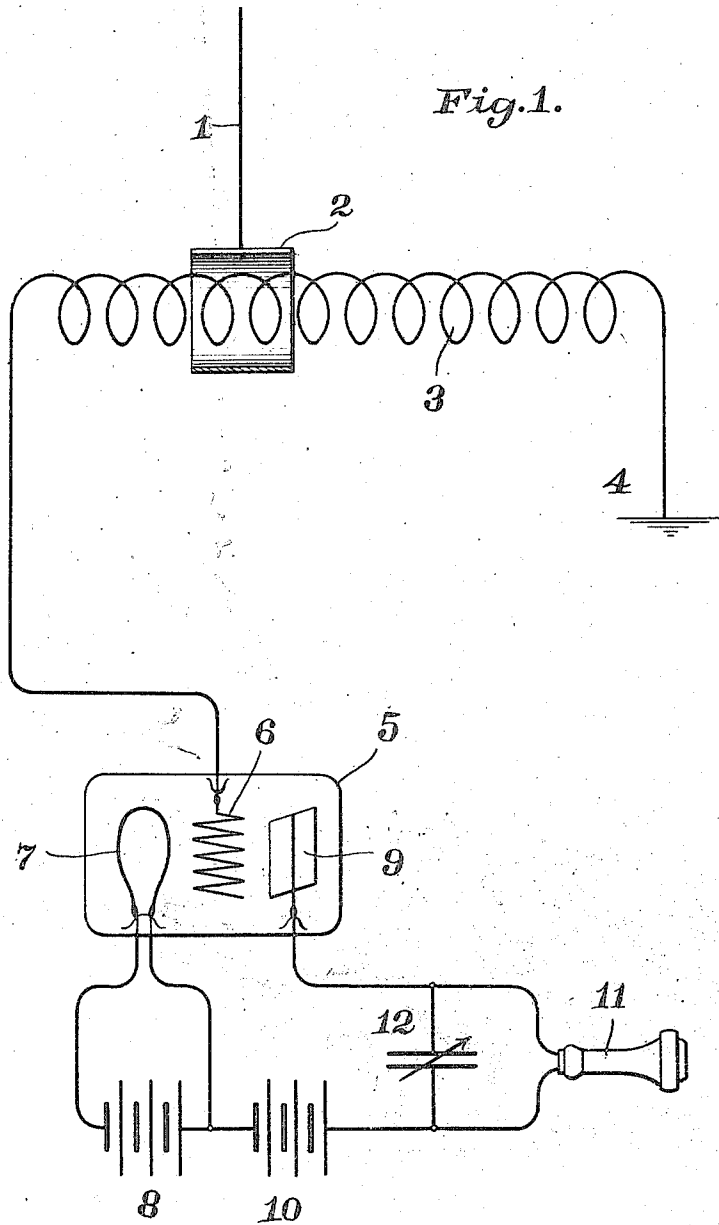


E. E. BUTCHER.
OSCILLATION RECEIVING APPARATUS.
APPLICATION FILED MAY 19, 1914.

1,228,647.

Patented June 5, 1917.
3 SHEETS—SHEET 1.



