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M. S. STROCK

UNIDIRECTIONAL RECEIVING SYSTEM

Filed Sept. 23, 1921

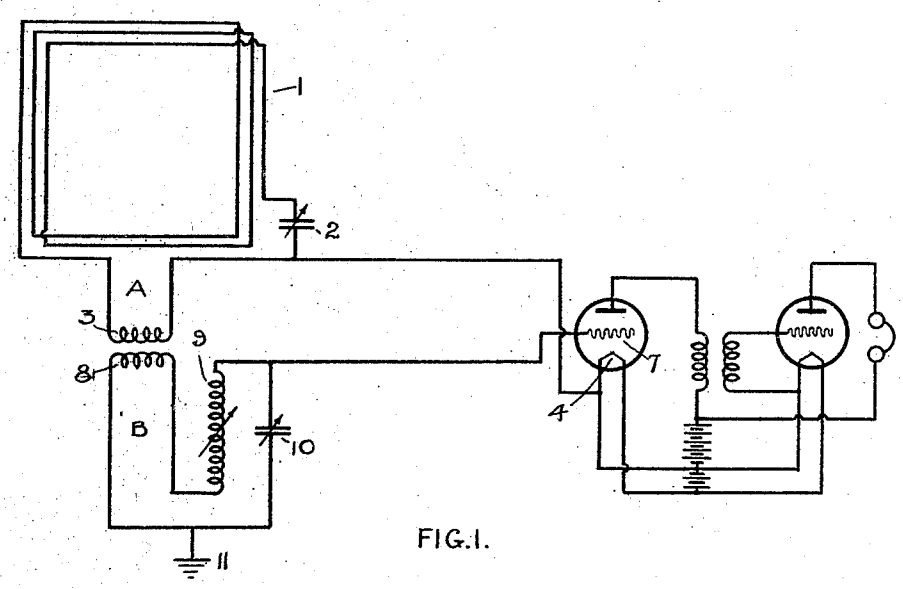


FIG. 1.

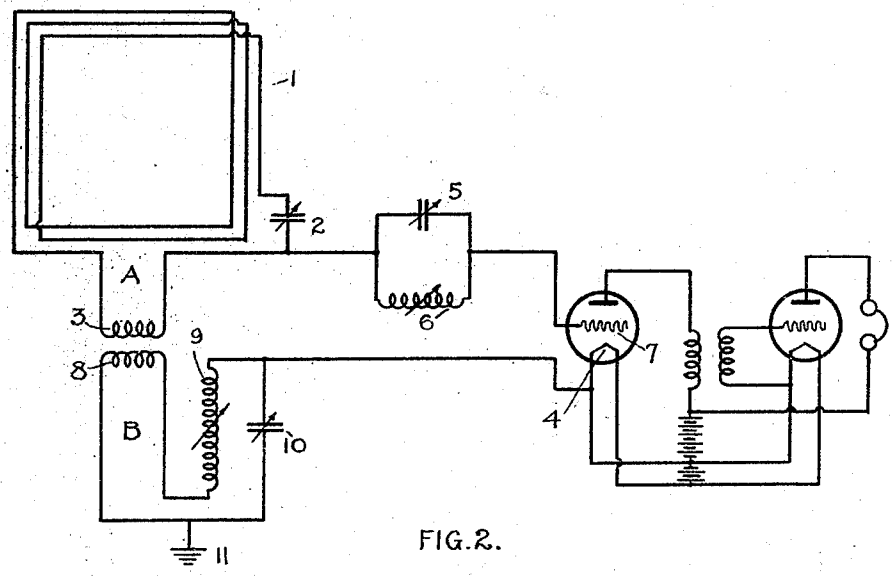


FIG. 2.

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UNITED STATES PATENT OFFICE.

MORRIS SPERRY STROCK, OF WASHINGTON, DISTRICT OF COLUMBIA.

UNIDIRECTIONAL RECEIVING SYSTEM.

Application filed September 23, 1921. Serial No. 502,806.

To all whom it may concern:

Be it known that I, MORRIS SPERRY STROCK, a citizen of the United States of America, and an officer of the Government, employed in the radio laboratory of the Bureau of Standards, in the Department of Commerce, residing in the city of Washington, in the District of Columbia, have invented certain new and useful Improvements in Unidirectional Receiving Systems, of which the following is a specification, reference being had to the accompanying drawing.

This application is made under the Act of March 3, 1883, Chapter 143, 22 Stat. L., 625, and the invention herein described and claimed may be used by the Government of the United States, or any of its officers or employees in the prosecution of work for the Government, or by any other person in the United States, without the payment to me of any royalty thereon.

The object of my invention is to provide a radio receiving system for the purpose specified.

The drawings Figure 1 and Figure 2 show the necessary circuits to produce the effects herein described.

