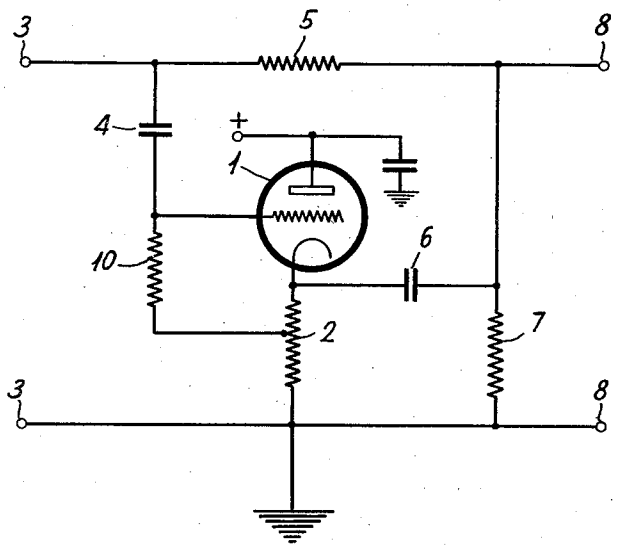
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THERMIONIC VALVE CIRCUIT

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THERMIONIC VALVE CIRCUIT

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This invention relates to improvements in thermionic valve circuits.

In the specification of the British Patent 448,421 there is described a circuit in which the effective value of the resultant shunt capacity of an input circuit and of a valve is reduced by providing a negative feedback path between the anode-cathode circuit and the input circuit of the valve, the feedback path comprising an impedance element connected between the cathode and earth. A valve having a circuit of this kind associated therewith has been termed a "cathode follower" since the potential of the cathode tends to follow potential variations of the grid.

Such a circuit is, however, not altogether satisfactory in cases where, for example, the circuit is arranged to feed a cathode ray tube picture reconstituting device and synchronising unit from a television receiver which is arranged to receive signals including a direct current component. In such cases the cathode of the valve is usually directly coupled to the control grid of the cathode ray tube and hence the steady voltage on the cathode of the valve is applied to the grid of the cathode ray tube. This steady voltage can be counterbalanced by suitably biassing the cathode ray tube and the first valve of the synchronising unit, but this operation is frequently inconvenient, and, in addition, if a change in the bias voltage occurs a change in the mean picture brightness results and also the operation of the synchronising unit may seriously be disturbed.

It is the chief object of the present invention to provide an improved circuit with a view to overcoming such defects.

According to the invention a thermionic valve circuit including a valve of the "cathode follower" type is provided which is capable of transmitting a wide band of frequencies in which the direct current and lower frequency currents from the input circuit are fed through a path which by-passes the "cathode follower" valve.

In this manner, therefore, only the higher frequencies are fed to the output from across the cathode impedance, and hence the steady voltage from the cathode of the valve need not be applied to the subsequent apparatus.

The method of carrying the invention into practice will be fully understood from the following description with reference to the typical circuit shown in the accompanying drawing.

In the said drawing the reference numeral 1 indicates a valve of the triode type by way of example, which is arranged to function as a cathode follower due to the provision of an impedance 2, between cathode and earth. Input signals are applied to the valve 1 from input terminals 3, the higher frequencies being applied between grid and earth through a blocking condenser 4, whilst, in accordance with the invention, the direct current and lower frequencies are fed through a separate path including resistance 5. The higher frequencies are taken from across the resistance 2 through a condenser 6 connected to the upper end of a resistance 7 which is connected across output terminals 8. The cathode of valve 1 is suitably biassed by the provision of a leak resistance 10, tapped at a suitable point on resistance 2.

It will be appreciated that the voltage amplification obtained with a valve acting as a cathode follower in most cases will be somewhat less than unity, and hence the resistance 5 and 7 may be adjusted in such a manner as to reduce the steady voltage and lower frequencies which are bypassed through the resistance 5 in the same proportion as the loss in amplification of the higher frequencies which occurs through the valve 1.

While the voltage amplification is not quite unity, it will be appreciated that considerable power amplification takes place as was pointed out in the above referred to British Patent No. 448,421, due to the fact that though the grid circuit impedance which constitutes the input is exceedingly high, the output impedance comprising the cathode resistance is quite low. Since substantially the same voltage appears across the output resistance as appeared across the grid circuit, it is clear that the output circuit will have much more power than the grid circuit, since from Ohm's law, the power in a circuit varies inversely as the resistance where the voltage is held constant. Thus the grid follower type of amplifier provides power amplification with impedance transformation, and is exceedingly useful where a high impedance source must feed into a relatively low impedance load.

It will also be appreciated that the condenser 4 must be sufficiently large for the potential on the grid of valve 1 to remain substantially equal to that between the terminals 3, until the frequency has fallen to a point at which the resistance of the condenser 6 has risen to a value such that it is no longer capable of shunting the circuit across the output terminals 8 and thus producing a voltage drop in resistance 5.

In addition providing the proportion of the resistance 2 below the tapping point is much greater than the proportion of the resistance

above such point, as will normally be the case, the lower end of the resistance 10, will almost follow potential variations of the grid and hence the effective value of the resistance 10, will be much larger than its actual value.

If it is desired further to reduce the capacity across the input circuit the valve 1 may be replaced by a screen-grid valve in which case the screen will be decoupled to the cathode.

I claim:

1. A wide frequency band amplifier comprising an electron tube having a cathode, control electrode, and an anode, a ground conductor, a first impedance connected between the cathode and said conductor, a second impedance connected between said control electrode and an intermediate point of said first impedance, a plurality of terminal means for feeding signal energy to said tube, one of said terminal means including said grounded conductor, coupling means connected between the ungrounded terminal means and the control electrode of said tube, a plurality of output terminal means for feeding output energy to a load circuit, one of said latter terminal means including said grounded conductor, a fourth impedance connected between both ungrounded terminal means, a fifth impedance connected between said grounded conductor and the connection between the ungrounded output terminal and said fourth impedance, and an impedance coupling connected between said cathode and said ungrounded output terminal.

2. An amplifier circuit comprising a thermionic tube having anode, cathode and at least one control electrode, a point of fixed potential, a first resistor connected between said cathode and said point of fixed potential, a pair of input terminal means one of which comprises said point of fixed potential, a serially connected capacity and second resistor connected between one of said input terminals and a point on said first resistor, a connection from said control electrode to the common terminal of said capacity and second resistor, a pair of ouput terminal means one of which comprises said point of fixed potential, a third resistor connected between the output terminals, capacity coupling means between the cathode of said tube and the third resistor, and a fourth impedance connected between the uncommon input and output terminals.

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