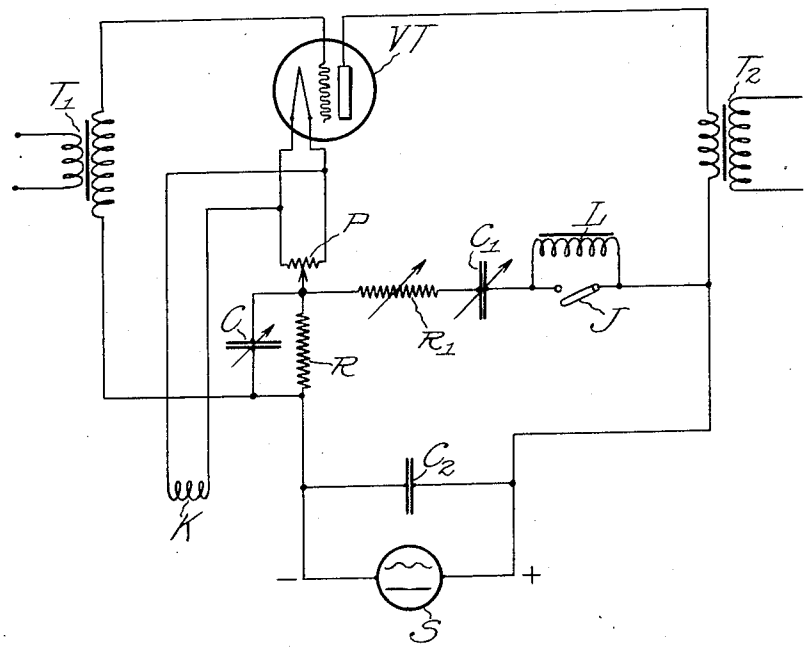
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AMPLIFIER ENERGIZING

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Inventor
BENJAMIN F. MIESSNER

WITNESS
Oliver W. Holmes

By Attorney

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AMPLIFIER ENERGIZING

Benjamin F. Miessner, Short Hills, N. J., assignor, by mesne assignments, to Radio Corporation of America, New York, N. Y., a corporation of Delaware

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2 Claims. (Cl. 179—171)

The present invention relates to the energizing of amplifiers for operation from unsteady sources of potential so as to avoid undue disturbances or hum; and more particularly three-electrode vacuum tubes energized with energy from a unidirectional pulsating current source, as rectified and filtered current from a 60 cycle commercial alternating current supply system.

One object of my present invention is to neutralize the fluctuating component of an energizing current in the output circuit by a properly impressed potential of the fluctuating component upon the grid of a three-electrode tube with a minimum of interference with the amplification function of the tube.

In my copending application, Serial No. 251,807 of February 4, 1928, I show a system for neutralizing the ripple current from an imperfect filter system in the plate circuit of a tube by impressing an oppositely acting ripple voltage on the grid of the tube, with means for developing the desired degree of rippling grid voltage. I have found that an improvement in the neutralizing can be obtained by the addition of means for regulating phase, and at the same time have better effect in signal current by-passing and signal current feed-back conditions.

The invention is described in connection with the one figure of the drawing in which a three-electrode vacuum tube VT is shown to have an input circuit including a signal input element, such as an audio frequency transformer T_1, and an output circuit including an output element such as an audio frequency transformer T_2, or a translating device for instance. The filament is shown supplied with heating current from the secondary winding of a transformer, any other conventional way of heating being understood.

A source of unidirectional pulsating current S, as the output of a filter system following an alternating current rectifier, is shown connected to supply the plate and grid electrodes with operating potential. The source may be shunted by a filtering and signal current by-passing condenser C_2 of suitably low impedance for these purposes if desired. The positive and negative terminals of the source are as indicated. The potential for the grid is developed by the plate current flow through grid bias developing resistor R, as is now usual.

I show a circuit connection between the positive connection of the source S to the output circuit and the filament by way of the usual potentiometer P, which connection includes a resistance R_1 and condenser C_1, as shown in my copending application referred to, for the purpose of increasing but regulating an additional ripple current from source S for passage through resistance R, thereby providing for an increased but regulated ripple voltage on the grid to neutralize the ripple current effect tending to be produced in output element T_2, all more fully described in my said copending application.

In shunt to resistance R, I employ a condenser C, selection of the capacity value of which will alter the phase of the ripple potential applied to the grid of the tube, and which at the same time provides a by-pass around resistance R for signal current in the grid circuit. Condenser C also lessens the deregenerative coupling of signal current energy from output circuit to input circuit, there being some signal current energy passing through resistance R, particularly as the usual adjustments of capacity of condenser C_1 and resistance R_1 for hum elimination leaves high enough impedance to cause considerable signal current to pass to the filament by way of condenser C_2 and other elements of the filter and resistance R.

I also show by means of switch J that I may or may not include in the ripple current feed-back circuit an inductance L. In some cases it may be necessary to introduce some inductive effect to obtain a desired degree of phasing of the feed-back ripple current to off-set inductive effects arising elsewhere as in transformer T_2 for instance.

While I have illustrated and described my invention in connection with a single stage of audio frequency amplification no limitations are intended by such choice for explanatory purposes, other useful adaptations being obvious from the description to those skilled in the art.

Having thus described my invention what I claim is:

1. An amplifier comprising an electron discharge tube having an inductive anode circuit, a source of pulsating current for energizing the circuits of said tube, a path between the anode circuit of the tube and the cathode for supplying a hum balancing voltage to the input circuit, said path including a resistor, capacity and inductance in series, said inductance being chosen to off-set dephasing of said balancing voltage due to the inductive anode circuit, a grid biasing resistor between said source and said input circuit, and a capacity across said bias resistor of a value for controlling the phase of said balancing voltage, and lessening the deregenerative coupling between the anode and input circuits.

2. An audiofrequency amplifier comprising an electron discharge tube having an inductive anode circuit, a source of pulsating current for energizing the circuits of said tube, a path between the anode circuit of the tube and the cathode for supplying a hum balancing voltage to the input circuit, said path including a resistor capacity and choke coil in series, said choke coil having an inductance whose magnitude is sufficient to off-set de-phasing of said balancing voltage due to the inductive anode circuit, a grid biasing resistor between said source and said input circuit, and a condenser across said bias resistor of a capacity value controlling the phase of said balancing voltage and lessening the audio frequency deregenerative coupling between the anode and the input circuits.

BENJAMIN F. MIESSNER.