Sept. 25, 1928. 1,685,763

L. COHEN

RADIO RECEIVING SYSTEM

Filed May 11, 1923

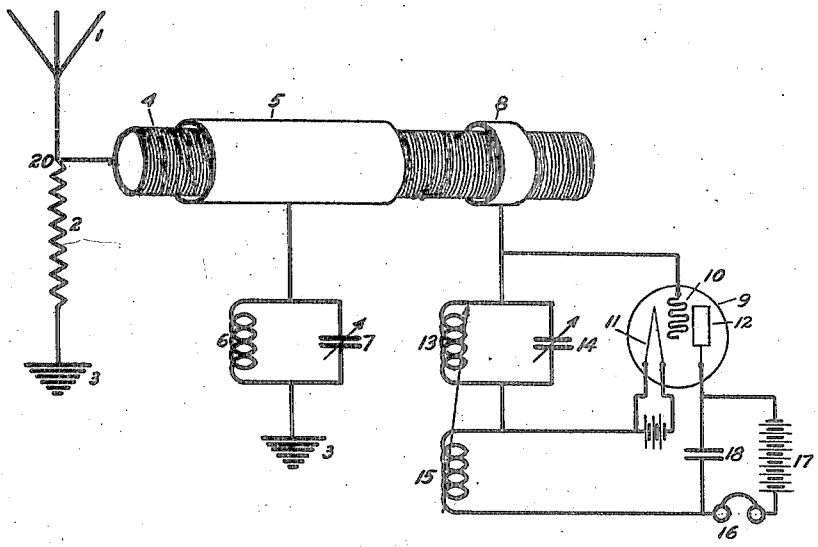

FIGURE-I.

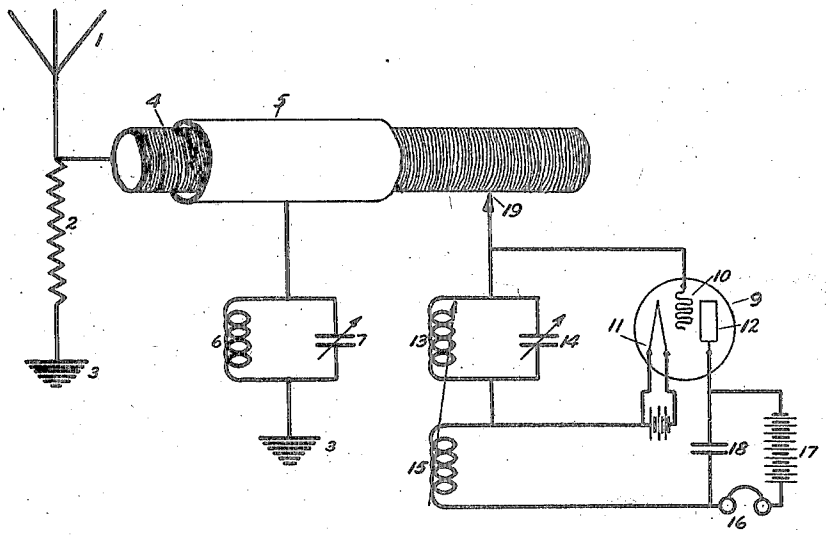

FIGURE-II

Inventor

LOUIS COHEN

Witnessed

J. H. Harmon

By Robert H. Young

Attorney

Patented Sept. 25, 1928. 1,685,763

UNITED STATES PATENT OFFICE.

LOUIS COHEN, OF WASHINGTON, DISTRICT OF COLUMBIA.

RADIO RECEIVING SYSTEM.

Application filed May 11, 1923. Serial No. 638,257.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757.)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon pursuant to the provisions of the act of March 3, 1883, c. 143; U. S. Statutes, XXII, p. 625, as amended by the act of April 30, 1928.

This invention relates in general to the art of radio signalling and more particularly to an improved system for receiving radio signals.

The object of the present invention is to provide means for the elimination of foreign electrical disturbances in the reception of radio signals, and thus insure greater reliability in radio communication.

