April 21, 1936. K. POSTHUMUS 2,038,236

RADIO RECEIVER

Filed May 20, 1932

Fig. 1

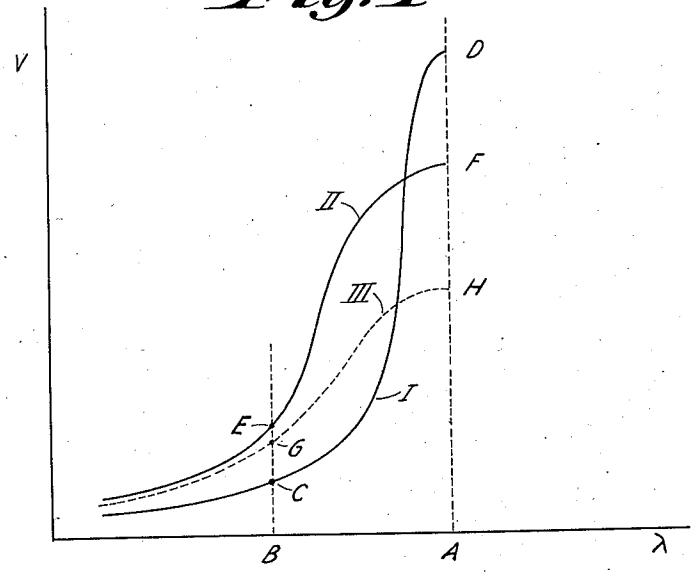


Fig. 2

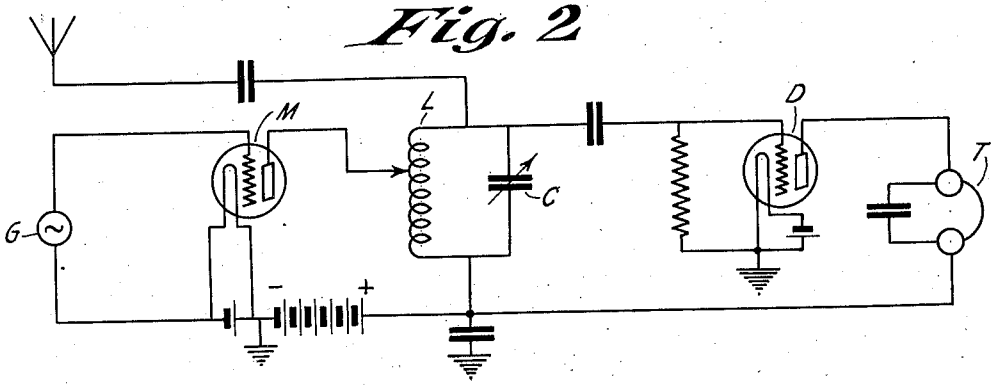
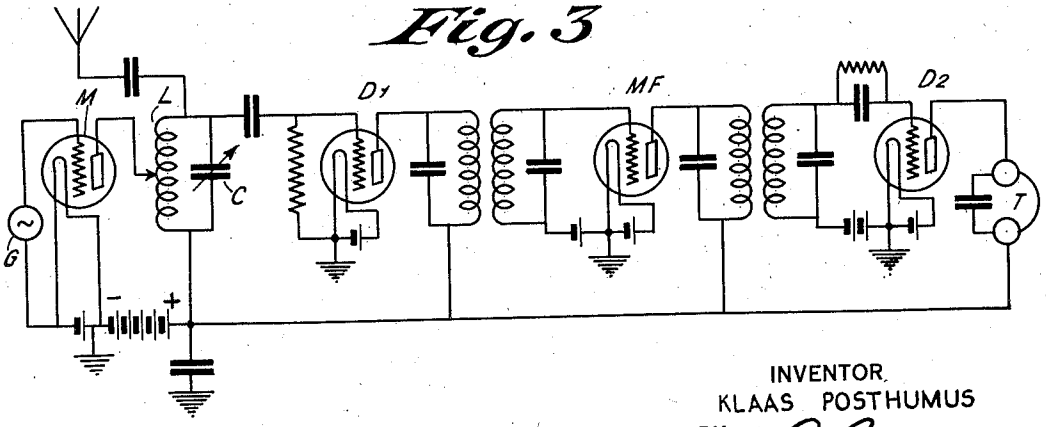


Fig. 3



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RADIO RECEIVER

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6 Claims. (Cl. 250—20)

This invention relates to the selective reception of high frequency electromagnetic oscillations.