Figures 1 and 2 each consist of two radiant energy absorbing means A and B. At 1 is shown a coil of one or more turns of wire commonly called a loop aerial, rotatable about a vertical axis, and 2 is a variable condenser forming a circuit with said loop aerial as shown. Means for inductively coupling radiant energy absorbing means A to radiant energy absorbing means B, are indicated by a coil 3.

The circuit including condenser 10, inductor 9, and coil 8, comprising the radiant energy absorbing means B is considered as having the effect of an open antenna impressing a voltage upon grid 7 which is due to the electrostatic component of the wave.

In Figure 1 a single connection is used between a terminal of the condenser 2 and the filament 4 of a three-element electron tube, said electron tube being a part of a detector-amplifier of electrical oscillations. In Figure 2 a single connection is used between a terminal of the condenser 2 and a terminal of a variable condenser 5, said condenser being in circuit with a variable inductor 6. The other terminal of condenser 5 is connected to the grid 7 of a three-element electron tube, said electron tube being a part of a detector-amplifier of electrical oscillations.

In Figure 1 a single connection is used from the radiant energy absorbing means B to the grid 7 of a three-element electron tube, said electron tube being part of a detector-amplifier of electrical oscillations, and in Figure 2, a single connection is used from radiant energy absorbing means B to the filament 4 of said electron tube. A coil 8 is used for coupling radiant energy absorbing means B to radiant energy absorbing means A (Figures 1 and 2) or this coil may be a part of the variable inductor 9 forming a circuit with a variable condenser 10 and an earth connection 11.

Radiant energy absorbing means A and B in Figures 1 and 2 are tuned to the frequency of the incoming wave, and the loop aerial is rotated so that its plane is perpendicular to the plane of the incoming wave front. In Figure 2, the circuit consisting of condenser 5 and inductor 6 must be properly adjusted so that a maximum voltage will be impressed upon the grid 7. An alternating voltage of the frequency of the incoming wave is impressed upon the filament 4 (Figures 1 and 2); likewise, an alternating voltage of the frequency of the incoming wave is impressed upon the grid 7. By means of the coupling coils 3 and 8, the electrical energy in radiant energy absorbing means A may be made to aid or oppose the electrical energy in radiant energy absorbing means B. When the loop aerial is in the position previously referred to, and the voltages associated with the two radiant energy absorbing means A and B are in phase with each other, the received signal will be of maximum intensity. If the loop aerial 1 now be rotated through 180 degrees, the voltage associated with the radiant energy absorbing means A falls to zero and then appears again but in a different sense, i. e. its phase has shifted 180 degrees. On the other hand the voltage associated with radiant energy absorbing means B remains unchanged. Hence when the coil is rotated into the new position, the voltages in the two circuits will be out of phase by 180 degrees, so that they will oppose and cancel each other. Thus as the loop aerial is rotated about a vertical axis through 360 degrees, a single position will be found where the signal is of maximum intensity. Mechanical means may be readily adopted to indicate the angular position of the station giving this maximum signal.

I claim—

1. A uni-directional radio receiving system comprising two radiant energy absorbing means, one being a grounded inductor, and the other a loop aerial, a circuit including said inductor, means for coupling said loop aerial to the circuit including said inductor, an electron tube having a grid, said electron tube being a part of a detector-amplifier of electrical oscillations, and a single connection only from one of said radiant energy absorbing means to said electron tube, said connection being to the grid of said electron tube.

2. A uni-directional radio receiving system comprising two radiant energy absorbing means, one being a grounded variable inductor in circuit with a condenser, and the other a loop aerial, means for coupling said loop aerial to the circuit including said variable inductor with said condenser, an electron tube having a grid, said electron being a part of a detector-amplifier of electrical oscillations, and a single connection only from one of said radiant energy absorbing means to said electron tube, said connection being to the grid of said electron tube.

3. A uni-directional radio receiving system comprising two radiant energy absorbing means, one being a grounded variable inductor in circuit with a variable condenser, and the other a loop aerial in circuit with a condenser, means for coupling the circuit including said loop aerial in circuit with said condenser to the circuit including said variable inductor with said variable condenser, an electron tube having a grid, said electron tube being a part of a detector-amplifier of electrical oscillations, and a single connection only from one of said radiant energy absorbing means to said electron tube, said connection being to the grid of said electron tube.

4. A uni-directional radio receiving system comprising two radiant energy absorbing means, one being a grounded variable inductor in circuit with a variable condenser, and the other a loop aerial in circuit with a variable condenser, means for coupling the circuit including said loop aerial in circuit with said variable condenser, to the circuit including said variable inductor with said variable condenser, an electron tube having a grid, said electron tube being a part of a detector-amplifier of electrical oscillations, and a single connection only from said radiant energy absorbing means including said loop aerial to the filament of said electron tube, and a single connection only from said radiant energy absorbing means including said variable inductor to the grid of said electron tube.

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Bur. of Standards Scientific Paper #428.