No. 767,985. PATENTED AUG. 16, 1904.

J. S. STONE.

SPACE TELEGRAPHY.

APPLICATION FILED NOV. 25, 1903.

NO MODEL.

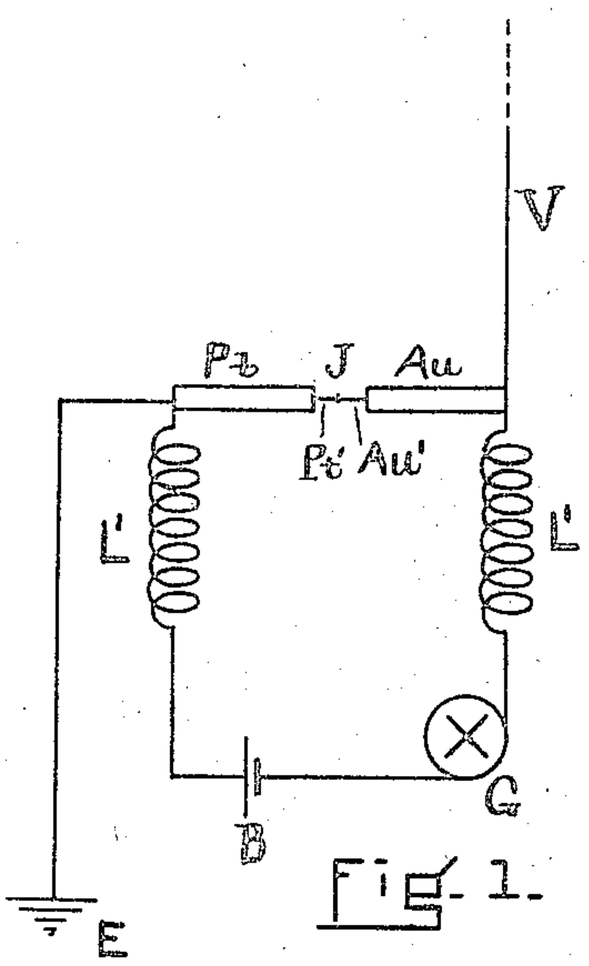

Fig. 1.

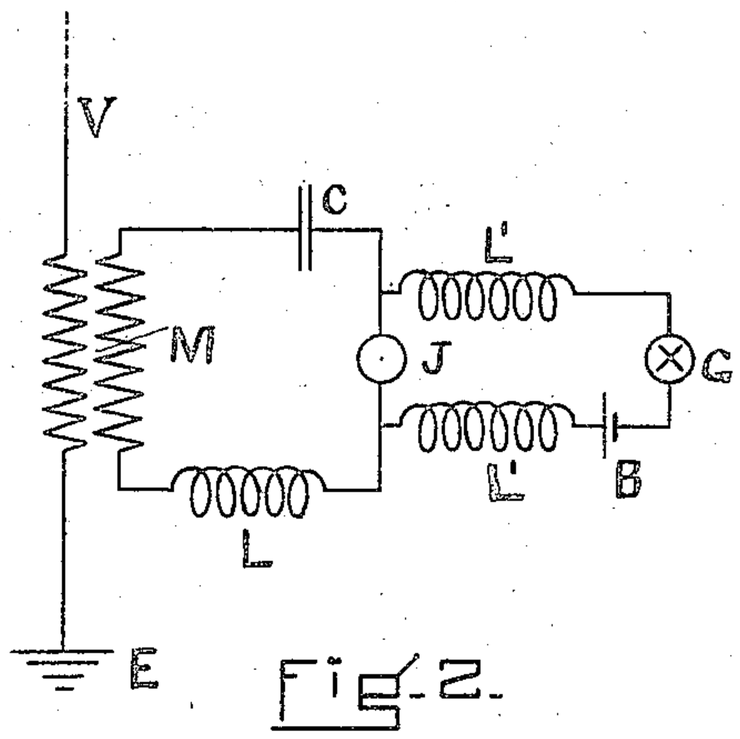

Fig. 2.

