

R. A. WEAGANT.
 WIRELESS SIGNALING APPARATUS.
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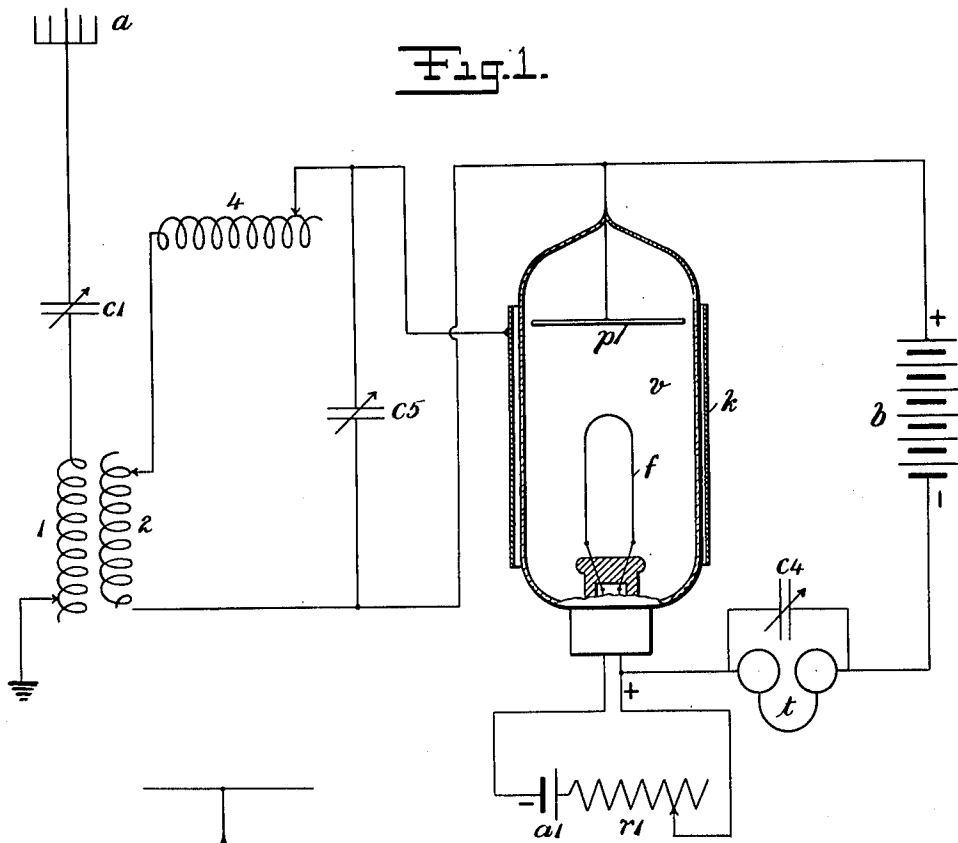


Fig. 1.

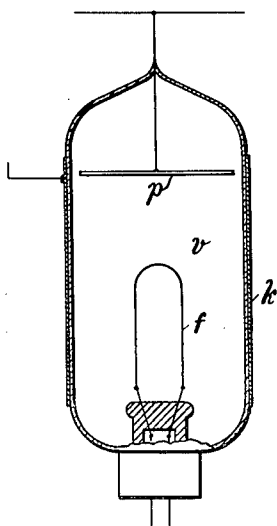


Fig. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

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WIRELESS SIGNALING APPARATUS.

1,289,981.

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To all whom it may concern:

Be it known that I, ROY A. WEAGANT, a citizen of the United States, residing in the town of Roselle, county of Union, State of New Jersey, have made certain new and useful Improvements in Wireless Signaling Apparatus, of which the following is a specification.

This invention relates to apparatus for use in radio communication and its object is to provide an improved means for the detection of electrical impulses or variations.

