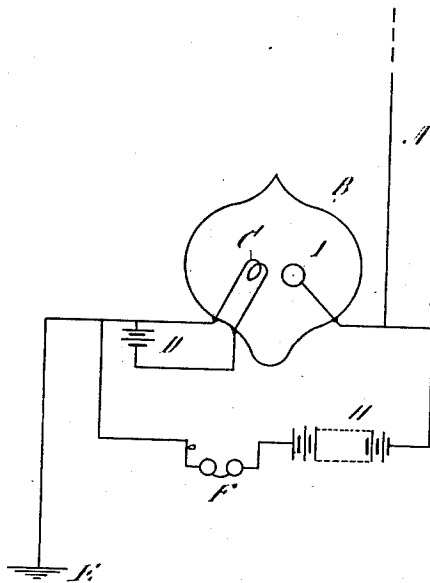


No. 836,070.

PATENTED NOV. 13, 1906.

L. DE FOREST.
OSCILLATION RESPONSIVE DEVICE.
APPLICATION FILED MAY 19, 1906.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LEE DE FOREST, OF NEW YORK, N. Y.

OSCILLATION-RESPONSIVE DEVICE.

No. 836,070.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Original application filed January 18, 1906, Serial No. 298,615. Divided and this application filed May 19, 1906.
Serial No. 317,721.

To all whom it may concern:

Be it known that I, LEE DE FOREST, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Oscillating Responsive Devices, of which the following is a specification.

My invention relates to devices for detecting feeble electrical currents or oscillations, in general, and especially such currents or oscillations which are developed in wireless-telegraph-receiving systems.

The object of my invention is to provide an oscillation detector or responder of great simplicity and sensitiveness and one which, inasmuch as it does not depend for its operation upon any variation of resistance of an imperfect electrical contact or any variation of the apparent resistance or counter electromotive force of a polarization-cell, requires no adjustment when employed for receiving wireless-telegraph signals.

With these objects in view, my invention comprises a receptacle inclosing a sensitive, gaseous conducting medium; a wave-intercepting means associated with said gaseous conducting medium whereby the feeble electrical currents or oscillations resulting from the energy absorbed from electromagnetic signal-waves may be impressed upon said gaseous conducting medium to alter its conductivity; and a signal-indicating device operatively connected with said gaseous conducting medium whereby alterations in the conductivity of the latter may be made manifest.

My invention may best be understood by having reference to the drawing which accompanies and forms a part of this specification and which illustrates diagrammatically one embodiment of my invention.

In the drawing, the figure represents a wireless-telegraph-receiving system provided with one form of the oscillation responsive device which constitutes the subject-matter of the present invention.

In the figure, A represents a receiving-antenna connected to earth at E and associated with the receptacle B. Two electrodes C and I are inclosed within said receptacle, which may be partially exhausted, and, as shown, they are sealed in said receptacle. The elec-

trode C may be an ordinary incandescent-lamp carbon filament, which is connected with a battery or other source of electrical energy D. The electrode I may be any suitable conductor and is herein shown as a disk of platinum or other material. The gaseous medium inclosed between the electrodes C and I is rendered sensitive to electrical oscillations by the radiation of heat from the electrode C, said electrode being heated by the source of energy D. The local circuit containing the battery H or other source of electrical energy and the telephone F or other signal-indicating device is electrically connected with the electrodes C and I; and as shown is connected in series therewith. The antenna A may be associated with either electrode and in such case the other electrode may be connected to earth. It will be understood, however, that the particular mode of associating the oscillation responsive device with the antenna forms no part of my invention and that any suitable system of circuits may be employed with said oscillation responsive device.

The potential to be impressed upon the electrodes C and I by the battery H depends upon the nature of the gas intervening between said electrodes and upon the degree of exhaustion maintained within the receptacle B. I have found that from twenty-five to one hundred and ten volts is sufficient and by employing a higher degree of exhaustion a much smaller voltage may be used. The conductivity of the gas, which may be air, or a gas containing compounds of the halogens or halogen salts or which may be mercury vapor, is increased sufficiently to render said gas sensitive to the passage of electrical oscillations across the gap by the radiation of heat from the electrode C. The passage of electrical oscillations across said gap alters the conductivity of the gas in said gap, probably by changing the speed of the ions in said gas, and thereby current variations are produced in the circuit containing the battery H, the electrodes C and I, and the telephone F, causing said telephone to respond. When the telephone is in series with the battery H and the electrodes C and I, the passage of oscillations across the gap between said electrodes causes an increase of current through the telephone and if the telephone is connect-

ed in shunt with said electrodes, the passage of oscillations across the gap decreases the current through the telephone.

I do not wish to be limited to the particular embodiment of my invention which I have disclosed herein inasmuch as many modifications may be made therein by those skilled in the art without departing from the spirit of my invention.

10 This application is a division of my application, Serial No. 296,615, filed January 18, 1906.

I claim—

15 1. An oscillation-responsive device comprising a partially-exhausted receptacle, two separated electrodes sealed in said receptacle, means for heating one only of said electrodes, means whereby electrical oscillations may be impressed upon the gaseous medium
20 intervening between said electrodes, and a local circuit including a source of electrical energy and a signal-indicating device electrically connected with said electrodes.

25 2. An oscillation-responsive device comprising a partially-exhausted receptacle, two separated electrodes sealed in said receptacle, means for heating one only of said electrodes, means whereby electrical oscillations may be impressed upon the gaseous medium
30 intervening between said electrodes, and a local circuit including a source of electrical energy and a signal-indicating device connected in series with said electrodes.

35 3. An oscillation-responsive device comprising a partially-exhausted receptacle, two separated electrodes sealed in said receptacle, a source of electric current so associated with one only of said electrodes as to render the gaseous medium intervening between
40 said electrodes sensitive to electrical oscillations, and a local circuit including a source of electrical energy and a signal-indicating device electrically connected with said electrodes.

45 4. An oscillation-responsive device comprising a partially-exhausted receptacle, separated electrodes sealed in said receptacle, means for heating one only of said elec-

trodes, and a local circuit including a source of electrical energy and a signal-indicating 50 device electrically connected with said electrodes.

5. An oscillation-responsive device comprising a receptacle, two separated electrodes inclosed within said receptacle, means 55 for heating one only of said electrodes, means whereby electrical oscillations may be impressed upon the gaseous medium intervening between said electrodes, and a local circuit including a source of electrical energy 60 and a signal-indicating device electrically connected with said electrodes.

6. An oscillation-responsive device comprising a receptacle, two separated electrodes inclosed within said receptacle, means 65 for heating one only of said electrodes, means whereby electrical oscillations may be impressed upon the gaseous medium intervening between said electrodes, and a local circuit including a source of electrical energy 70 and a signal-indicating device connected in series with said electrodes.

7. An oscillation-responsive device comprising a receptacle, two separated electrodes inclosed within said receptacle, a 75 source of electric current so associated with one only of said electrodes as to render the gaseous medium intervening between said electrodes sensitive to electrical oscillations, and a local circuit including a source of electrical 80 energy and a signal-indicating device electrically connected with said electrodes.

8. An oscillation-responsive device comprising a receptacle, two separated electrodes inclosed within said receptacle, means 85 for heating one only of said electrodes, and a local circuit including a source of electrical energy and a signal-indicating device electrically connected with said electrodes.

In testimony whereof I have hereunto subscribed my name this 10th day of May, 1906.

LEE DE FOREST.

Witnesses:

PHILIP FARNSWORTH,
GEO. L. LEWIS.