Feb. 18, 1936. R. W. GEORGE 2,031,103

ULTRA SHORT WAVE RECEIVER

Filed Jan. 11, 1933

Fig. 1

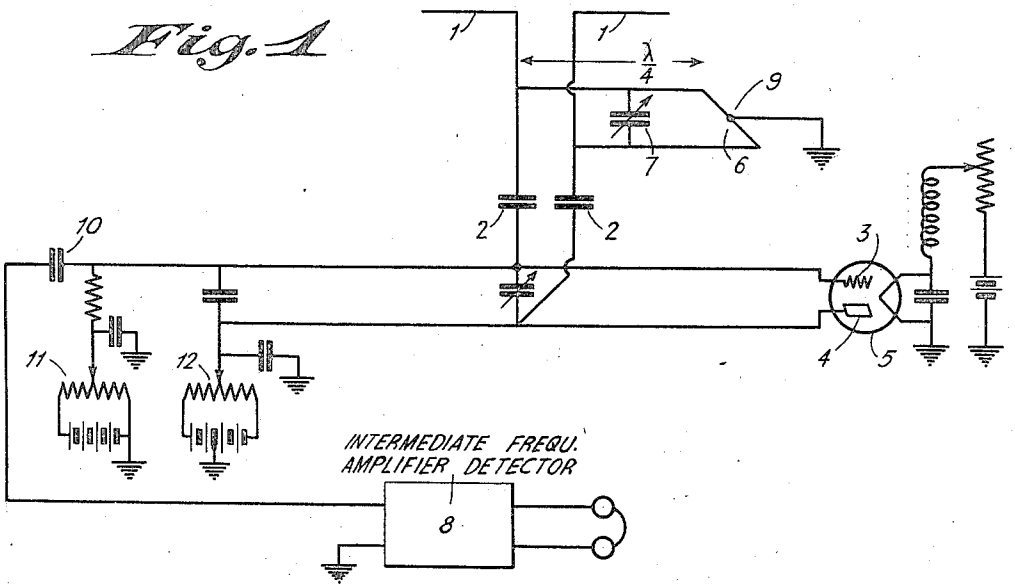


Fig. 2

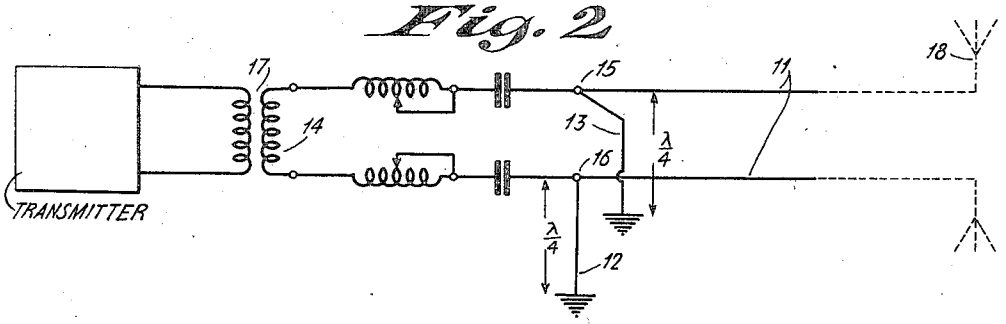
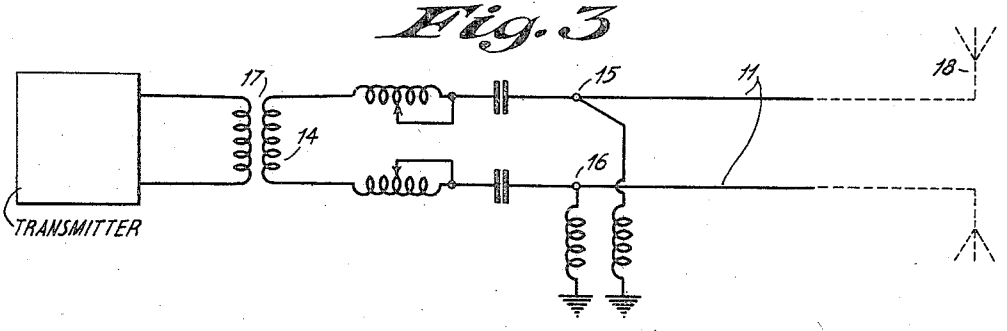


Fig. 3



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ULTRA SHORT WAVE RECEIVER

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Application January 11, 1933, Serial No. 651,097

1 Claim. (Cl. 250—33)

This invention relates to circuit arrangements for eliminating undesirable oscillations from high frequency circuits, and is a continuation in part of my United States Patent No. 2,011,942, granted August 20, 1935.

In the use of high frequency currents for communication purposes, particularly in radio transmitters and receivers, it is frequently necessary to utilize oscillations of a single frequency and to eliminate from the system all other high frequency oscillations occurring simultaneously with the desired oscillations. The presence of these undesirable high frequency currents has been found to be due, usually, to parasitic oscillations and to harmonics of the generated current of the desired frequency in the case of transmitting equipment, and, in the case of receivers, to incoming received oscillations which have a frequency other than the desired signal frequency.

