No. 767,987. PATENTED AUG. 16, 1904.

J. S. STONE.

SPACE TELEGRAPHY.

APPLICATION FILED DEC. 8, 1903.

NO MODEL.

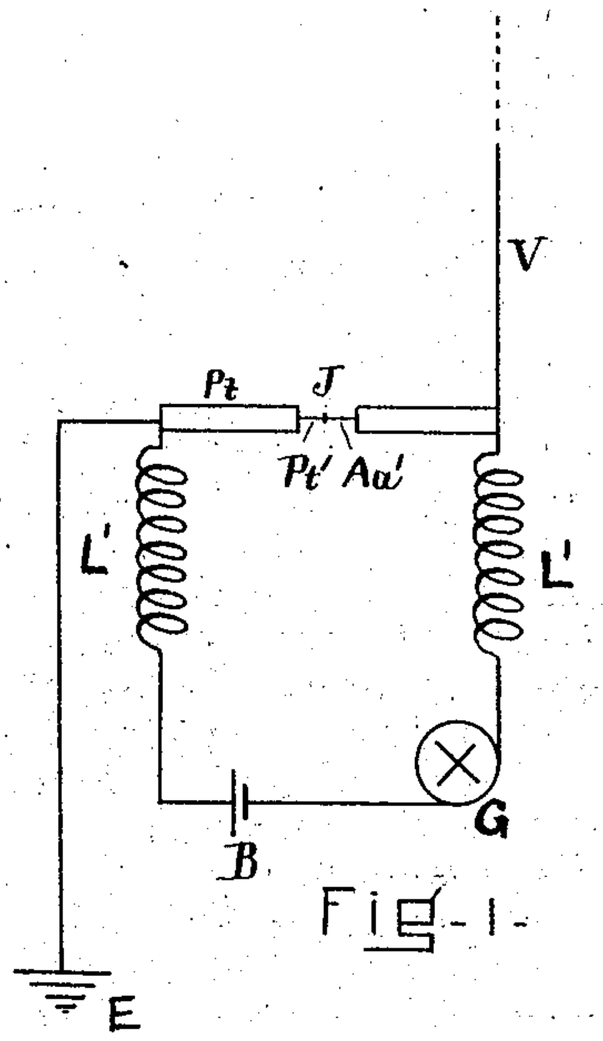

Fig. 1.

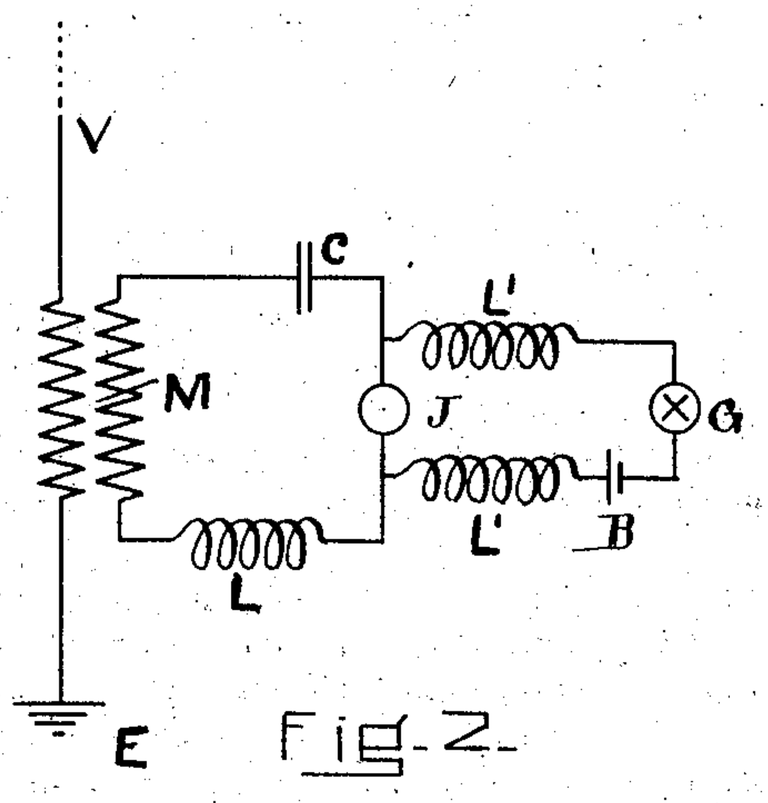

Fig. 2.

