Nov. 2, 1937.

A. HAMMER

2,097,879

RECEIVING ARRANGEMENT

Filed Dec. 21, 1934

Fig. 1

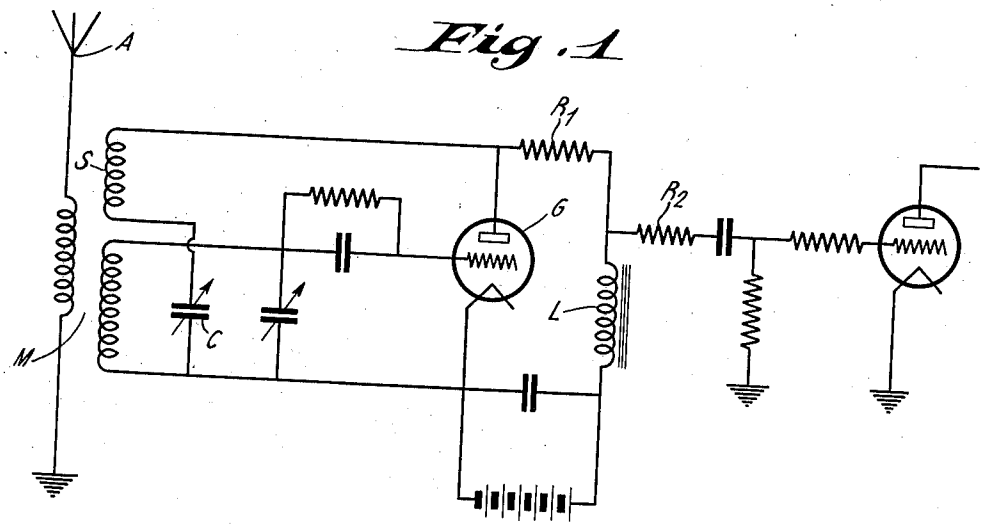
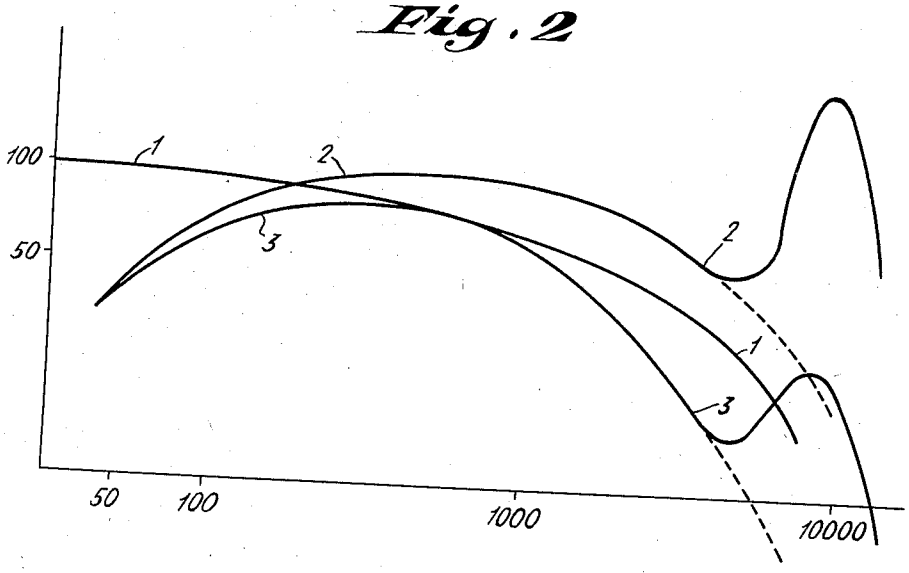


Fig. 2



INVENTOR
ARTHUR HAMMER
BY H. B. Brown
ATTORNEY

Patented Nov. 2, 1937 2,097,879

UNITED STATES PATENT OFFICE

2,097,879

RECEIVING ARRANGEMENT

Arthur Hammer, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

Application December 21, 1934, Serial No. 758,551
In Germany December 23, 1933

8 Claims. (Cl. 250—20)

It is a known fact that upon increasing selectance by making the feedback of a radio receiver closer, the transmission (transfer) of the higher modulation frequencies is impaired. This disadvantage may be compensated only by automatically increasing the gain for the higher modulation frequencies as the feedback is increased.

According to this invention, the suggestion is made to raise the audio frequency amplification of the higher frequencies by so choosing the resonance between the choke coil serving for establishing coupling relations with a higher stage and the condenser serving to regulate the feedback, that it falls within the upper end of the frequency range.

