

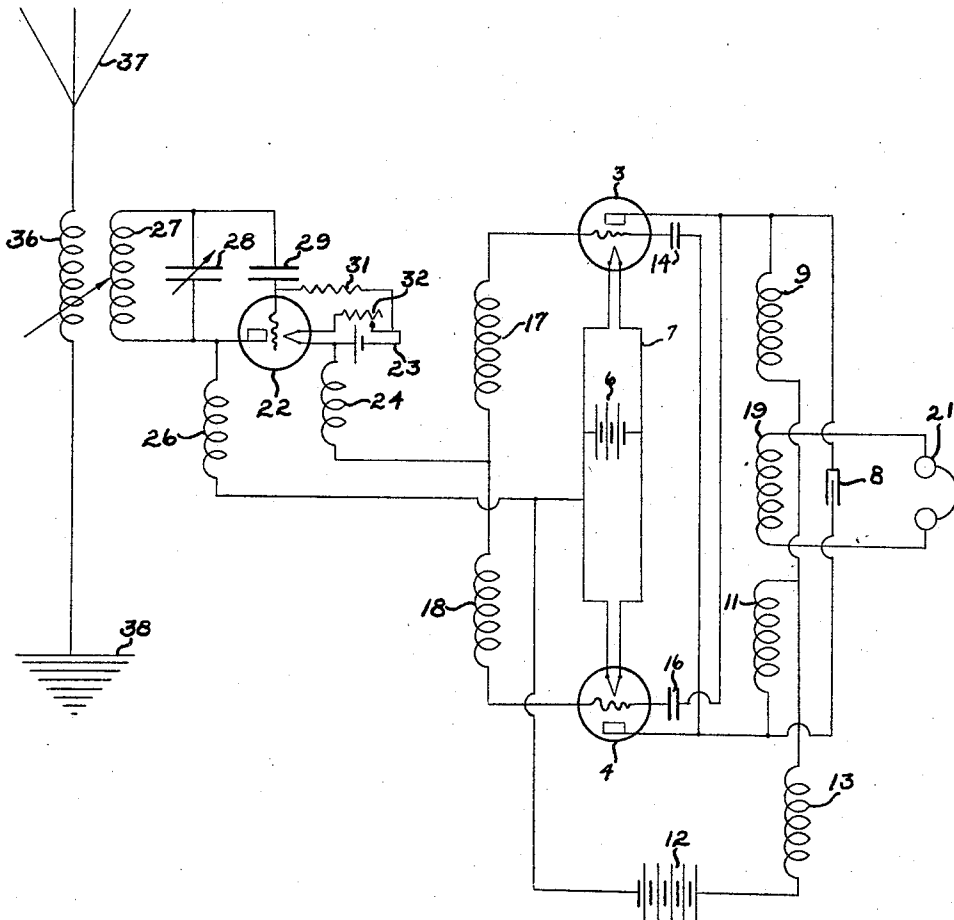
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RECEIVER FOR CONTINUOUS WAVES

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RECEIVER FOR CONTINUOUS WAVES

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My invention relates to receivers for radio waves, and particularly to receivers for continuous waves of high frequency and short wave lengths.

5 Among the objects of my invention are: First, to provide a receiver which will translate the received wave into electrical oscillation of a definite predetermined frequency; second, to provide a receiver for continuous
10 waves which does not produce interfering oscillations or waves of the same order of frequency as the received signal; third, to provide a receiver capable of practically unlimited amplification; and fourth, to provide
15 a receiver which is simply and easily adjustable.

My invention possesses numerous other objects and features of advantage, some of which, with the foregoing, will be set forth
20 in the following description of my invention. It is to be understood that I do not limit myself to this disclosure of species of my invention, as I may adopt variant embodiments thereof within the scope of the claims.

25 Radio telegraph signals are transmitted with maximum efficiency and minimum of interference by the continuous wave or "CW" system. This system may be described from one point of view as the transmission of
30 trains of waves corresponding to the telegraphic dots and dashes, the trains being of constant amplitude, i. e., the trains are not themselves modulated. The customary translating device for making the signals in-
35 telligible is a telephone receiver, but since the waves are high above audible frequency some method must be used for first converting the high frequency oscillations into oscillations of low frequency, at the same time
40 preserving the "group frequency" or dot and dash formation. Moreover, in short wave or high frequency telegraph transmission the vacuum tube amplifiers used are very inefficient at the frequency of transmission,
45 and hence, even though it may be desirable to use graphic or other methods of recording rather than the customary phones, it is desirable to translate the incoming wave trains into lower frequencies before amplification.

50 Broadly considered, my invention com-

prises a generator capable of producing oscillations of the required low frequency. Means are provided for normally blocking the operation of this generator, and the received oscillations or waves are applied to
55 release this blocking means. Preferably the blocking means comprise a trigger tube which forms a grid leak for the oscillator, and the received waves are applied to the grid of this tube to permit the grid current
60 required for the oscillator operation to flow.

The drawing is a circuit diagram showing one form of the receiver of my invention.

The form of my invention here shown comprises an oscillator using a pair of vacuum
65 tubes 3 and 4, having the customary anode, control electrode, and cathode or filament, the latter being energized by the battery 6 through a filament circuit 7. Connected to the tubes is an oscillating circuit comprising
70 a condenser 8 and two inductance coils 9 and 11 which are arranged to have zero mutual coupling. The plate of the tube 3 is connected to the inductance coil 9, and the plate of the tube 4 is connected to the coil 11. Di-
75 rect current for the tube is supplied from a suitable source 12 through a choke coil 13 connected to the junction point of the two inductances.

