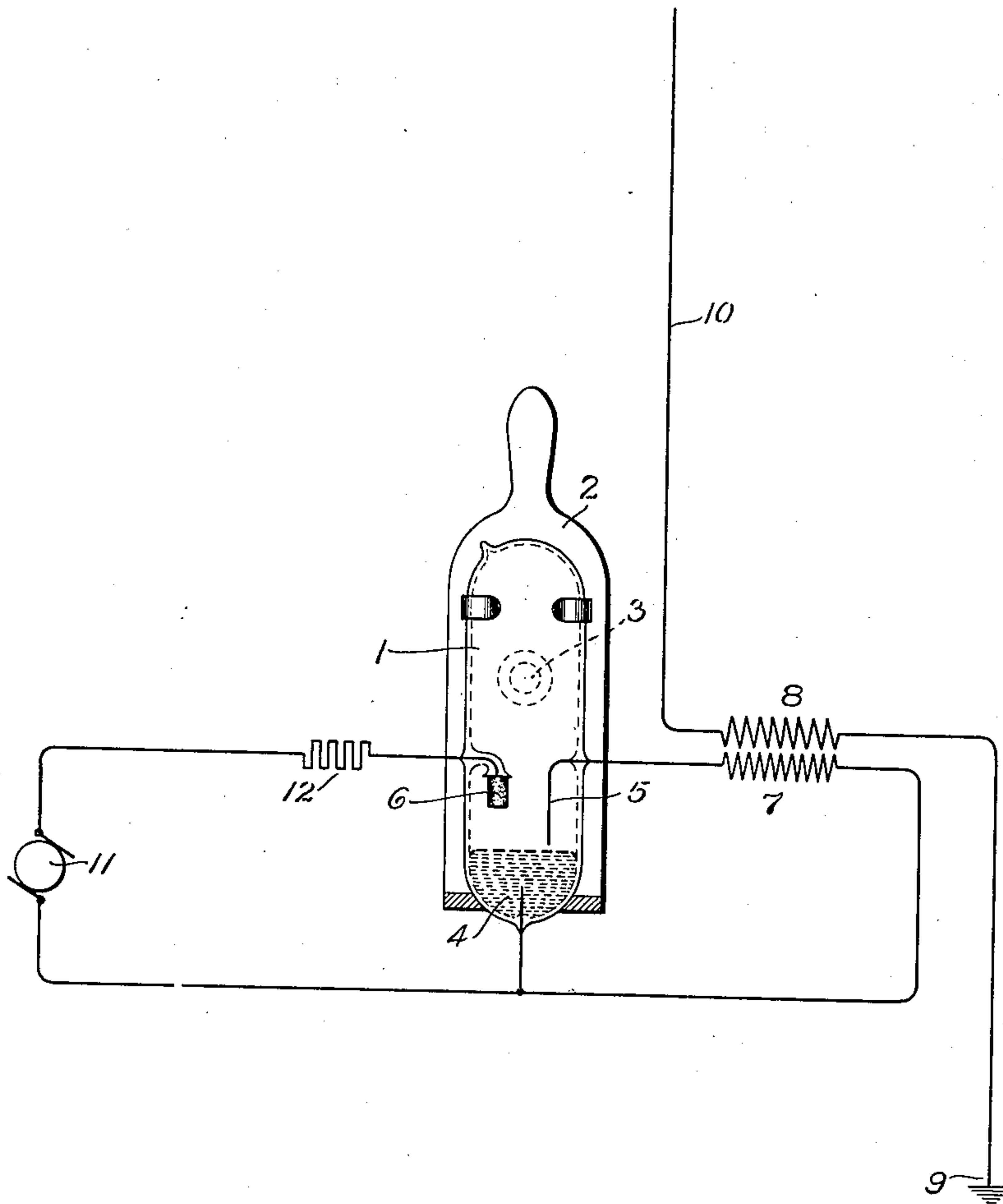


E. WEINTRAUB.  
VAPOR ELECTRIC APPARATUS.

APPLICATION FILED DEC. 21, 1903. RENEWED NOV. 21, 1906.