As a rule this selection is effected by means of one or more L—C circuits and in order to achieve a sufficient selectivity care is to be taken for a slight damping of this circuit or circuits, since otherwise an undue number of circuits would be required. With telephony-reception, however, one is bound to a certain minimal damping per circuit, since otherwise the high speech frequencies would be cut off.

With telegraphy-reception this limitation does not exist, but when using a circuit having a very sharp resonance curve disturbances will be suffered notwithstanding from a neighboring (in frequency) powerful emitter. In fact, the part of the resonance curve corresponding to the frequency of said disturbing station will lie beside the resonance crest, it is true, but all the same above the zero-axis. Consequently, if the signals transmitted by this station are many times stronger than those of the station which one likes to hear, the reception will be disturbed.

In order to avoid said difficulties it has already been proposed, to connect in opposition two tuning circuits having equal self-inductions and capacities but different dampings. The consideration underlying this method was that the resonance curves of two of such circuits differ materially in the middle only, viz, at the peak, whereas they coincide practically entirely on either side of this peak. Consequently, when connecting in opposition the amplitudes of all frequencies outside the frequency band to be received, are practically equal to zero.

According to the present invention another way of proceeding is followed by giving a single tuning circuit a periodic damping variation. When receiving telegraphy this variation will preferably occur in an audible rhythm and with telephony naturally with an ultra-audible frequency. In this case only the amplitudes of the frequencies falling within the resonance crest within the frequency band to be received (respectively) will vary in the above rhythm, whereas all other frequencies of the varying damping condition of the tuning circuit will practically not be affected.

If this tuning circuit is placed before a detector then with telegraphy the station to be received will be heard in a telephone connected behind this detector in the tone of the variation rhythm. With telephony the ultra-audible frequency (medium or intermediate frequency) must be sifted out in a known manner behind the said detector and a second detector must be used for the low frequency demodulation.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically several circuit organizations whereby my invention may be carried into effect.

The invention will be more clearly understood by reference to the accompanying drawing.

Fig. 1 is a graphical view illustrating the principle of the invention,

Figs. 2 and 3 show forms of construction for telegraphy and telephony reception respectively.

In Fig. 1 the curve I shows the course of the tension at the ends of a good tuning circuit (slight damping) as a function of the frequency applied between said ends. The point A on the abscissa-axis indicates the carrier wave frequency of the station to which the circuit is tuned and the ordinate AD is a measure for the amplitude of this frequency. The point B indicates the frequency of a neighboring station whose power gives rise to disturbances. The signals transmitted by this station will be damped in the proportion AD:BC with respect to those of the desired station. If the field strength of the disturbing station is locally x times greater than that of the desired station, the above damping proportion divided by X represents the intensity proportion of the signals of both stations in the telephone. Consequently, for AD:BC=x both stations are reproduced with equal intensity.

The curve II represents the resonance curve of another circuit having a materially greater damping. This circuit per se would give far worse results than those referred to above, since the proportion AH:BC is much smaller than AD:BC. When increasing the damping of said circuit still more, then the course of the resonance curve will be smoothed still further and acquire, for instance, the form of the curve III. When varying the damping periodically between both values with a frequency n, then intensity variations with this frequency will occur for all carrier wave frequencies, for which the curves II and III do not coincide, and with an amplitude depending on the difference of ordination between said curves.