The invention is an improvement on the well-known Fleming vacuum valve shown and described in U. S. Letters Patent No. 803684, November 7th, 1905. In the improved apparatus shown and described herein there is employed a vacuum chamber, a hot element and a cold element, and outside the chamber an element having extended capacity area in close proximity to the outer surface of the chamber; preferably a metal, as copper, is electro-plated onto the exterior surface of the valve chamber; in any case this outer member, is preferably fixed in position, and arranged with its surface area parallel with respect to the path of electrons in the vacuum chamber, moving from the hot element at one end toward the cold element at the other end, the hot and cold elements being fixed at opposite ends of the chamber. The space between said interior elements is extended and the outer element in area is coextensive or a little more extended than the space between the interior elements. The object is to establish an extensive and intimate relation between the path of the electrons and the surface of the outer element. In the form shown the apparatus is adapted for use as a detector of electrical oscillations in association with a local circuit and an indicating device such as a telephone receiver, and in addition the oscillating circuit is electrically connected with the valve and the telephone circuit.

Figure 1 shows the valve and its circuit connections used as a detector; Fig. 2 shows the outer electrode electro-plated on the outer surface of the valve.

The vacuum chamber v consists of an evacuated glass vessel, and contains the filament electrode f at one end and the plate electrode p at the other end. These are fixed some distance apart, so as to leave an open space between them. Outside the

vacuum chamber v , is a plate of thin metal k ; it is fixed in position close to the exterior of the chamber and I prefer an electro-plated coating of copper, as shown in Fig. 2; the extent of this outer element is preferably sufficient to span the space separating the two interior electrodes f and p and includes both said electrodes. The hot filament electrode f , is heated by battery a' the number of cells of battery and the resistance r , being varied to graduate the heat. There is a battery b , graduated as to its electromotive force by varying the number of cells in series, included in circuit with a telephone or indicating device t ; a variable condenser c^1 is in circuit in parallel with telephone t ; the terminals of this circuit are connected, respectively to the two electrodes f and p in valve chamber v . The antenna wire includes primary coil 1 and variable condenser c^2 ; the secondary circuit is a closed oscillating circuit provided with tuning elements such as inductance 2, inductance 4, which is practically a part of inductance 2, and the variable condenser c^3 , one terminal of this circuit is connected to plate electrode p and the first described local circuit, the other terminal is connected to the outside element k . When the surface of the outside element is disposed parallel to the electron stream between the interior elements as described above, it follows that the field of force of the outside element when charged is at an angle to the electron stream.

The valve so employed as a detector is more stable as regards adjustment and more powerful as regards response to receive impulses. The valve described above operates to amplify feeble oscillating or pulsating currents, and can be used for line telephony, as well as for wireless telephony and telegraphy.

The outside terminal k I prefer to designate as an electrostatic control element. I use this designation to define a terminal such as the one shown at k disposed outside the chamber, and so connected to the source of oscillations or to the circuit carrying the oscillation current to be detected or amplified that it will operate to vary the flow of electrons within the chamber synchronously with the impulses or oscillations of the current to be amplified or detected.

What I claim is:

