This invention relates to an ultra-high frequency amplifying circuit comprising a discharge tube which contains at least a cathode, a control grid and an anode, and in which the oscillations to be amplified are supplied to the control grid and the cathode, whereas the amplified oscillations are obtained from an output impedance interposed between the output electrode and the control grid.

In the case of high frequency amplifiers use is generally made of the so-called common cathode circuit, in which the input impedance is arranged between the control grid and the cathode and the output impedance between the output electrode and the cathode of the amplifier valve. When amplifying ultra-high frequencies it may, however, be advantageous to arrange the output impedance between the output electrode and the control grid, the latter being connected, so far as high-frequency currents are concerned, to a point of constant potential (earth), such circuit arrangement being referred to as a common grid circuit. There are bands of very high frequencies in which the common grid circuit has a lower input damping than the common cathode circuit, but even so the input damping of the common grid circuit in such frequency bands may be comparatively high, so that it is desirable to provide for means by which the input damping is further reduced.

According to the invention, for this purpose that part of the control grid circuit that does not form part of the high frequency connection between the output electrode and the cathode includes a predominantly capacitive impedance which is so proportioned that the damping produced by the tube on the input impedance is substantially neutralised.

The said predominantly capacitive impedance is preferably constituted by a Lecher line connected between the control grid and a point of constant potential.

As an alternative, a highly efficient embodiment of the invention may be secured, if the said predominantly capacitive impedance is constituted by a condenser which is housed in the discharge tube and shunted by a leak resistance and which is connected by connections as short as possible on the one hand to the control grid and on the other hand to a tapping point, from which issue two current supply leads one of which is connected to the input impedance and the other to the output impedance.

In order that the invention may be clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying drawing, in which some few embodiments are illustrated.

In the drawing:

Fig. 1 is a schematic circuit diagram of one embodiment of an amplifier in accordance with the invention.

Fig. 2 is a schematic circuit diagram of another embodiment of an amplifier in accordance with the invention, and

Fig. 3 is a schematic circuit diagram of yet another embodiment.

Figure 1 shows an amplifier circuit for ultra-high frequency oscillations which comprises an amplifier valve 1. This valve contains a cathode 2, a control grid 3, a screening grid 4, a suppressor grid 5 connected to the cathode, and an anode 6. The control grid 3 and the cathode 2 have been arranged between them an input impedance 7 to which the oscillations to be amplified are supplied, whereas the anode 6 and the control grid 4 have been connected between them an output impedance 8 from which the amplified oscillations are obtained. The connecting point between the impedances 7 and 8 is earthed.

According to the invention, the control grid 3 and earth have been arranged between them a condenser 9 which is proportioned in such manner that the damping produced by the tube on the input impedance 7 is substantially neutralised. For this purpose, the condenser 9 must in practice have a capacity which is of the same order of magnitude as or several times higher than the control grid-cathode capacity.

Figure 2 shows an embodiment of the invention in which the condenser 9 is replaced by a Lecher line 16 whose length is chosen to be such that it has a capacitive input impedance. The input impedance 7 and the output impedance 8 are also replaced by Lecher lines, which are designated 41 and 42 respectively.

Figure 3 shows an embodiment of the invention in which the condenser is housed jointly with a leak resistance 13 in the discharge tube and connected through short connecting wires on the one hand to the control grid 3 and on the other hand to a tapping point 14. From the tapping point issue two supply leads one of which leads to the input impedance (in the present case the Lecher line 11) and the other to the output impedance (in the present case the Lecher line 12).

What we claim is:

1. A high frequency amplifying system com-
A high frequency amplifying system comprising an electron discharge device having a cathode, a control grid, a screen grid, and an anode, an input impedance having one end connected to said cathode, an output impedance having one end connected to said anode, the other ends of said impedances being interconnected, a predominantly capacitive impedance connected between said interconnection and said control grid and having a value substantially neutralizing the damping effect of said device on said input impedance, and means effectively coupling said screen grid to ground.

2. A high frequency amplifying system comprising an electron discharge device having a cathode, a control grid, a screen grid, and an anode, a tuned input impedance connecting said cathode to ground, a tuned output impedance coupling said anode to ground, a predominantly capacitive impedance connecting said control grid to ground and having a value substantially neutralizing the damping effect of said device on said input impedance, and means effectively coupling said screen grid to ground for high frequencies.

3. A high frequency amplifying system comprising an electron discharge device having a cathode, a control grid, a screen grid, and an anode, a tuned input impedance connecting said cathode to ground, a tuned output impedance coupling said anode to ground, a capacitor connecting said control grid to ground and having a value substantially neutralizing the damping effect of said device on said input impedance, and means effectively coupling said screen grid to ground for high frequencies.

4. A high frequency amplifying system comprising an electron discharge device having a cathode, a control grid, a screen grid, and an anode, a tuned input impedance connecting said cathode to ground, a tuned output impedance coupling said anode to ground, a Lecher line having a length at which said line acts as a capacitance connecting said control grid to ground and having a value substantially neutralizing the damping effect of said device on said input impedance, and means effectively coupling said screen grid to ground for high frequencies.

5. An amplifying system adapted to operate at a high frequency comprising an electron discharge device having a cathode, a control grid, a screen grid, and an anode, an input Lecher line tuned to the operating frequency and connected between said cathode and ground, an output Lecher line tuned to the operating frequency and connected between said anode and ground, an auxiliary Lecher line having a length at which said line acts as a capacitance at the operating frequency, said auxiliary line being connected between said control grid and ground and having a capacitive value substantially neutralizing the damping effect of said device on said input Lecher line, and means effecting by-passing said screen grid to ground at the operating frequency.

6. An amplifying system adapted to operate at a high frequency comprising an electron discharge device including within an envelope a cathode, a control grid, a screen grid, and an anode, an input impedance connected between said cathode and said control grid, an output impedance connected between said anode and said control grid, a capacitor connected in parallel with a grid leak disposed within the envelope of said device and electrically interposed between said control grid and said input and output impedances, said capacitor having a value substantially neutralizing the damping effect of said device on said input impedance, and means effectively by-passing said screen grid to ground at the operating frequency.

7. An arrangement as set forth in claim 6 wherein said input and output impedances are each constituted by a Lecher line tuned to the operating frequency.

REFERENCES CITEd

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