

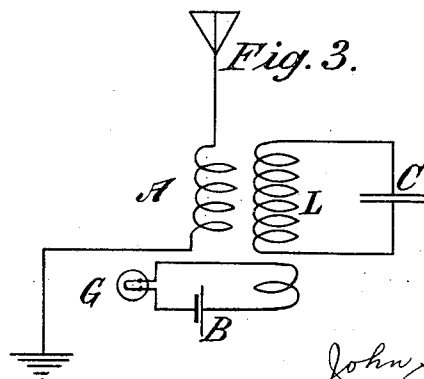
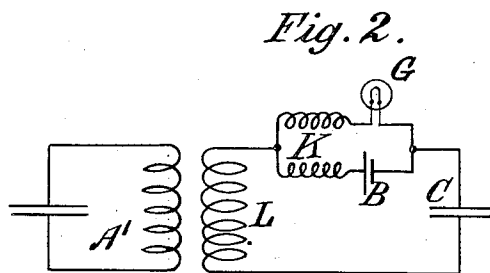
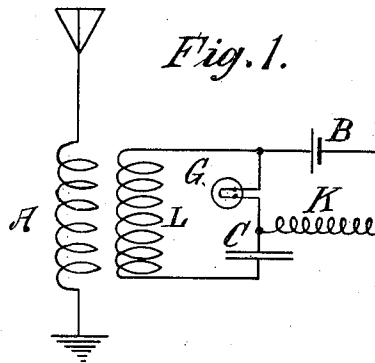
May 15, 1923.

1,455,458

J. S. E. TOWNSEND

MEANS FOR DETECTING SMALL ELECTRIC CURRENTS

Filed Oct. 15, 1918



John S. E. Townsend
By his Attorneys
Purdum & Wight

Patented May 15, 1923.

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UNITED STATES PATENT OFFICE.

JOHN SEALY EDWARD TOWNSEND, OF OXFORD, ENGLAND.

MEANS FOR DETECTING SMALL ELECTRIC CURRENTS.

Application filed October 15, 1918. Serial No. 258,287.

To all whom it may concern:

Be it known that I, JOHN SEALY EDWARD TOWNSEND, a subject of the King of Great Britain, residing at 20 Merton Street, Oxford, England, have invented new and useful Improved Means for Detecting Small Electric Currents, of which the following is a specification.

The object of this invention is primarily to provide a simplified instrument whereby the wave length of electrical oscillations can be readily measured. The instrument may, however, be used merely for detecting the presence of small oscillating currents.

It has been before proposed to employ an incandescent electric lamp bulb for detecting electric currents, but hitherto it has been possible to use such a detector only when the current is fairly large: that is, large enough to heat the filament from its normal condition to the temperature at which it becomes incandescent.

According to this invention I employ an evacuated bulb having its filament connected in series with a choke coil and a battery of sufficient strength to heat the filament to a temperature slightly above or below the point of incandescence, so that the lamp is in a sensitive condition to show visually any small change of temperature due to the passage through the filament of a small current, and I superimpose the current to be detected upon the current flowing from the battery through the filament, so that the addition of this small current to the normal current may cause a change in the condition of the filament, which change is easily distinguished by the eye. Such a detector is especially suitable for showing alternating currents or currents of high frequency, and may be used either to detect the currents or to indicate when they attain a maximum value.

My invention is illustrated by the accompanying diagrams.

Figure 1 is a diagram of the connections in one form of my invention and Figures 2 and 3 are diagrams of modifications.

In Figure 1, G is a low resistance lamp having its filament connected in an oscillatory circuit comprising a condenser C and an inductance L. In series with the filament are also connected a cell B and a choke coil K. The battery is of such a strength as to maintain the filament of the lamp at a temperature just below that of

incandescence, while the choking coil prevents the passage of oscillations through the battery. It is desirable to have the choke coil K of low resistance and low capacity, and provided with a large number of turns so that its impedance for high frequency currents is large as compared with the resistance of the lamp filament. When therefore an oscillatory current flows through the circuit CGL the temperature of the filament is raised and the filament glows.

Thus the figure shows the circuits arranged near an aerial A, in which oscillations are supposed to be occurring. When the aerial is in tune with the circuit GGL the filament will be at its brightest.

The oscillatory circuit may be tuned by making either the condenser or the inductance adjustable; when this circuit is in tune with the oscillations to be detected the brightness of the filament is at a maximum, and therefore the arrangement may be used as a wave meter, and the wave length of the oscillations can be determined.

If the circuits are placed in proximity to a closed oscillatory circuit A' in which oscillations are flowing, the lamp G will be at its brightest when the circuits are in tune.

What I claim is:—

1. In means for detecting the presence of small oscillating currents, the combination of an evacuated bulb, a filament contained therein, a choke coil and a battery both connected in series with the filament and an oscillatory circuit in which can flow the currents to be detected, the filament being connected in that circuit, the battery being adapted to heat the filament near to the point of incandescence and the choke coil having large impedance compared with the resistance of the filament for the whole range of frequencies of the oscillatory circuit.

2. In means for detecting the presence of small oscillating currents, the combination of an evacuated bulb, a filament contained therein, a battery connected in series with the filament and adapted to heat it near to the point of incandescence, a choke coil connected in series with the battery and filament, and an oscillatory circuit in which can flow the currents to be detected, a portion of the coil being included with the filament in the circuit, the remainder of the coil having large impedance compared with

the resistance of the filament for the whole range of frequencies of the oscillatory circuit.

3. In means for detecting the presence of
5 small oscillating currents, the combination of an evacuated bulb, a filament contained therein, a battery adapted to heat the filament near to the point of incandescence, a coil connected in series with the battery and
10 filament, and an oscillatory circuit coupled to the coil.

4. In a wave meter, the combination of an evacuated bulb, a filament contained therein, a cell connected to the filament and possessing
15 a voltage slightly less than that required to heat the filament to ordinary incandescence, a choke coil connected in series with the cell and the filament and an oscillatory circuit in which the filament is included and
20 in which can flow the oscillations to be measured, the choke coil having a large impedance compared with the resistance of the filament for the whole range of frequencies of the oscillatory circuit.

25 5. In means for receiving and detecting small electric currents, the combination of an evacuated bulb, a filament contained therein, a battery connected in series with the filament and maintaining it near the

point of incandescence, and means whereby
30 a small current to be detected by variations in the brightness of the filament can be received and superimposed on the battery current through the filament.

6. In means for receiving and detecting
35 small electric currents, the combination of an evacuated bulb, a filament contained therein, a battery connected in series with the filament and maintaining it near the point of incandescence, and a second circuit
40 connected to said filament, said second circuit being adapted to receive and have flow therethrough the small currents to be detected.

7. The method of receiving and detect-
45 ing small electric currents, which consists in superimposing such currents upon a battery current passing through a filament contained in an evacuated bulb, maintaining the filament near the point of incandescence,
50 and observing the existence of such currents by variations in the point of incandescence of the filament.

In testimony that I claim the foregoing
as my invention, I have signed my name
55 this 18th day of September, 1918.

JOHN SEALY EDWARD TOWNSEND.