925,060.

Patented June 15, 1909.



Witnesses:  
*George H. Thornton,*  
*Alfred Alfred*

Inventor:  
Ezechiele Weintraub,  
by *Albert S. Davis*  
Att'y.



# UNITED STATES PATENT OFFICE.

EZECHIEL WEINTRAUB, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## VAPOR ELECTRIC APPARATUS.

No. 925,060.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed December 21, 1903, Serial No. 185,931. Renewed November 21, 1906. Serial No. 344,500.

*To all whom it may concern:*

Be it known that I, EZECHIEL WEINTRAUB, a subject of the Czar of Russia, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Vapor Electric Apparatus, of which the following is a specification.

My present invention relates to vapor electric apparatus and comprises more especially a device of this character arranged to operate as a receiver or wave-detector for wireless telegraph systems. The device which I thus employ to make evident the presence of electro-magnetic waves is one in which the properties of a mercury or other vapor arc come into play. To this end I employ a highly evacuated receptacle, of some light-transmitting material, as glass, having a plurality of electrodes. One of the electrodes is of mercury or other vaporizable material and the other electrodes may or may not be of vaporizable material though, for convenience, I prefer that they should be of some solid, and therefore non-vaporizable, material. Between the mercury electrode and one of the companion electrodes I cause a spark to pass due to the influence of the electro-magnetic wave the presence of which is to be detected. This spark is ordinarily so small as to be practically invisible except upon the closest possible scrutiny. I therefore connect between the mercury electrode and one of the other electrodes a source of direct current of suitable voltage, which source causes an arc to pass between the electrodes to which it is connected, whenever an arc or spark is produced as the result of the electro-magnetic wave. This arc produces a bright flash within the glass receptacle and serves as a visual signal.

The novel features which characterize my invention I have endeavored to point out with particularity in the appended claims. The invention itself however will be best understood, both as to its details of construction and mode of operation, by reference to the following description taken in connection with the accompanying drawing which represents, in a largely diagrammatic manner, one mode of embodying my invention.

The receiver or detector proper consists of a highly exhausted glass receptacle 1 carried by a pivoted support 2. This support moves stiffly upon its pivot, indicated in dotted

lines at 3, and thus permits the position of inclination of the receiver to be adjusted at will. Within the receptacle are three electrodes, one a mercury electrode 4, another a platinum wire 5 the lower end of which extends into very close proximity to electrode 4, and the third a cylindrical body of carbon or graphite 6. The distance between the platinum wire and the mercury electrode may be adjusted by turning the apparatus on its pivot 3. All of these electrodes are provided with suitable leading-in conductors by which connections may be made to the circuits of the apparatus.

The platinum wire electrode 5 is connected to one terminal of the secondary 7 of a step-up transformer, the other terminal of which is connected with the leading-in conductor of the mercury electrode 4. The primary 8 of this step-up transformer has one terminal grounded as at 9 and the other connected to a lead 10 extending to the antennæ or other mechanism for receiving the electromagnetic waves transmitted through space.

The electrode 6 is connected with one terminal of a source of direct current 11, the other terminal of which makes connection with the mercury electrode 4. In series with this direct current source is a resistance 12.

When now an electro-magnetic wave causes a flow of current through the primary 8, the effect of this current is transmitted to the secondary 7 by means of which a greatly magnified voltage is impressed upon the electrodes 4 and 5. These electrodes are close enough together so that the effect of even a very small current in the primary 8 is sufficient to cause a small spark to jump from the electrode 5 to the electrode 4. This spark produces a slight ionization of the mercury surface 4 thereby rendering the space between the electrodes 6 and 4 sufficiently conducting to enable an arc to be produced by current from the source 11. This arc, being produced by current from a source of ample power, renders luminous the space between the electrodes through which it acts, and so serves with great clearness as a signal. Ordinarily when such an arc is started it continues indefinitely and to prevent this I provide the resistance 12, which is of such magnitude as to reduce the current value below the point at which an arc can be maintained with stability by the source 11. Almost as soon, therefore, as the arc is started it goes



out, and starts again only when another magnetic wave produces a starting spark between the platinum wire 5 and the mercury 4. Instead of the resistance I may of course use a circuit interrupter actuated by the current from the source 11.