Fig. 1 shows a circuit embodying a practical application of the idea underlying the invention and Fig. 2 is a diagram serving to explain the operation of the circuit. Referring to Fig. 1, G denotes the rectifier tube to which the alternating voltage to be rectified is fed from the antenna A by way of the radio frequency transformer M. The choke coil L, which is contained in the plate circuit, serves for coupling. A resistance R_1 connected to the plate of tube G and a similar resistance R_2 contained in the lead to the grid of the following tube, serve for smoothing the radio frequency. Feedback is established in a parallel branch with coil S and condenser C.

Choke coil L and feedback condenser C are of such dimensions that the natural frequency of the oscillation circuit consisting of the choke and the condenser, in the case of loose regeneration, lies outside the transmitted frequency band; in other words, above 10,000 cycles per second. As the feedback is raised by raising C, this resonance more and more approaches the transmission range, and this, incidentally, means an improvement in the amplification of the higher frequencies.

This will become clear from Fig. 2 where 2 designates the audio frequency curve with high frequency selection, 1 the audio frequency curve pure and simple, and curve 3 the product of the two. The broken portion of the graphs 2 and 3 shows their shape in the case of normal amplifiers. By having recourse to resonance by the tuned choke coil, there result curve portions 2 and 3 indicated by the solid lines where the drop of the high frequencies is avoided. In order to insure suitable damping of the audio frequency resonance peak, recourse may be had to resistances R_1 and R_2.

I claim:

1. A radio receiving circuit comprising a vacuum tube and associated input and output circuits, a feedback circuit including an adjustable reactance for controlling the selectivity of the input circuit, means for compensating for the loss in gain of high tonal frequencies caused by an increase in the selectivity upon increase of feedback, said compensating means comprising an inductance in the output circuit which forms with the adjustable feedback reactance an oscillation circuit resonating at a frequency which for slight feedback lies outside the transmitted audio frequency range and which with increase of feedback is shifted more and more into the transmission range.

2. A radio receiving circuit according to the preceding claim, wherein the audio frequency oscillation circuit has associated with it one or more resistances which serve for radio frequency filtering and at the same time for the damping of audio frequency resonance.

3. A radio receiving circuit comprising a vacuum tube and associated input and output circuits, means including an adjustable condenser for feeding back energy from said output to said input circuit to control the sharpness of tuning, means for compensating for the loss in gain of high tonal frequencies incidental with increase in sharpness of tuning, said compensating means comprising an inductance in the output circuit which forms with the adjustable feedback condenser an oscillation circuit resonating at a frequency which for slight feedback lies outside the transmitted audio frequency range and which with increase of feedback is shifted more and more into the transmission range.

4. A radio receiving circuit according to the preceding claim, wherein the mentioned vacuum tube is coupled to a second tube and the output circuit inductance serves as the coupling means.

5. In combination, a regenerative detector having an adjustable reactance to control the degree of regeneration, an inductance in the plate circuit of the detector serving to couple the same to an audio frequency amplifier, said adjustable reactance and said inductance constituting an oscillation circuit the natural frequency of which varies with the degree of regeneration in such a manner that the natural frequency of the oscillation circuit is outside the tonal frequencies at small degrees of regeneration and within the tonal frequencies at large degrees of regeneration.

6. In combination, a regenerative detector having a tunable input circuit, a feedback circuit including a series connected inductance magnetically coupled to said input circuit and an adjust-

able condenser for controlling the degree of regeneration, a choke coil in the output circuit of the detector serving to couple the same to an audio frequency amplifier, said adjustable condenser and said choke coil constituting an oscillation circuit the natural frequency of which varies with the degree of regeneration in such a manner that the natural frequency of the oscillation circuit is outside the tonal frequencies at small degrees of regeneration and within the tonal frequencies at large degrees of regeneration.

7. The invention defined by the preceding claim wherein a pair of resistances are connected in series with the choke coil, one being included in the detector output circuit and the other being included in the amplifier input circuit.

8. A radio receiving circuit comprising an electronic tube, a tunable input circuit and an output circuit for said tube, means for connecting the input circuit to a source of signalling energy, means for connecting the output circuit to a signal energy utilizing device, said input circuit being linked with said output circuit to facilitate the transfer of energy from said output circuit to said input circuit, an adjustable reactance for controlling the amount of energy transferred from the output circuit to the input circuit and thereby control the selectivity characteristics of the input circuit, means for compensating for the loss in gain of high tonal frequencies caused by an increase in the selectivity upon operation of the adjustable reactance in a direction to increase the amount of energy fed from the output circuit to the input circuit, said compensating means comprising a reactance device in the output circuit which together with said adjustable reactance forms an oscillation circuit resonating at a frequency which at low energy transfer between the output circuit and the input circuit lies above the transmitted audio frequency range and which with increase in the amount of transfer of energy from the output circuit to the input circuit is shifted more and more into the upper portion of the audio frequency transmission range.

ARTHUR HAMMER.