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ARRANGEMENT FOR AMPLITUDE REGULATION

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Fig. 1

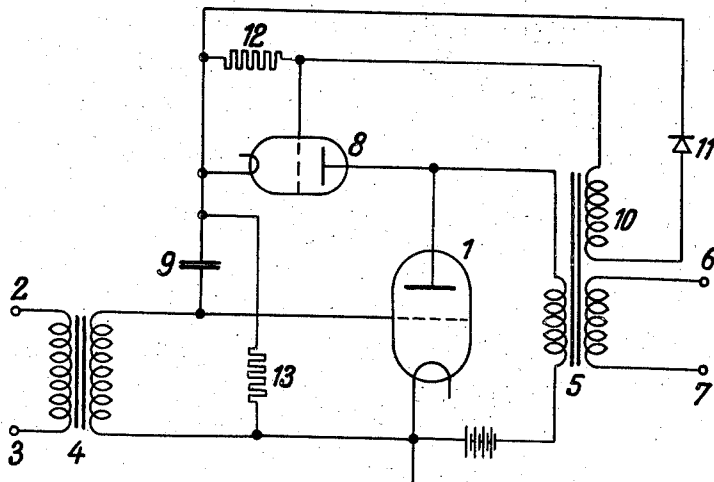
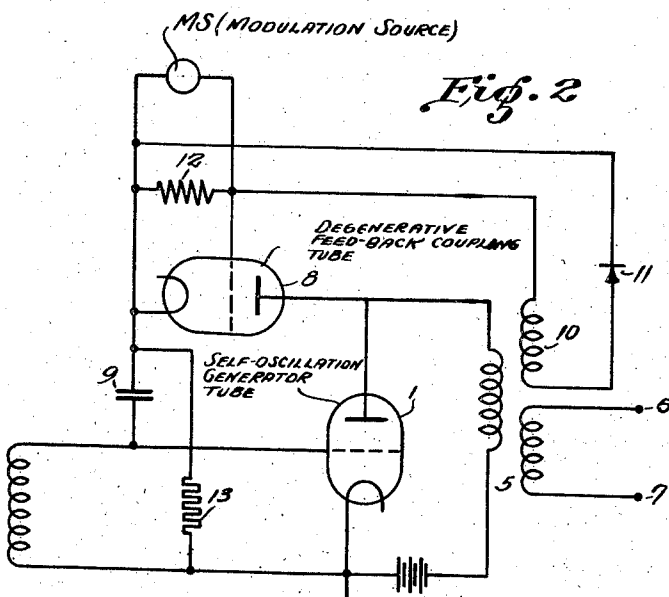


Fig. 2



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ARRANGEMENT FOR AMPLITUDE
REGULATION

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1 Claim. (Cl. 179—171.5)

The amplitude regulation in high frequency or low frequency circuits is in general such that the regulating voltage, in dependence on which the amplitude regulation of an amplifier, for instance, is to be effected, is rectified and that the uni-directional voltage so obtained is made to form the grid bias for an amplifying tube or a number thereof. By varying the regulating voltage the grid bias of the regulating tube is varied, the working point of this tube being displaced into the region of greater or less slope of the characteristic curve.

Regulating arrangements of this type, however, have the drawback that the working point of the amplifying tubes is not invariably located in the linear part of the characteristic curve but is by the regulating voltage displaced also into the curvature thereof. The amplification is hence not effected in linear fashion. As a result, distortions arise especially in the region of smaller amplitudes. Furthermore, in the case of high frequency currents there is the disadvantage that the amplitude regulation entails a variation of the tube resistance and thereby causes the appertaining oscillatory circuits to be detuned.