Since in the case referred to in the drawing it

has been supposed that the ordinate through B is intersected by the curves II and III in two different points E and G respectively, the signals of the disturbing station will be damped in the proportion HF:GE with respect to the desired signals. It will be readily understood that this proportion for the bad circuit II is far better than for the good circuit I. For disturbing stations still more remote from A this proportion becomes far better, and at the point at which II and III coincide completely foreign station cannot disturb at all, however large their local field strength may be.

Fig. 2 shows a simple form of construction of a telegraphy receiver. The circuit arrangement consists of a detector D, in whose grid circuit is inserted a circuit LC tuned to the undamped waves of the station to be received. The damping of the circuit LC is periodically varied by placing a variable part of the coil L in the anode circuit of a triode M, in whose grid circuit is inserted a buzzer or other generator G with an audible frequency. As long as undamped oscillations are received having a frequency to which LC is tuned the buzzer tone is heard in the telephone T.

Fig. 3 is a diagram of an arrangement for telephony. Up to the anode circuit of the first detector D_1 all is the same as in Fig. 2, but in the construction shown in Fig. 3 the generator G must supply an ultra-audible frequency. To this frequency are adjusted both the anode circuit of D_1 and all further tuning circuits placed before the second detector D_2. In the case referred to in this figure medium or intermediate frequency amplification occurs once. The low frequency demodulation is effected by the second detector D_2.

The invention offers in general the advantage that a single tuning circuit, which needs even not be particularly free from damping, affords a selectivity for which otherwise at least two circuits were required. With telegraphy the additional advantage is obtained that it is not necessary for the detector to generate, so that the antenna is not caused to radiate. With telephony the same additional advantage is obtained in comparison with the superheterodyne receiver to which the present arrangement has a slight resemblance externally. Furthermore damping reduction is not necessary since, as stated before, no efforts need be made for rendering the circuit extra free from damping.

While I have indicated and described several systems for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organizations shown and described, but that many modifications may be made without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. In combination a high frequency detector provided with an input circuit resonant to a desired frequency, means including a triode having a source of audible frequency oscillations in its grid circuit for periodically damping said circuit at a predetermined fixed audible frequency.

2. In combination a high frequency detector provided with an input circuit resonant to a desired frequency, means for periodically damping said circuit at a predetermined fixed frequency, said means including a source of electric oscillations and a tube having said source in its grid circuit whereby the tube internal resistance varies periodically, said tube being in shunt with said input circuit.

3. In a radio receiver, a tube provided with an input circuit resonant to a desired signal frequency, a source of oscillations, a tube including said source in its grid circuit connecting said source to said input circuit, the damping of said latter circuit being thereby periodically varied.

4. In a radio receiver, a tube provided with an input circuit resonant to a desired signal frequency, a source of oscillations, a tube including said source in its grid circuit connecting said source to said input circuit, the damping of said latter circuit being thereby periodically varied, a detector, and at least one tuned circuit, between said first tube output circuit and the detector input circuit, resonant to the frequency of said source.

5. In a radio receiver, a tube provided with an input circuit resonant to a desired signal frequency, a source of super-audible oscillations, a tube including said source in its grid circuit connecting said source to said input circuit, the damping of said latter circuit being thereby periodically varied.

6. In a radio system, an antenna circuit, a repeater tube provided with a tuned input circuit and a tuned output circuit, means coupling said antenna circuit to said tuned input circuit, means for varying the frequency of said tuned input circuit over a predetermined band of frequencies, a thermionic device, connections for including at least a part of said tuned input circuit in the output circuit of said thermionic device, a source of oscillations in the input circuit of said thermionic device, said thermionic device acting as a variable resistance for periodically damping said tuned input circuit at the frequency of said source of oscillations, means for tuning said tuned output circuit to the frequency of oscillation of said source of oscillations and a utilizing circuit coupled to said tuned output circuit.

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