The source of current 11, instead of being a direct current source may, if desired, produce alternating current, in which case the resistance 12 would not be necessary since the alternating current arc will exist only long enough, after it is started, to complete the half wave during which it starts.

My invention in certain of its aspects is not limited to wireless telegraphy but covers broadly the starting of a vapor arc by the influence of energy transmitted through space without the use of wires or similar conductors. I therefore do not wish my claims to be limited to the details shown and described.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The combination of a vapor electric lamp having a vaporizable cathode, a receiving circuit for electro-magnetic waves, and means controlled by said electro-magnetic waves for starting said lamp.

2. In a wave detector, the combination of a source of current having an interposed arcing path, means for limiting the current below that necessary for stability, and means operated by the waves to be detected for rendering said path conductive.

3. A wave detector consisting of an exhausted receptacle provided with electrodes, a source of current connected with electrodes in said receptacle, and means connected to one of said electrodes and controlled by electromagnetic waves for starting arcs or flashes in said receptacle due to energy supplied from said source.

4. A wave detector for space telegraph systems consisting of an exhausted receptacle provided with electrodes, a connection between two of the electrodes and a source of direct current, and connections from one of said electrodes and another electrode to a device upon which the effect of the electro-magnetic waves is impressed.

5. A wave detector for space telegraph systems, consisting of a sealed receptacle, electrodes therein one at least of which is of vaporizable material, a source of current connected between the vaporizable electrode and another electrode, an operative connection from the vaporizable electrode and a third electrode to the wave receiving conductor of the system, and means for securing a non-stable operation of the arc produced by current from said source.

6. A wave detector consisting of a sealed receptacle, and electrodes in said receptacle one connected to a source of current, another in operative relation to the wave receiving conductor, and a third in operative relation both to said source and to said conductor.

7. A wave detector for space telegraph systems, comprising an exhausted receptacle provided with electrodes, means for impressing a potential across the space separating said electrodes, and means for transmitting the effect of electro-magnetic waves to said receptacle to effect an ionization at one of said electrodes.

8. A wave detector consisting of a sealed receptacle, electrodes therein spaced apart, a local source of current connected to said electrodes and impressing a potential therebetween, and means for transmitting oscillations to excite one of said electrodes.

9. A wave detector comprising a sealed receptacle having an attenuated atmosphere, an anode within said receptacle, a cathode separated from said anode by a space, a local source of energy impressing a potential across said space, and means for transmitting oscillations to excite said cathode.

10. A wave detector comprising a sealed receptacle having an attenuated atmosphere, an anode within said receptacle, a cathode separated from said anode by a space, means for introducing high frequency oscillations into said receptacle to excite said cathode and a local source of energy initially impressing a potential across said space and operative to detect the presence of said high frequency oscillations.

11. A wave detector comprising a sealed receptacle, electrodes therein separated by a highly attenuated medium, means for impressing oscillations upon said medium to decrease the resistance between said electrodes, and a local source of electrical energy connected across said electrodes and adjusted to give an unstable current flow.

12. A wave detector comprising a sealed receptacle, a plurality of electrodes therein separated by a gap, one at least of said electrodes being of vaporizable material, a local source impressing a potential strain across said gap to render it sensitive to electrical oscillations, and means for introducing oscillations into said receptacle to vary the resistance of said gap.

In witness whereof, I have hereunto set my hand this 18th day of December, 1903.

EZECHIEL WEINTRAUB.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.