Feb. 4, 1930. R. S. OHL 1,745,376

SHORT WAVE RADIORECEIVER

Filed Dec. 31, 1924

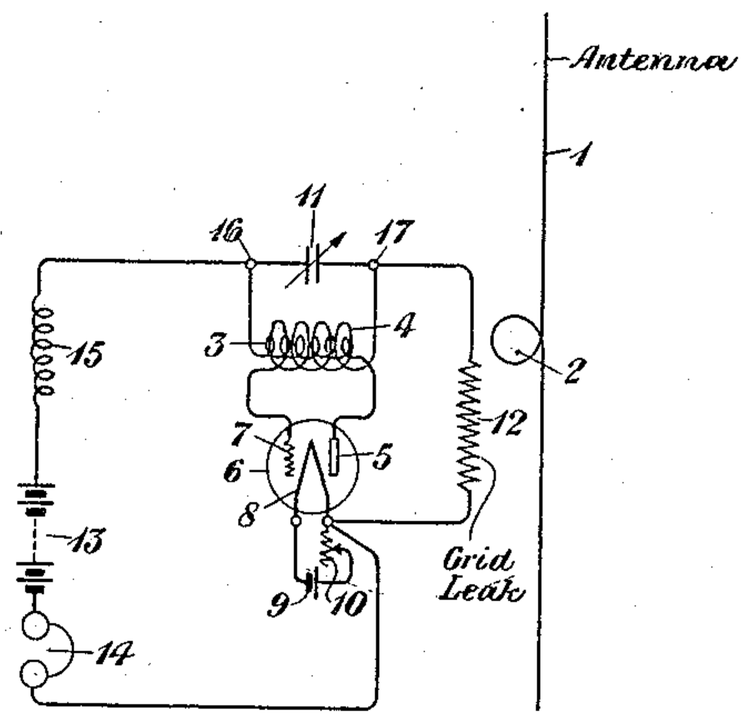

Fig. 1

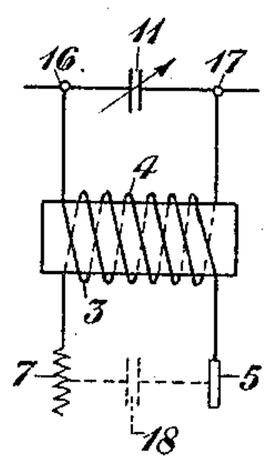

Fig. 2

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SHORT-WAVE RADIORECEIVER

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This invention relates to radio receiving systems and particularly to a system of that type which is adapted to receive radio signals transmitted by oscillations having a wave length of the order of 2 to 3 meters.

Radio receiving systems that have been devised and used for the reception of signals transmitted by oscillations of relatively long waves, as, for example, of the order of 300 to 500 meters, are not well adapted for receiving extremely short waves of the order of 2 to 3 meters. There are several causes for such inability or inefficiency of the long wave receivers when used for short wave reception. The principal cause of failure resides in the capacitance of the various parts of the long wave receiver which becomes a serious factor in receiving signals of the frequency of 100,000 kilocycles.

One of the objects of this invention is to provide a receiving circuit for a short wave signaling system, of the order of from 2 to 3 meters, which system is free from the detrimental effects present in long wave receivers when used for short wave reception.

This and other objects of the invention will be apparent from the following description when read in connection with the attached drawing, of which Figure 1 shows schematically a form of embodiment of the invention, and Fig. 2 is a detail of Fig. 1 illustrating the mode of winding the tuning inductance shown in Fig. 1.