1. In combination, an evacuated container comprising an internal source of electrons,

- an electrode in the path of said electrons, and an electrostatic control element surrounding a portion of said container through which the electron stream passes and arranged approximately parallel to the path of the electrons, the control element being located near enough to the source or stream of electrons to usefully vary the space charge, due to said stream.
2. In combination, an evacuated container comprising a source of electrons, an electrode in the path of said electrons, and an electrostatic control element surrounding the entire portion of said container between said electrode and said source of electrons and arranged approximately parallel to the path of the electrons, the control element being located near enough to the source or stream of electrons to usefully vary the space charge, due to said stream.
3. In a wireless signaling apparatus, the combination with an antenna of a vacuum chamber, a hot element and a cold element in said chamber, a conducting terminal of extended area located in position outside said chamber with its surface approximately parallel to the direct line of electron movement, a local circuit having its terminals connected with one electrode within the chamber and the electrode outside the chamber, said circuit including an inductance, a capacity and means associating said circuit with the antenna.
4. In a wireless signaling apparatus, the combination of an antenna, a vacuum chamber, a hot element and a cold element in said chamber, a conducting terminal having extended area located outside said chamber, its surface in close proximity and approximately parallel to the direct line of electron movement, a local circuit having its terminals connected with said hot and cold elements, respectively, and including a battery and an indicating instrument.
5. In a wireless signaling apparatus, the combination with the antenna, of a vacuum chamber, a hot element and a cold element in said chamber, a conducting terminal of extended area located in position outside said chamber with its surface in close proximity and parallel to the direct line of electron movement, a local circuit having its terminals connected with one electrode within the chamber and the electrode outside the chamber, said circuit including an inductance, a capacity, and means for associating said circuit with the antenna circuit and a second circuit having its terminals connected with said hot and cold elements respectively, and including an indicating device and a source of direct current.
6. In an apparatus of the kind described, the combination of a vacuum chamber, two electrodes in said chamber, means for heating one of said electrodes, a conducting terminal of extended area outside said chamber and composed of a layer of metal electro-plated upon the exterior surface of the chamber.
7. In a vacuum tube device, a vacuum chamber, two elements within said chamber, means for heating one of said elements, means for producing an electron stream between said elements, an electrostatic control element outside said chamber, the field of force of the outside element being at an angle to the electron stream between the interior elements and the outside element being located near enough to the source or stream of electrons to usefully vary the space charge due to said stream.
8. In a vacuum tube device, a vacuum chamber, two electrodes within said chamber, means for heating one of said electrodes, means for producing an electron stream between said electrodes, an electrostatic control element outside said chamber, the space intervening between the outside electrode and the electron stream being substantially free and unobstructed to the electrostatic field of force exerted by the outside element.
9. In a vacuum tube device, a vacuum chamber, two electrodes within said chamber, means for heating one of said electrodes, means for producing an electron stream between said electrodes, an electrostatic control element outside said chamber adjacent the source and stream of electrons, the space intervening between the outside electrode and the electron stream being substantially free and unobstructed to the electrostatic field of force exerted by the outside element.
10. A vacuum tube detector consisting of a cylindrical evacuated vessel having a heated filament at one end and a cold electrode at the other end, and an electrostatic control element on the external surface of said cylinder.
11. An evacuated container including a hot electrode, a cold electrode placed in the path of the electron stream from said hot electrode, and a plate surrounding the portion of said container through which the electron stream passes and arranged parallel to a line connecting said hot and cold electrodes.
12. An evacuated container including a hot electrode, a cold electrode placed in the path of the electron stream from said hot electrode, and a plate arranged alongside of the portion of the container through which the electron stream passes and arranged parallel to a line connecting said hot and cold electrodes.
13. A radio frequency signaling device comprising a vacuum chamber containing two elements, means for heating one of said elements, and an electro-static control element outside said chamber, the electro-static field due to said control element being at an angle to the electron stream within the vacu-

um chamber and thereby capable of producing useful variations therein.

5 14. A radio frequency signaling device comprising a vacuum chamber containing means for producing a stream of electrons, and an electro-static control element outside said chamber adapted to project a field of force into the space within the chamber at an angle to said stream of electrons.

19 15. A radio frequency signaling device comprising a vacuum chamber containing means for producing a stream of electrons, and an electro-static control element outside said chamber adapted to project a field of force into the space within the chamber at an angle to said stream of electrons, the space intervening between the outside element and the electron stream being substantially free and unobstructed to the electro-
20 static field of force exerted by the outside element.

16. In a radio frequency signaling apparatus having input and output circuits a sig-

naling device comprising a vacuum chamber containing means for producing a stream of 25 electrons, and an electro-static control element outside said chamber, adapted to produce a field at an angle to the electron stream within the chamber, said signaling device being thereby capable of producing in the 30 output circuit electrical variations of the same frequency but of greater magnitude than those applied to the input circuit.

17. In a device of the kind described a vacuum chamber; a plurality of electrodes 35 sealed therein, means for establishing an electron flow between two of the electrodes, a circuit upon which the received oscillations are impressed, and an electrode located 40 externally to the vacuum chamber and at a point of maximum potential of the said circuit, for influencing the electron flow, the said external electrode having an extended surface substantially parallel to the general axis or direct line of electron flow.

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