

July 10, 1928.

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1,676,748

MEANS FOR RADIO SIGNALING

Filed June 16, 1924

Fig. 1,

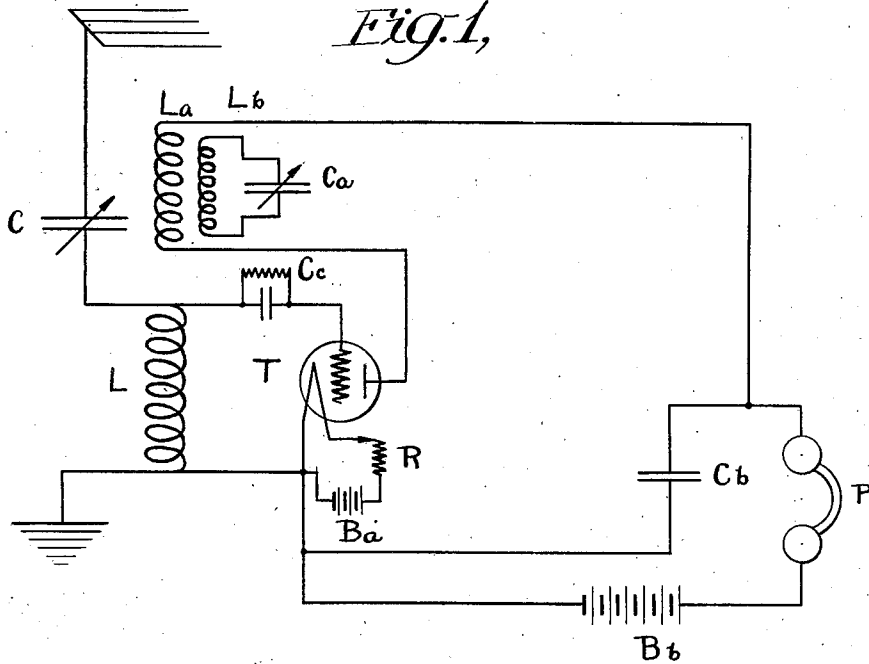
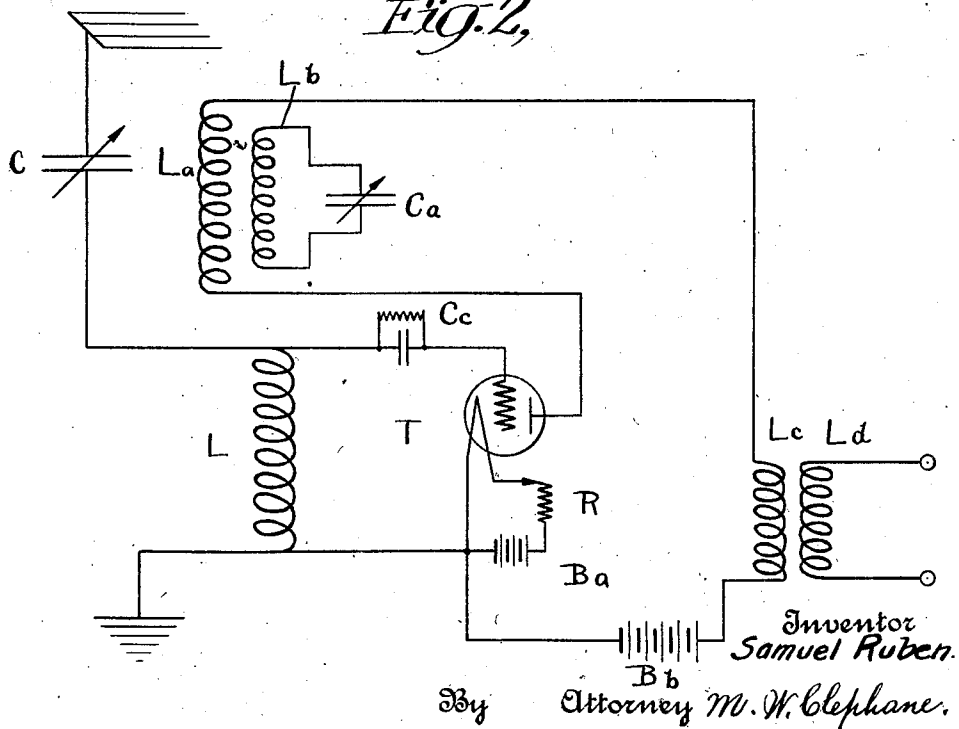


Fig. 2,



UNITED STATES PATENT OFFICE.

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MEANS FOR RADIOSIGNALING.

Application filed June 16, 1924. Serial No. 720,341.

This invention relates generally to radio signaling, and more particularly to apparatus and methods useful in receiving systems.

5 An important object of the invention is to reduce interference of any intensity, with the reception of radio signaling, due to what is known as "static" or to any undesirable waves radiating from other sources, and to accomplish this result by a means which is simple both in construction and operation.

10 Another important object of the invention is to provide a means for obtaining a high degree of selectivity in receiving systems, and especially in those employing single circuit resonance systems.