An object of the present invention is to enable the elimination of the undesired high frequency oscillations in a very simple and highly efficient manner.

In general, this is accomplished according to the present invention by providing across the line in which it is desired to suppress the undesirable oscillations a circuit whose effective length is equal to one half the length of the wave of the desired frequency and which is grounded at its center point. Such an arrangement presents infinite impedance to the oscillations of the desired frequency and much less to the undesired frequencies. According to a particular embodiment of the present invention, this circuit may comprise a U-shaped conductor across which there is placed a tunable condenser for aiding in the tuning of the circuit. In another embodiment the circuit merely comprises two quarter wave length connections extending from the transmission line to ground. These connections might either be linear conductors or coils electrically equivalent to one quarter of the length of the communication wave.

In the accompanying drawing, which is given by way of example only, Figure 1 illustrates the use of the present invention in circuit with the antenna of an ultra short wave receiving system, for eliminating undesirable incoming oscillations; and Figures 2 and 3 illustrate the use of the invention in connection with a transmission line feeding energy to the antenna of a radio transmitting circuit.

Referring to Figure 1, there is shown an ultra short wave receiving system of a type described in my United States patent, supra, comprising a simple bipolar antenna system 1, 1 in circuit with a Barkhausen type of ultra high frequency oscillator-detector 5 and an intermediate frequency amplifier-detector 8. The antenna is shown connected through condensers 2, 2 to the grid 3 and plate 4 of the ultra high frequency oscillator tube 5. Attached to the antenna wires in the manner shown in the drawing, is a tuned antenna circuit 6 in accordance with the present invention for eliminating received undesirable frequencies. This circuit comprises a U-shaped affair which is grounded at its center point 9, the individual wires of which are each approximately a quarter of the length of the communication wave, and across which there is provided a tunable condenser 7. The inductance of these wires taken with the capacity of condenser 7 forms a parallel resonant circuit which is tuned to the frequency of the incoming signal waves. As is well known, such a parallel tuned circuit presents infinite impedance to the signals of the desired frequency and a low impedance path to all other frequencies.

Since the receiving circuit of Figure 1, as a whole, forms no part, per se, of the present invention, and is adequately described in my United States patent, supra, it will not be described in detail herein, but only in a very general manner.

The incoming signal oscillations received over antenna 1, 1 are passed through blocking condensers 2, 2 and combine with the oscillations generated by the Barkhausen oscillator-detector circuit 5 to form an intermediate frequency which, in turn, is fed through a blocking condenser 10 to the intermediate frequency amplifier 8 which may be of any suitable type. This amplifier is indicated only in conventional form, the particular type and arrangement used being unimportant since any well known device adapted to perform the desired function may be used. Potentiometer circuits 11 and 12 supply suitable potentials to the electrodes of tube 5.

Those oscillations which are received by antenna 1, 1 and which are not of the desired frequency are passed to ground over the low impedance path provided by parallel tuned circuit 7 which is resonant only at the desired signal frequency. It will thus be evident that U-shaped circuit 6 presents an infinite impedance only to frequencies which it is desired to receive and pass on to the final utilization circuit.

In Figure 2 there is shown one manner of eliminating undesirable second harmonic energy from the transmission line and antenna circuit of a radio transmitter. The circuit shown consists es-

sentially of two connections 12 and 13, each extending from ground to points 15 and 16 on the two wires 11, 11, respectively, of the transmission line, and having a length equal to one quarter of the fundamental wave length. These points on the respective wires are designed to be equally distant from the secondary winding 14 of the transformer 17 which is adapted to inductively couple the output of the transmitter to the antenna system. Wires 12 and 13 are one quarter wave length long for the fundamental frequency and, therefore, offer a high impedance to currents of this frequency, but are one half wave length long for the second harmonic frequency and present very low impedance to ground for currents of this latter frequency, thus eliminating energy of this harmonic frequency from the transmission lines and antenna system. If desired, coils which are effectively a quarter wave length long for the fundamental frequency, or a half wave length long for the second harmonic frequency, may be used, as shown in Figure 3, instead of the one quarter wave length straight linear wires for eliminating the second harmonic energy. A transmitting arrangement of this type is described in a copending application of George L. Usselman Serial No. 618,607, filed June 22, 1932.

If standing waves exist cophasally on the transmission line, the connecting points of conductors 12 and 13 to the line should be located at the high potential points on the reflected second harmonic wave for more effectively eliminating the second harmonic energy in the system.

From the foregoing, it will be evident that this invention is not limited to the precise arrangements shown, but is capable of use in various other organizations without departing from the spirit and scope of the appended claim, in ways which are quite apparent to those skilled in the art.

I claim:

The combination with a two wire line adapted to carry currents of a predetermined frequency, of individual linear conductors having effective electrical lengths approximately equal to a quarter wave length of said currents extending from each of said wires to ground, and a tunable condenser connected across said conductors, the inductance of said conductors and the capacity of said condenser forming a parallel resonant circuit tuned to said predetermined frequency.

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