Witnesses:
M. MacIntyre
Wm M. Earl

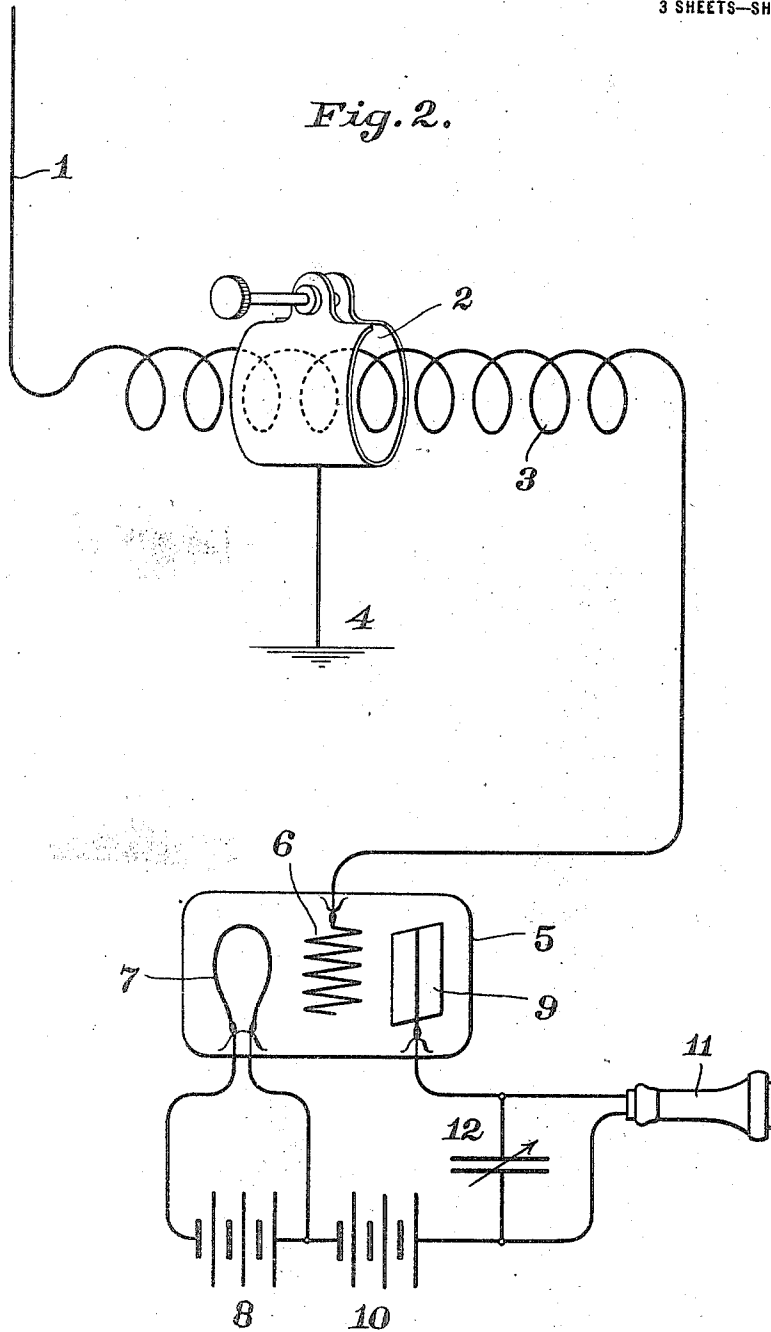
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Fig. 2.



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Fig. 3.

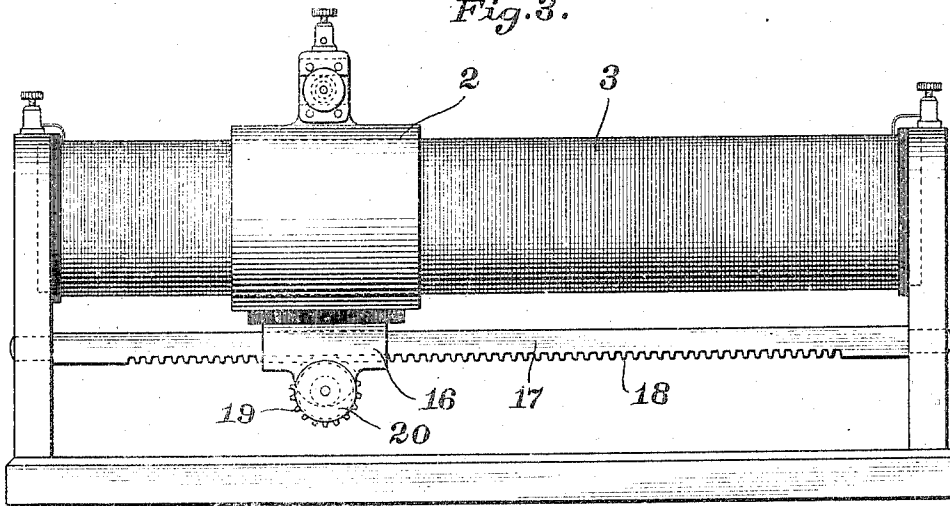
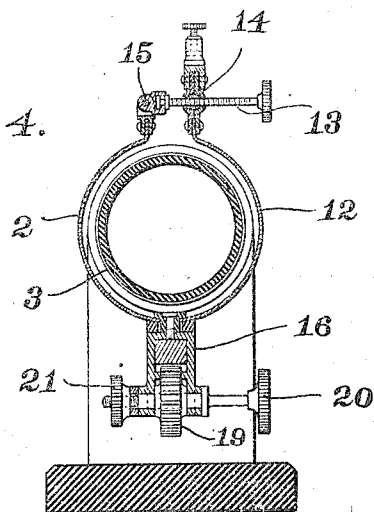