In Fig. 1, the antenna 1, which is made up of a straight wire disconnected from the ground, is coupled to the receiving circuit by means of the single turn 2 in the middle of the wire constituting the antenna. The total length of the wire should be about one-half the wave length of the signals to be received. The receiving circuit, which is a detecting circuit, comprises a tuning inductance made up of the coils 3 and 4, which coils are inductively related each to the other, and to the single turn 2 of the antenna. The coil 3 is connected with the plate 5 of the vacuum tube 6, and the coil 4 with the grid 7 of the said tube. The filament 8 is activated by the source 9 of direct current, the magnitude of which is controlled by the resistance 10. A variable condenser 11 is connected between the terminal 16 of coil 3 and the terminal 17 of coil 4. A resistance 12 of low capacity is connected between the filament 8 and the terminal 17 of coil 4, the said resistance acting as a grid-leak to the detector tube. Connected between the said filament and the terminal 16 of coil 3 is the signal indicating circuit comprising a receiver 14, a source of plate voltage 13 and an inductance 15. This inductance should have low distributed capacity and should be of very high impedance for the frequencies used, thus serving as a choke coil to keep the high frequencies out of the low frequency circuit. The manner of constructing the tuning inductance 3—4 is clearly shown in Fig. 2. Each coil should be made of heavy copper wire, for example, of No. 14 B. & S. hard drawn wire so as to be self-supporting. The turns should be evenly spaced and the coils should be wound in the same direction.

The manner in which the circuit functions as a detector will be apparent by considering the detail shown in Fig. 2. In this figure, the capacity between the grid 7 and the plate 5 is represented by the dotted condenser 18. The resonant circuit may be traced from the terminal 16 through the coil 3 to the plate 5, thence through the capacity represented by 18 to the grid 7, thence through the coil 4 to the terminal 17, and finally through the variable condenser 11 to the terminal 16. The condenser 11 should be adjusted until a condition of resonance is created at the signaling frequency. The incoming oscillations upon which the signal to be detected is superimposed will be impressed by the turn 2 of the antenna upon the tuning inductance. These oscillations will be detected in the receiving circuit, and the resultant signal will be impressed upon the signal indicating device 13 connected with the plate-filament circuit.

As will be seen, the detector circuit is of the type having a condenser in the grid lead, and a grid leak. The detecting action obtains by using the properties of the vacuum tube, operating it upon the curved portion of the grid-voltage, grid-current characteristic and

upon the straight portion of the grid-voltage, plate-current characteristic. This method of detecting signals is well known to those skilled in the art and is described in various text-books so that it seems unnecessary to describe it herein.

As an aid in working the invention heretofore described, it may be stated that in a radio receiver intended for the reception of waves of about two meters, the variable condenser 11 should preferably have a micrometer adjustment and should be of maximum capacity of about 45 mmf, and of minimum capacity of not more than about 5 mmf. This permits about 200% variation in wave length. The resistance 12 should be a low capacity 2 megohm element, and, as stated, the choke coil 15 should be of low capacity and high impedance. The invention is not limited to the reception of waves of 2 or 3 meters since other wave lengths may be received by apparatus embodying my invention.

A receiving system of the type described should preferably be elevated above the earth in order to improve the receiving efficiency. When this is done, the leads supplying the current to the filament of the tube should also have a high impedance choke coil in each in order to suppress the transmission therethrough of the high frequencies.

While this invention has been disclosed as embodied in a particular form, it is to be understood that it is capable of embodiment in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. An oscillation detector for short waves comprising a vacuum tube having a plate, a grid and a filament, two mutually inductive coils one connected with the plate and the other with the grid of the said tube, a source of plate potential effectively connected with the plate coil, a grid leak resistance connected with the grid coil, and a variable tuning condenser having one side connected with the plate circuit between the plate coil and the said source of potential, and having its other side connected with the grid circuit between the grid coil and the grid leak resistance.

2. An oscillation detector for short waves comprising a vacuum tube having a plate, a grid and a filament, a circuit connecting the said plate and the said filament including an inductance coil, a source of plate potential, an indicating device and a choke coil operative to suppress high frequency oscillations, a circuit connecting said grid and said filament including an inductance coil and a grid leak resistance, the coils of the plate circuit and the grid circuit being mutually inductive, and a variable condenser connected between the plate-filament circuit and the grid-filament circuit, the point of connection with each circuit being at or near that terminal of the inductance coil that is nearer the said filament.

In testimony whereof, I have signed my name to this specification this 30th day of December, 1924.

RUSSELL S. OHL.