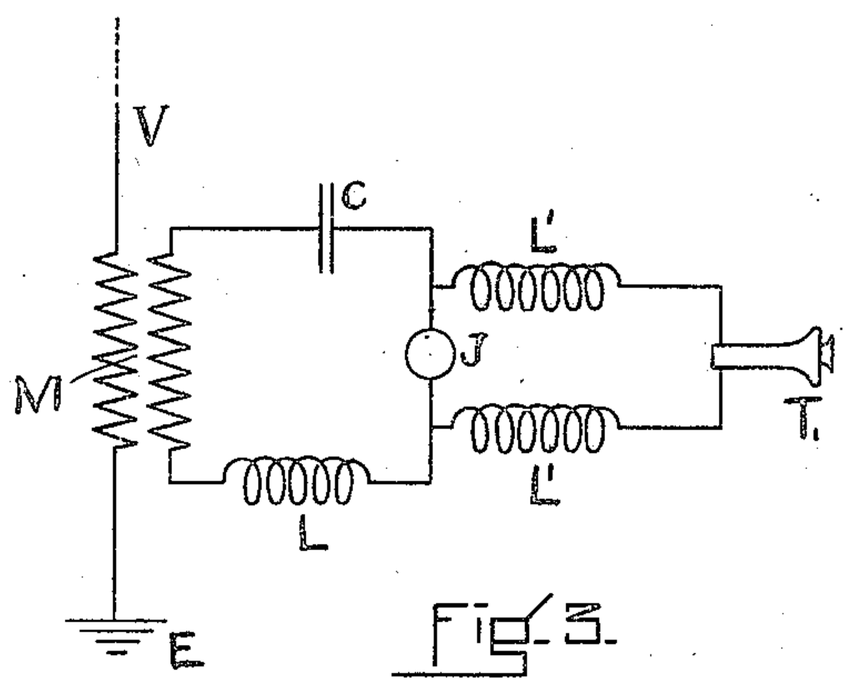

Fig. 3.

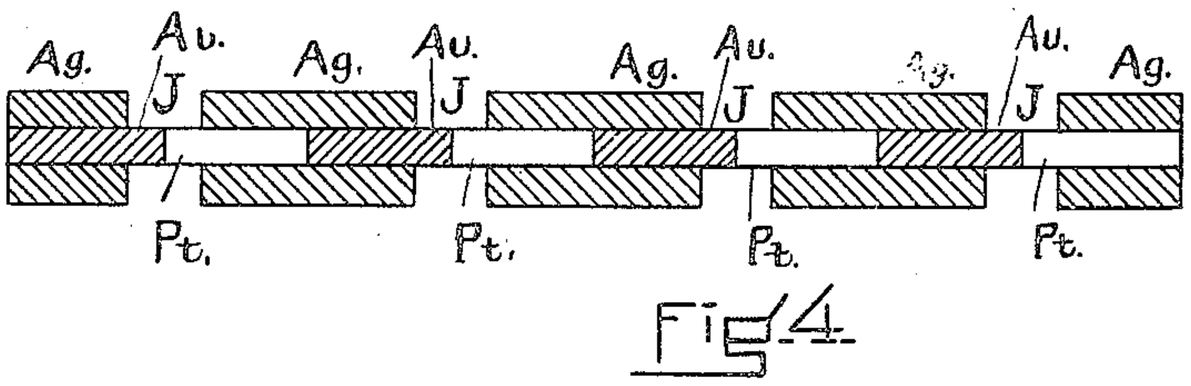

Fig. 4.

WITNESSES.

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No. 767,985. Patented August 16, 1904.

UNITED STATES PATENT OFFICE.

JOHN STONE STONE, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO WILLIAM W. SWAN, TRUSTEE, OF BROOKLINE, MASSACHUSETTS.

SPACE TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 767,985, dated August 16, 1904.

Application filed November 25, 1903. Serial No. 182,633. (No model.)

To all whom it may concern:

Be it known that I, JOHN STONE STONE, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Space Telegraphy, of which the following is a specification.

My invention relates to the art of space telegraphy in which signals are transmitted by means of electromagnetic waves without the use of wires to guide the waves to their destination; and it relates more particularly to a method of receiving the energy of such waves.

To receive the energy of the electromagnetic signal-waves and to produce the indication of intelligible signals, I employ a thermo-electric couple through which the energy of the electric oscillations developed in the receiving-wire is led and is thereby converted into heat, and this heat so developed causes a variation in the thermo-electric couple, and thereby produces an indication in a suitable signal-indicating device.

The invention may be best understood by having reference to the drawings which accompany and form a part of this specification.

In the drawings, Figures 1, 2, and 3 indicate in diagram various embodiments of my invention, and Fig. 4 shows in section a detail of construction hereinafter more fully described.