15 These and other objects and advantages are attained by neutralizing all of the undesired oscillations received, by coupling to the tuned antenna circuit an opposing feed-back circuit, and to that a resonance circuit tuned to the desired frequency, thus neutralizing or reducing any effect of such undesirable oscillations on the plate or utilization circuit, and selectively permitting the oscillations of the desired frequencies to affect the responsive device in the utilization circuit.

20 Broadly, the principles of the invention rest upon the neutralization of oscillations in the input circuit by means of a negative feed-back thereof, by which their effect in the utilization circuit is greatly reduced and, by employing a resonance circuit conductively or inductively coupled to the negative feed-back plate circuit inductance tuned to oscillations of the desired frequencies.

25 In a typical embodiment of the invention the desired results are achieved by employing in the tuned antenna circuit an inductance coupled to an inductance in the plate circuit of a detector device in the utilization circuit, in which latter circuit the received oscillations are negatively fed back to the input circuit, neutralizing impressed oscillations of all frequencies and other characteristics, and using in inductive relation to the negative feed-back inductance a resonance circuit which, when tuned to the desired frequency, prevents the neutralization of the oscillations of that wave length, due to the fact that the negatively directed energy which would otherwise be induced into the input circuit from the resonance circuit is, instead, induced into this tuned

resonance circuit thereby reducing the effective inductance of the negative feed-back coil, thus permitting those oscillations to discharge through the plate or utilization circuit.

The principles of the invention will be further apparent from the accompanying drawings which illustrate diagrammatically certain practical embodiments thereof. In these drawings,

Fig. 1 is a diagrammatic showing of a single circuit receiving system embodying the invention. Fig. 2 illustrates an application of the principles of the invention to a receiving system employing amplification means.

Referring to the drawings in detail, C is a condenser for tuning to resonance the antenna-ground circuit with inductance L connected therein. T represents a vacuum tube device in the system, B_a and B_b being batteries respectively for energizing the tube filament and for maintaining a potential between the filament and the plate, R being a variable resistance in the filament circuit and P and C_o respectively representing a telephone receiver and a condenser in the utilization circuit. C_c is a bypass condenser and L_a an inductance coil in the plate circuit in which the current is fed back negatively with respect to the coil in the input circuit. Coupled to inductance L_a is inductance L_b in a resonance circuit tuned by condenser C_a. In Fig. 2 L_c and L_d are respectively the primary and secondary elements of an audio frequency transformer in an amplification circuit.

In operation, the antenna-ground circuit is tuned to resonance, and as oscillations, including those due to static and other sources, are impressed upon the tube control element they produce equivalent variations in the plate circuit through which the received oscillations are fed back through inductance L_a in a direction opposed to that of the oscillations in the input circuit, which are thereby neutralized, any response thereto being thus greatly reduced. But when the resonance circuit, to which the feed-back circuit is coupled through inductance L_b, is tuned to the desired frequency, the fed back oscillations of that frequency are absorbed in that circuit and the energy thereof is prevented from being fed back in the plate circuit in the negative directions; so that there is response thereto in the translating

device, the telephone receiver P. This response is only as to oscillations of the frequency to which the resonance circuit is tuned, all forced oscillations, except that of the same frequency, and other interference, being reduced by the opposed relation between the oscillations in the input circuit and the fed back oscillations of the output circuit.

10 The operation of the invention as shown in Fig. 2 is the same as of that shown in Fig. 1, except that the output circuit energy is applied to the audio frequency transformer for multistage amplification, which also applies where radio frequency amplification is employed.

What I claim is:

1. In a radio signaling system, the combination, with a resonant grid circuit upon which high frequency oscillations are impressed, of a plate or output circuit arranged to feed back in opposite polarity to the impressed oscillations in said resonant grid circuit, and of a third circuit coupled to said output circuit and adapted to be tuned to resonance with oscillations of the desired frequencies.

2. In a radio receiving system, the combination, with a resonant grid circuit upon which radio oscillations of high frequency are impressed, of a plate or output circuit arranged to feed the oscillations back to the resonant grid circuit in reverse to those oscillations, of a third circuit coupled to said plate or output circuit and means for selectively absorbing oscillations of the desired frequencies from said output circuit.

3. The method of detecting high-frequency electrical oscillations impressed upon a resonant grid circuit electrically connected in a radio receiving system with the control element of a vacuum discharge device, having a cathode, a control element and a plate element, the cathode and plate elements being connected by an external circuit, and having another circuit coupled to the external circuit, which consists in negatively feeding back the oscillations in the cathode-plate circuit from said device to the grid circuit and tuning a circuit coupled to the cathode-plate circuit, to resonance with desired high frequency oscillations.

4. The method of detecting high-frequency electrical oscillations impressed upon a resonant grid circuit connected in a radio receiving system with the control element of a vacuum discharge device, having a cathode, a control element and a plate element, said cathode and plate elements being connected by an external circuit, and having another circuit coupled to the external circuit, which consists in causing the oscillations in said resonant grid circuit to be neutralized by negatively feeding back to the resonant grid circuit the oscillations in the cathode-plate circuit and tuning a circuit coupled to said cathode-plate circuit, to resonance with the impressed oscillations of the desired frequency.

Signed at New York city in the county of New York and State of New York this 14th day of June A. D. 1924.

SAMUEL RUBEN.