Fig. 4.



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UNITED STATES PATENT OFFICE.

ELMER E. BUTCHER, OF INTERLAKEN, NEW JERSEY, ASSIGNOR TO MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA, A CORPORATION OF NEW JERSEY.

OSCILLATION-RECEIVING APPARATUS.

1,228,647.

Specification of Letters Patent.

Patented June 5, 1917.

Application filed May 19, 1914. Serial No. 339,433.

To all whom it may concern:

Be it known that I, ELMER E. BUTCHER, a citizen of the United States, and a resident of Interlaken, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Oscillation-Receiving Apparatus, of which the following is a specification.

My invention relates to apparatus adapted to the receiving and amplification of electrical oscillations, and has for its general object the provision of such apparatus of a simple character, having few adjustments, and by which received oscillations may be greatly amplified.

My invention may be applied to the reception of electrical oscillations irrespective of the manner in which they are produced or of their particular character, and may be used in any connection in which it is found applicable, as, for instance, in wireless or wire telegraphy, or wireless or wire telephony.

I shall describe my invention in connection with wireless telegraphy and in the drawings which accompany the specification I shall illustrate forms which my invention may take. These drawings, however, are intended only to show operative forms of my invention and are therefore diagrammatic and illustrative only, and should not be taken as showing the only forms or applications in which my invention finds utility.

Figure 1 shows diagrammatically the electrical connections of the receiving end of a wireless telegraph system embodying my invention; Fig. 2 shows a modified form of the electrical connections; Fig. 3 is a side view of the means for electrostatically coupling the circuits and Fig. 4 is an end view thereof partly in section.

Referring to Fig. 1, I have shown an aerial at 1. This aerial may take any suitable form and includes in its circuit a metallic element, which is shown in the drawings, for the sake of illustration, as being in the form of a cylinder 2. The secondary or detector circuit comprises an inductance 3 which is preferably in the form of a relatively long coil of wire and is grounded at 4. This point also constitutes the ground for the aerial circuit. The opposite end of the inductance 3 is connected to an element of a detector 5. I have shown the detector 5 in the form of a multiple element valve detec-

tor, but this is not the only type which may be used, since other forms of detectors, such as crystal detectors, for instance, may be advantageously employed. The multiple element valve detector 5 I have illustrated, comprises a sealed vessel inclosing three elements, a grid element 6 to which inductance 3 is connected, a filament element 7 which is heated by battery 8 or other suitable source of heat, and a plate element 9. Filament element 7 and plate element 9 are connected by a circuit which includes a battery 10 and a telephone 11 in series. Telephone 11 may be shunted by a variable condenser 12, although the latter is not essential. The local circuits of the detector may be modified to accord with the type of detector used, or the particular conditions of its use.

In the operation of my device the metallic element 2 is moved along coil 3, and the closeness of the electrostatic coupling between the coil and the metallic element is varied in any suitable manner, as by increasing or decreasing the diameter of the cylinder. These are the only adjustments which my improved device requires. By the movement of metallic element 2 the aerial and secondary or detector circuits are simultaneously tuned and the amount of inductance included therein varied. The arrangement is such that a point of maximum potential is formed at the grid element of the detector 6. In Fig. 2 I have shown a modification of my apparatus which consists essentially in reversing the electrostatic coupling shown in Fig. 1, but leaving the aerial circuit electrostatically coupled to the detector circuit. While in Fig. 1 the aerial is connected to the metallic element of the coupling, in Fig. 2 it is connected to the inductance and the earth is connected to the metallic element instead of directly to the inductance as in Fig. 1. Also in Fig. 2 the connection of the secondary circuit to the ground is effected through the electrostatic coupling instead of directly, but this does not alter its essential character as a grounded circuit. The underlying principles, however, of the apparatus of both Figs. 1 and 2 are the same and the method of operation is essentially identical.