In the figures, V is an elevated receiving-conductor connected to earth at E. C is a condenser. L L′ are inductances. B is a battery. G is a galvanometer or other suitable signal-indicating device. T is a telephone, and J is a thermo-electric couple.

In Fig. 1, *Au* and *Pt* represent two relatively large conductors of gold and platinum, and *Au′* and *Pt′* represent two exceedingly fine wires or strips of gold and platinum forming the thermo-electric couple J. The temperature of the heated juncture J may be maintained by battery B at a temperature depending upon the position in the thermo-electric scale of the materials employed in the construction of the thermo-electric couple. The currents developed in the elevated conductor by electromagnetic waves are led through the thermo-electric couple and by changing the temperature thereof vary the electromotive force of the couple, which produces an indication in the galvanometer G or other suitable signal-indicating device. The choking-coils L L′ confine these currents to the path containing the couple and prevent their passage to earth by way of the galvanometer G and battery B.

In Fig. 2 the thermo-electric couple J is connected in series with the resonant circuit C M L, which is attuned to the frequency of the electromagnetic waves the energy of which is to be received.

In Fig. 3 is shown a system employing the thermo-electric couple in which no battery is used, but in which the telephone T or other suitable receiver is connected across the terminals of the couple J by means of conductors containing the choking-coils L′.

In the three systems illustrated the energy of the electromagnetic waves is changed into heat, and the heat so developed causes the production of thermo-electromotive forces which causes a current to flow through the signal-indicating device.

In Fig. 4 is shown one embodiment of a thermo-electric couple suitable for the purpose herein described. This couple is constructed by electrolytically depositing platinum upon a fine gold wire, then depositing gold in like manner upon the platinum, and repeating the process until a wire has been produced containing alternate lengths of gold and platinum. This wire is then reduced to a very fine diameter and the portions thereof immediately surrounding the alternate junctures of gold and platinum are coated with an insulating film—as, for example, a film of paraffin. The wire at this stage is placed in a bath containing a silver salt and plated to a thickness considerably greater than its diameter with silver, as shown at *Ag*, Fig. 3. The completed couple will have the appearance of a continuous wire, but when highly magnified will have the appearance of the conductor illustrated in Fig. 4, consisting of a plurality

of couples J in series, whereby the thermo-electromotive force developed by the heat generated by the oscillatory currents which pass through the series of couples is amplified in proportion to the number of couples employed.

An apparatus whereby the herein-described method may be carried out has been claimed in my application, Serial No. 184,282, filed December 8, 1903.

I claim—

1. The method of receiving space-telegraph signals which consists in absorbing the energy of electromagnetic signal-waves, conveying the energy of the resulting electric oscillations to a thermo-electric couple and operating a signal-indicating device by the thermo-electric currents developed by said couple.

2. The method of receiving space-telegraph signals which consists in absorbing the energy of electromagnetic signal-waves, converting the dissipative energy of the resulting electric oscillations into heat and utilizing the energy of the heat so produced to develop electric currents in a suitable signal-indicating device.

3. The method of receiving space-telegraph signals which consists in absorbing the energy of electromagnetic signal-waves by an elevated conductor, amplifying the resulting electric oscillations by means of a resonant circuit attuned to the frequency of said waves, converting the dissipative energy of the amplified oscillations into thermal energy, converting the thermal energy into the energy of electric currents and thereby operating a suitable signal-indicating device.

4. The method of receiving space-telegraph signals which consists in absorbing the energy of electromagnetic signal-waves, conveying the energy of the resulting electric oscillations to a thermo-electric couple, elevating the normal temperature of said thermo-electric couple, converting the energy of said electric oscillations into heat by means of the thermo-electric couple and operating a signal-indicating device by the thermo-electric currents thereby developed.

5. The method of receiving space-telegraph signals which consists in absorbing the energy of electromagnetic signal-waves, conveying the energy of the resulting electrical oscillations to a thermo-electric couple, regulating the temperature of said thermo-electric couple in accordance with the position in the thermo-electric scale of the elements forming said thermo-electric couple, converting the energy of said electrical oscillations into thermal energy at the thermo-electric couple and operating a signal-indicating device by the thermo-electric currents thereby developed.

In testimony whereof I have hereunto subscribed my name this 24th day of November, 1903.

JOHN STONE STONE.

Witnesses:

G. A. Higgins,

Brainerd T. Judkins.