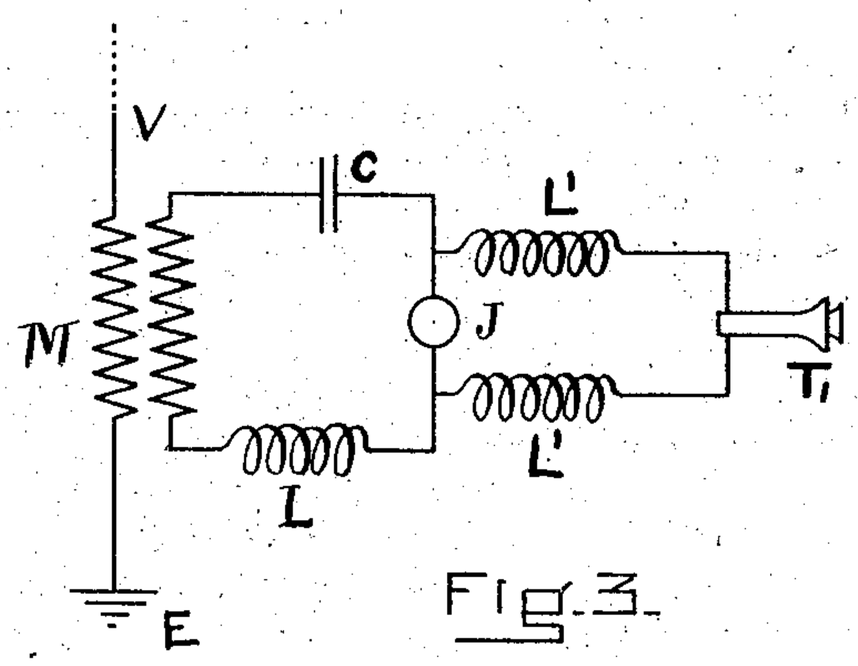

Fig. 3.

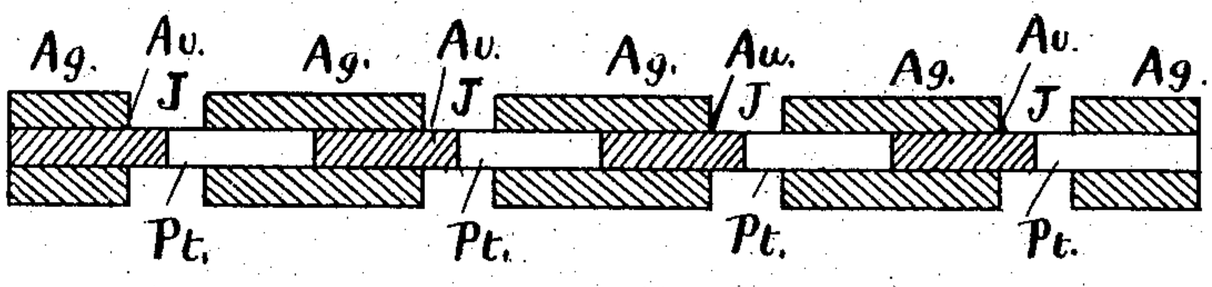

Fig. 4.

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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. 767,987, dated August 16, 1904.

Original application filed November 25, 1903, Serial No. 182,633. Divided and this application filed December 8, 1903. Serial No. 184,282. (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 certain 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 an apparatus for 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, A*u* and P*t* represent two relatively large conductors of gold and platinum, and A*u*′ and P*t*′ 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-electric motive forces which cause 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 A*g*, 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.

This application is a division of my application, Serial No. 182,633, filed November 25, 1903.

I claim—

1. A receiving apparatus for space-telegraph signals comprising a thermo-electric couple and a signal-indicating device adapted to be operated thereby.

2. A receiving apparatus for space-telegraph signals comprising a series of thermo-electric couples and means for elevating the normal temperature of said thermo-electric couples.

3. A receiving apparatus for space-telegraph signals comprising a thermo-electric couple, a signal-indicating device operated thereby and means for elevating the normal temperature of said thermo-electric couple.

4. A receiving apparatus for space-telegraph signals comprising a plurality of thermo-electric couples in series.

5. A receiving apparatus for space-telegraph signals comprising a thermo-electric couple, and means for elevating the normal temperature of said thermo-electric couple.

6. A receiving apparatus for space-telegraph signals comprising a thermo-electric couple and a source of electric current for elevating the normal temperature of said thermo-electric couple.

7. In a space-telegraph receiving system, a receiving-conductor and an apparatus for receiving space-telegraph signals comprising a thermo-electric couple operatively connected therewith.

8. In a space-telegraph receiving system, a receiving-conductor, an apparatus for receiving space-telegraph signals comprising a thermo-electric couple operatively connected therewith, and means for elevating the normal temperature of said thermo-electric couple.

9. In a space-telegraph receiving system, a resonant circuit and a thermo-electric couple connected in series with said resonant circuit.

10. In a space-telegraph receiving system, the combination of a receiving-conductor and a receiving apparatus for space-telegraph signals comprising means adapted to utilize the dissipative energy of the electrical oscillations created therein for the development of electric currents.

11. In a space-telegraph receiving system, the combination of a receiving-conductor and a receiving apparatus for space-telegraph signals comprising means adapted to convert the energy of the electrical oscillations developed therein into unidirectional electric currents.

12. In a space-telegraph receiving system, a receiving-conductor, a signal-indicating device and a receiving apparatus for space-telegraph signals operating by changes in its thermal condition to produce indications in said signal-indicating device without the interposition of a source of electric energy.

13. In a space-telegraph receiving system, a receiving-conductor, a signal-indicating device and a receiving apparatus for space-telegraph signals consisting of means for creating electric energy in said signal-indicating device.

14. A receiving apparatus for space-telegraph signals comprising a thermo-electric generator.

15. A receiving apparatus for space-telegraph signals comprising a thermo-electric couple, and means for 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.

In testimony whereof I have hereunto subscribed my name this 7th day of December, 1903.

JOHN STONE STONE.

Witnesses:

ALEX. P. BROWNE,

BRAINERD T. JUDKINS.