In the Patents 1,493,024, May 6, 1924; 1,538,466, May 19, 1925; and 1,504,570, August 12, 1924, issued jointly to Louis Cohen and Joseph O. Mauborgne, the reception of radio signals are described, and the theory and principles of operation explained. This present invention is a modification of the ideas embodied in the applications referred to, in that an aperiodic antenna is employed, which offers additional advantages in facilitating the elimination of undesirable electrical disturbances in the reception of radio signals. Briefly the method employed here consists in using an untuned high resistance antenna and connecting a wave coil together with other auxiliary circuits to a selected high potential point on the antenna, the circuits of the wave coil system being so adjusted as to permit the waves of the signal energy to be propagated along the wave coil without any attenuation, while waves of frequencies differing from the frequency of the signal energy are attenuated in their propagation along the wave coil. When a static impulse strikes the antenna, it will not assume an oscillatory character because the antenna is an aperiodic system; the effect will exhibit itself in the form of a damped impulse discharge, most of the current of the static impulse in the antenna leaking away to ground through the high resistance of the antenna. Any potential of the static effect which may be impressed on the wave coil, will again be of an entirely different character from that of the signalling wave energy, and will be attenuated in a very marked degree in its propagation along the wave coil. This method offers a very effective means for eliminating from the receiving instruments all undesirable electrical effects which may be due to static or any other foreign disturbances.

A more detailed explanation of the method is given in connection with the accompanying diagrams, discussing the functions of all of the elements of the system. In the accompanying drawings:

Figure 1 is a diagrammatic view of the invention illustrating the principles of the method employed and in which the detector circuit is connected eletrostatically to the wave coil.

Figure 2 is similar to Figure 1, except that the detector circuit is directly connected to the wave coil.

Having particular reference to the drawings and in which like numbers designate similar elements in both figures, in Figure 1, 1 is an antenna, 2 is high resistance, 3 is a ground connection, 1, 2, 3, constituting the antenna circuit. 4 designates a wave coil which is partially enclosed in a metal tube 5, this metal tube being grounded through a loop circuit consisting of a variable inductance 6, and a variable capacity 7, the two being joined in parallel. 8 is a metal ring placed on the end section of the wave coil 4 and serves as the electrostatic connection of the detector circuit to the wave coil; this metal ring is connected to the grid 10 of the three electro-vacuum tube 9. The circuit of inductance 13 and capacity 14, together with the coupling coil 15, is shown here to indicate a means for producing local oscillations which may be sometimes required to interact with the received signals to produce beats and thus making the signals audible. This, however, is merely shown here as one form of circuit arrangement for beat production; other arrangements could be used just as effectively. The present invention is not concerned with methods for beat production to make the signals audible. In using this arrangement for the reception of telephonic signals the local oscillations are, of course, altogether unnecessary; a simple detector connected to the wave coil will serve the purpose. Amplifiers, either radio frequency or audio-frequency, can be used as desired.

The principle of operation is as follows: When the signal wave energy acts on the antenna, a current flow is set up in the antenna and a potential produced at the terminal 20

of the antenna. The loop circuit 6, 7, is adjusted to be in resonance for the frequency of the signal desired to receive and thus offers a very high impedance to ground for the signals, that is, the signal wave energy in its travel along the wave coil 4 will not leak off to the ground through the capacity between the coil and the metal tube 5, because the impedance between metal tube and ground is very high for this particular frequency, and as a consequence the potential effects of the signals are propagated along the wave coil without practically any attenuation, with the result that the potential at the end of the coil due to the signal energy is comparatively large and can thus actuate the potentially operated detector which is coupled electrostatically through the ring 8 to the wave coil 4. Any foreign electrical disturbance acting on the antenna will not assume an oscillatory character at all, and at the most, if any oscillations at all are generated, they will be of a highly damped character, and of frequencies different from the signal frequency. For such currents the loop circuit 6, 7, offers a low resistance path and the current in its travel along the wave coil is by-passed to the metal tube and then to ground through the loop circuit. As a consequence these effects are very sharply attenuated in their travel along the wave coil and practically nothing remains by the time the end of the coil is reached to affect the detector and interfere with the signals it is desired to receive.

Figure 2 is similar to Figure 1, except that the grid of the vacuum tube in this case is directly connected to a suitable point 19 on the wave coil. The principles of operation do not differ from those described in connection with Figure 1.

The diagrams shown in this application are merely illustrations of the embodiments of this invention, and many other modifications can be used, of course, without departing from the spirit of the invention.

What is claimed is:

1. In a radio receiving signalling system wherein the signals are received on a high resistance untuned antenna circuit, means for transmitting the effect produced on the said antenna to a wave coil electrically associated with said antenna, an indicating instrument electrically associated with the said wave coil for detecting said signals.

2. A radio receiving system comprising a high resistance antenna circuit and a wave coil, said antenna circuit being adapted to transmit potential effects developed thereon to said wave coil along which latter said potential effects are propagated, a loop circuit tuned to the frequency of the signal which is desired to be received, said wave coil being enclosed in a metal tube which is grounded through said tuned loop circuit, and an indicating instrument electrically associated with said wave coil for detecting the signals received.

In testimony whereof I affix my signature.

LOUIS COHEN.