

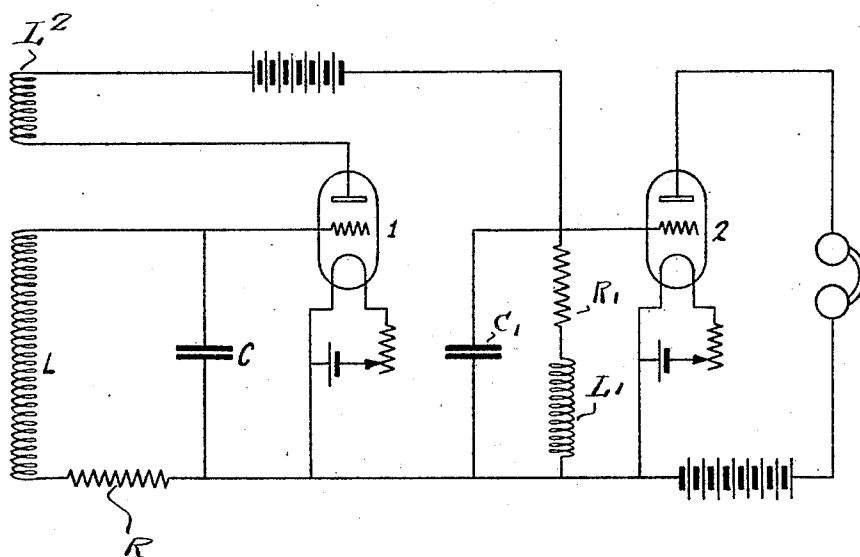
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RADIO RECEIVING APPARATUS

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RADIO RECEIVING APPARATUS.

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This invention relates to radio receiving apparatus and especially to apparatus for receiving modulated waves, particularly waves modulated by telephone currents.

It is well recognized that when the amount of reaction in a regenerative receiver is increased distortion occurs in the reception of modulated waves because an increase in reaction results, in effect, in an increase of selectivity and, therefore, there is a greater reduction in the amplitude of the high side-tones than in that of the lower side-tones.

The object of this invention is to provide receiving apparatus in which the amount of reaction employed may be increased to such an extent as would otherwise lead to undue distortion and therefore prevent satisfactory reception without, however, the occurrence of unpleasant distortion.

According to this invention I employ with a regenerative receiver, means in the audio frequency stage which will increase the amplitude of the higher side-tones, the amplitude of which has been decreased owing to the reaction, more than the amplitude of the lower side-tones, which have been comparatively unaffected by the reaction.

In order to obtain this result I employ in the audio frequency stage a circuit having in it impedances one at least of which is such that the potential fall across it produced by the higher frequencies, which have been reduced in amplitude owing to the reaction, is greater than that which would be produced by the lower frequencies of the same amplitude.

Theoretical considerations tend to show that the best arrangement is to employ in the

anode circuit of the regenerative valve an inductance and a resistance in series, these two elements being connected between the grid and filament of an amplifying valve, and that the constants of the circuits should be so chosen that the ratio of the said resistance to the said inductance should be equal to half the ratio of the lumped resistance of the input circuit of the regenerative valve to the inductance of that input circuit. If this is done, the effect of the higher audio frequency distortion in the regenerative valve will be exactly compensated by the increase in audio frequency amplification of the higher frequencies in the audio frequency amplifier.

Such an arrangement is shown in the single figure of the drawing in which 1 is a regenerative valve and 2 an amplifying valve. The input circuit of 1 is composed of an inductance L and condenser C , the lumped resistance of said circuit being represented by a resistance R . Regeneration in this valve is obtained by an inductance L_2 in the anode circuit of valve 1 coupled to the inductance L in the grid cathode circuit of 1. In the anode circuit of valve 1 and across the grid and filament of valve 2 are connected a resistance R_1 and inductance L_1 which are shunted by a small condenser C_1 acting as a high frequency by pass, the impedance of which to low frequency currents can be reckoned as large compared with R_1 and L_1 . The required correction is obtained by making the ratio of R_1 and L_1 half that of the effective resistance of the circuit CL (taking reaction into account) to L . That is the constants should be so chosen that

$$\frac{\text{Ohmic resistance } R_1}{\text{Inductance } L_1} = \frac{\text{Effective resistance } CLR}{2\pi \text{ inductance } L}$$

I do not, however, limit myself to such an arrangement. In some cases it is desirable to employ a number of tuned circuits of low damping and a corresponding number of audio frequency impedances so chosen as to correct for the reduction of the higher side-tones. Such an arrangement would increase the selectivity without impairing the quality of the reproduction.

Having now particularly described and ascertained the nature of my said invention

and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination of a three electrode vacuum tube having cathode, anode and control electrodes, an input circuit connected between the cathode and control electrodes, an output circuit connected between the cathode and anode electrodes and coupled to the input circuit sufficiently close to produce selectivity which reduces the amplitude of sidebands corresponding to higher tones, said

cathode-anode circuit having a capacity element in parallel with serially connected resistance and inductance elements of such a value that substantially uniform potential drops are produced across the terminals of said parallel connected elements for the side band frequencies.

2. In a regenerative receiver a vacuum tube having anode, cathode and grid electrodes, an input circuit having an inductance L_1 , a resistance R and a capacity C in parallel with said inductance and resistance, connecting said grid and cathode, an output circuit between said anode and cathode, means for causing said output circuit to react on said input circuit, and means including a resistance R_1 and inductance L_1 in said output circuit, so proportioned that the resistance of R_1 divided by the inductance of L_1 equals the effective

resistance of CLR divided by the inductance of $2L_1$, for insuring uniform potential drop across the resistance and inductance in said output circuit at all frequencies.

3. In a regenerative receiver a vacuum tube having input and output circuits, an inductance and resistance shunted by a capacity in said input circuit, means for coupling said output circuit and said input circuit to produce regeneration, and means in said output circuit adapted to control the input circuit of an amplifier including a series resistance and inductance so proportioned with reference to the capacity shunted elements in said input circuit that the amplitude of the potential drop across said series resistance and inductance will be uniform at all frequencies

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