In order to overcome these drawbacks the invention described hereafter is concerned with a regulating arrangement which is quite different from those of the aforesaid kind. In the novel arrangement the working point of the amplifying tubes is stationary and a counter-coupling, that is to say, a negative reaction coupling over an electron tube is provided. The internal resistance of this counter-coupling tube is controlled in dependence upon the regulating voltage, whereby the counter-coupling is rendered more or less tight. As in the case of a tight counter-coupling, that is, with low resistance of the counter-coupling tube the loudness greatly decreases while increasing with the counter-coupling becoming less tight, an amplitude regulation may be effected in this way. The counter-coupling tube may be controlled in one way or another. For instance, the regulating voltage may be rectified and the continuous voltage so obtained may be used as grid bias. However, the counter-coupling tube may be controlled instead by influencing its anode circuit.

The accompanying drawing shows in Figure 1 a diagram illustrating one embodiment of the invention as applied to an amplifier tube and in Figure 2 the invention is applied to an oscillation generator.

The example shown in Figure 1 has an am-

plifying tube or valve amplifier 1 to the grid circuit of which the voltage to be amplified is conveyed over terminals 2, 3 and a transformer 4, for instance. The amplified voltage is derived over a transformer 5 and terminals 6, 7. It is immaterial of course whether the described amplifying arrangement is a low frequency amplifier or a high frequency amplifier.

In accordance with the invention an electron tube 8 is interposed between the anode circuit and grid circuit of tube 1. The tube 8 causes the current flowing in this anode circuit to react on the grid circuit of tube 1. The feedback phase has to be so adjusted that it shall be in opposition to the phase of a feedback used for the purpose of self-excitation. In the circuit of tube 8 a condenser 9 may be included. Also, an additional resistance 13 may be arranged in a manner to form a potentiometer connection.

Assume the amplifier regulation to be effected in dependence upon the amplified voltage itself in order that the output voltage of the amplifying tube 1 be always the same irrespective of the input voltage. To such end this output voltage is derived over a second secondary winding 10 of transformer 5 and is rectified by a rectifier 11, and further, the uni-directional voltage so obtained is used as grid bias for the counter-coupling tube 8. Such uni-directional or continuous voltage is effective over a resistance 12. The rectifier 11 is so connected that with the amplitude increasing in the anode circuit of tube 1 the grid voltage of tube 8 will be displaced farther in the positive direction, the resistance of tube 8 thus being diminished. The counter-coupling is thereby rendered tight, and the loudness is hence decreased.

The arrangement may of course be such that the control action will occur in the reverse direction, thus entailing a so-called dynamics slope increase. In this case, the polarity of the rectifier 11 has to be changed, and an amplitude increase in the anode circuit of tube 1 then causes the resistance of tube 8 to increase so that the amplitude will be still farther enlarged.

The novel arrangement is not restricted to the regulation of amplifiers but may be employed also in connection with oscillation generators, such as tube buzzers or high frequency transmitters, for example. In the case of arrangements of the latter kind the amplitude of the oscillation produced by the generator may be influenced by varying the counter-coupling in a manner to effect modulation. For instance, in

Figure 2 the tube 1 is connected to act as a self-oscillation generator, and continuous current impulses in the shape of Morse signals supplied from a source MS are conducted to the grid of the counter-coupling tube 8 interposed between the anode circuit and grid circuit of the oscillator tube, then a keying operation acting on the transmitter is effected. By supplying an alternating voltage from source MS a modulation will be obtained.

What is claimed is:

A modulating arrangement comprising a first electron tube having an anode, a cathode and a grid, said first tube being connected in a self-oscillation circuit including an output circuit operatively connected to the anode of the first tube, a second electron tube having an anode, a cathode, and a grid, the anodes of said tubes being connected together, a negative feed-back

circuit between the anode and grid of said first tube including a connection between the cathode of the second tube and the grid of the first tube, means for producing a bias voltage proportional to the amplitude of the oscillatory energy in said output circuit, means for coupling said bias voltage means to the grid of said second tube in a positive sense, whereby an increase in the amplitude of the oscillatory energy in the output circuit of said first tube increases the bias voltage of the grid of said second tube positively, a source of modulating signals, and means for coupling said source of modulating signals to the grid of said second tube to vary the impedance of said second tube in accordance with said modulating signals.

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