein a phase control device is provided in connection with a hum neutralizing arrangement..

In amplifying circuits using high mu tubes such as screen grid tubes, difficulties are met with in such connections, owing to the low reaction of the anode upon the field of the space charge of the cathode. In most cases the negative biasing voltage is produced by the voltage drop of an ohmic resistance in the anode circuit at the cathode end. In order to apply an A. C. potential of suitable magnitude to the control electrode which in view of the low reaction of the anode, must have a small value according to the present invention, a potentiometer is placed in parallel to the resistor, producing the grid biasing voltage, in such manner that only the A. C. component passes through the potentiometer. Such potentiometer, as may be seen from the embodiment shown in the drawing, is comprised of a resistance, connected at its one end to the anode circuit through a capacity C and from which the compensating potential is tapped by means of a sliding contact K. In the drawing, the resistance producing the grid biasing potential is designated by R_2.

In my copending application No. 365,843 Patent No. 2,000,986, May 14, 1935 a circuit arrangement adapted to feed amplifier tubes from a supply line has been disclosed in which such voltage variations as will invariably arise at the plate because of the imperfect action of smoothing means are compensated by the aid of alternating potentials furnished to the grid, the tapping of the grid bias potential of the tube being effected on a resistance W_1 (Fig. 2) traversed by the plate current, another resistance W_2 being provided in parallel relation to the former resistance, and a shunt condenser C_4 to the filament point. According to the invention disclosed in said copending application the sizes of the resistances W_1, W_2, and of C_4 are so chosen that, when the fall of potential occasioned by the plate current across resistance W_1 has the value adapted to the operation of the tube, also the alternating voltage impressed upon the grid possesses the optimum value to compensate the plate potential both as regards size and phase.

However, in the circuit arrangement disclosed in said copending application it has not been feasible to secure strict phase compensation by the aid of the alternating potential impressed upon the grid electrode. According to a circuit arrangement described in a prior copending application No. 621,595 a supplementary condenser C_1 is provided in parallel relation to the resistance W_1 (see Fig. 3) by means of which phase coincidence of the compensator potentials is effected.

However, it is not an easy matter in practice to adjust the phase relations by the setting of the said supplemental condenser inasmuch as variable capacities of an order of magnitude as required therefor are comparatively costly. The use of variable resistances involves less expense, and according to the present invention as shown in Fig. 3 phase adjustment is thus insured by the use of a variable resistance W_3 connected in parallel to condenser C being blocked in reference to D. C. by condenser C'', resistance W_2 in this scheme being also made preferably variable in nature.

I claim:

1. In combination with a source of fluctuating unidirectional current, a filter system connected to said source for reducing the fluctuating component of the unidirectional current, a utilizing device comprising a space discharge tube provided with a grid circuit and an anode circuit means including a resistor device for connecting the anode circuit of the utilizing device across the filter system output, additional means for coupling the filter system output to the grid circuit of the utilizing device for substantially neutralizing the remaining ripple component of the unidirectional current within the utilizing circuit, said last-named means comprising a circuit including a resistive element and a capacitive element in series and shunted across said resistor device and a connection between the common point of said two series elements and the utilizing device grid circuit, said first named means including, in addition, means for

varying the phase of the fluctuating component of the unidirectional current.

2. In combination with a source of fluctuating uni-directional current, a filter system having its input terminals connected to said source for reducing the fluctuating component of the unidirectional current, a utilizing circuit comprising an electronic tube provided with an anode circuit and a grid circuit said anode circuit being connected across the filter output terminals, an impedance element common to the anode and grid circuits for providing said tube with biasing potentials, means associated with the common impedance for impressing upon the input circuit a fluctuating component derived from the filter system and of phase and magnitude to neutralize the effect of the remaining fluctuating component impressed upon the anode circuit through the filter system and a fluctuating component phase control means connected across the anode circuit.

3. In combination with a source of fluctuating unidirectional current, a filter circuit provided with a pair of input terminals and a pair of output terminals, said input terminals being connected across the source, a utilizing circuit comprising an electronic tube provided with anode, cathode and a grid electrode, a connection between one of the output terminals of the filter circuit and the anode and a connection between the other output terminal and the cathode, said last-named connection including a bias resistor device, a condenser shunted across said bias resistor, means for connecting the last-named output terminal to said grid electrode said last-named means including a resistor element, a condenser connected between the grid side of the last-named resistor and the cathode side of the bias resistor, a phase adjusting circuit connected between the first named output terminal and the cathode of the tube said phase adjusting circuit including a condenser shunted by a circuit comprising a resistor and a condenser in series, said last named condenser acting as a blocking condenser to prevent passage of direct current through the last-named resistor.

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