The control electrode of the tube 3 is con-
80 nected through a blocking condenser 14 to the plate of the tube 4; the control electrode of the tube connects through a similar blocking condenser 16 to the plate of the tube 3. The two control electrodes are connected to-
85 gether through the choke coils 17 and 18.

A coil 19, coupled to the coil 11, draws energy from the oscillating circuit and delivers it to the translating device which is exemplified by the head phones 21.
90

In order that such an oscillator may operate it must be provided with a grid leak, as otherwise the control electrode will promptly become so negative as to permit no current to flow. Such a leak is provided by the
95 tube 22 which has a filament circuit 23 connected through a high frequency choke 24 to the junction of the choke coils 17 and 18. The plate of this tube is connected through a second choke 26 with the oscillator filament 100

circuit 7. The negative charge accumulated by the control electrodes of the oscillator tube provides the plate potential for the tube 22.

5 A parallel oscillating circuit comprising an inductor 27 and variable condenser 28 is connected between the plate and control electrode of the tube 22 through a blocking condenser 29. A grid leak 31 connects with the
10 filament circuit 23 in such manner that the voltage drop through a rheostat 32 provides a negative bias which blocks current flow through the tube. The receiving circuit is coupled in the usual manner through a coil
15 36 to a circuit comprising the antenna 37 and ground 38 or other suitable absorbing circuit.

It will be noted that the receiving circuit 27—28 is of the regenerative type, since plate
20 and control electrode are connected to points of opposite potential. It is to be understood that this circuit is preferably not permitted to oscillate, and that if desired a nonregenerative circuit may be used, the incoming signals being impressed between filament and
25 grid of the tube 22 in the usual way.

The tube 22 may be referred to as a trigger tube. Its connection is such that it normally permits no current to flow, and the oscillator
30 is therefore normally blocked. When a received signal is impressed upon the grid of the trigger tube its positive swings permit a flow of current between the oscillator control electrode and the filament circuit 7, releasing
35 the oscillator and permitting it to operate. When the signal cases the oscillator immediately blocks again.

The circuit may be considered either as a self-blocking oscillator with releasing means
40 provided, or as a normal oscillator to which blocking means are added. Either of these views is correct, but one or the other may be preferable for purposes of description.

It is not essential that the oscillator operate at audio frequency. Instead of its output being applied directly to the phones or
45 other translating device, this output may be amplified at an intermediate frequency and the amplified signal applied to the grid of a second trigger tube controlling an audio frequency oscillator. The reduction of frequency by multiple stages is sometimes advisable, but does not differ in principle from
50 the single stage reduction here shown.

It is to be noted that the frequency of the oscillator is fixed, and does not depend in
55 any way upon the frequency of the incoming signal as is the case with the heterodyne method of reception. For this reason only the receiving circuit and not the oscillating
60 circuit need be provided with variable tuning devices, and maximum amplification may be obtained by making the translating device sharply responsive to the amplifier frequency. Moreover, the frequency of the os-

cillator is not of the same order as that of the received waves, and hence it does not generate waves which may cause interference with other signals.

Although I have shown a specific form of
70 oscillator circuit and a specific form of receiving circuit these specific forms are not essential to the operation of my invention; any form of oscillator in which the control
75 electrode may be isolated or controlled through a trigger tube may be used, and any form of a regenerative or nonregenerative receiving circuit may be connected to the trigger tube.

I claim:

1. A receiver for continuous waves comprising a self-blocking oscillator, a trigger
80 detector tube having a control electrode and a plate circuit connected to permit a current flow releasing said oscillator, and a regenerative detector circuit associated with said control
85 electrode and arranged normally to block said current flow and to release said current flow when a received wave is impressed thereon.

2. A receiver for continuous waves comprising a self-blocking oscillator having a
90 cathode and a control electrode, a trigger detector tube having a plate circuit connected between the cathode and control electrode of said oscillator, said trigger detector tube also
95 having a control electrode, and a regenerative circuit including a blocking condenser associated with the control electrode of said trigger tube and arranged normally to block
100 current flow in the plate circuit of said tube and to release said flow when a received wave is impressed thereon.

3. A receiver for continuous waves comprising a vacuum tube oscillator for generating
105 a frequency lower than that of the waves to be received, a trigger detector tube forming a grid leak for said oscillator and having a control electrode, and a regenerative circuit including a blocking condenser connected
110 to said control electrode and arranged normally to block current flow through said trigger tube and to release said flow when a received wave is impressed thereon.

4. A receiver for continuous waves comprising a vacuum tube oscillator for generating
115 a frequency lower than that of the waves to be received, a trigger detector tube forming a grid leak for said oscillator and having a control electrode, and a regenerative circuit including a blocking condenser connected
120 to said control electrode and including means for impressing a potential on said control electrode sufficient normally to block current flow through said trigger tube.

5. A receiver for continuous waves comprising an oscillator having a cathode and a
125 control electrode, a trigger detector tube having a cathode, an anode and a control electrode, the cathode of said trigger tube being

connected to the oscillator control electrode and the anode of said trigger tube being connected to the oscillator cathode, a regenerative receiving circuit connected to the trigger
5 control electrode, and means for impressing a mean potential on said trigger control electrode sufficient substantially to block current flow through said trigger tube.

6. A receiver for continuous waves comprising an oscillator, a trigger tube forming
10 a grid leak for said oscillator, and a receiving circuit regeneratively connected with said trigger tube.

In testimony whereof, I have hereunto set
15 my hand.

RALPH M. HEINTZ.

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