Figs. 3 and 4 show a convenient mechanism for varying the electrostatic coupling between the metallic element 2 and the coil 3. Referring to these figures it will be seen

that the metallic element 2 is in the form of a split cylinder, the upper ends being connected by means of a thumb-screw 13 which passes through a ball 14 mounted on one edge of the cylinder, and is attached to a pivot 15 on the other. The cylinder is supported upon a slider 16, which is adapted to slide along a bar 17, the under side of which has a rack 18 formed in it. A pinion 19, operated by a thumb-piece 20, engages rack 18, and serves to move the slider along by its rotation. A lock nut 21 is provided so that the cylinder may be locked in any given position relatively to the coil.

As I have pointed out above, the forms of my invention I have illustrated and described are not the only forms it may take, and they may be altered in manners which will be apparent to those skilled in the art, without departing from the spirit of my invention, and I therefore do not intend to confine myself to the specific forms shown and described.

What I claim is:

1. In an oscillation receiving apparatus, a grounded open secondary circuit containing an inductance and a detector and tuned to the periodicity of the received oscillations excited by an aerial circuit electrostatically coupled thereto and also tuned to the periodicity of the received oscillations.

2. In an oscillation receiving apparatus, an open oscillating circuit containing an inductance and connected to the earth at one end and to a detector at a point of maximum potential remote from the earthed point and an aerial circuit tuned to the periodicity of the received oscillations electrostatically coupled thereto.

3. In an oscillation receiving apparatus, an open oscillating circuit containing an inductance and a detector and an oscillating circuit electrostatically coupled thereto at the point at which the inductance is included in the circuit.

4. In an oscillation receiving apparatus, an aerial circuit containing one element of an electrostatic coupling and a detector circuit containing an inductance and a detector, the inductance constituting the other element of the electrostatic coupling.

5. In an oscillation receiving apparatus, an aerial circuit containing one element of

an electrostatic coupling and an open detector circuit grounded at one end, containing an inductance and connected to a detector at a point of maximum potential remote from the earthed point, the inductance constituting the other element of the electrostatic coupling.

6. In an oscillation receiving apparatus, an open oscillating circuit containing an inductance, grounded at one end and connected to a detector at a point of maximum potential remote from the earthed point, a second oscillating circuit adapted to excite the first and electrostatically coupled thereto, means for varying the closeness of the coupling and means for varying the amount of the inductance included in the two circuits.

7. In an oscillation receiving apparatus, a secondary circuit containing an inductance in the form of a coil, an oscillating circuit adapted to excite the secondary circuit and means for electrostatically coupling the circuits, comprising the coil and a metallic member in proximity to the coil and adapted to be moved relatively to it.

8. In an oscillation receiving apparatus, a secondary circuit containing an inductance in the form of a coil, an oscillating circuit adapted to excite the secondary circuit, and means for electrostatically coupling the circuits and for varying the coupling, comprising a cylinder surrounding the coil, means for contracting the cylinder and means for moving the cylinder longitudinally of the coil.

9. In an oscillation receiving apparatus, a secondary circuit, an exciting circuit and means for electrostatically coupling the two circuits and for varying the coupling, comprising a coil, a split cylinder slidably mounted thereon, means for contracting the cylinder and for holding it in its contracted position and means for moving the cylinder longitudinally of the coil and for locking it in any given position.

In witness whereof I have hereto signed my name in the presence of two witnesses this 18th day of May, 1914.

ELMER E. BUTCHER.

Witnesses:

WALTER S. JONES,
WM. M. EARL.