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SPACE TELEGRAPHY.

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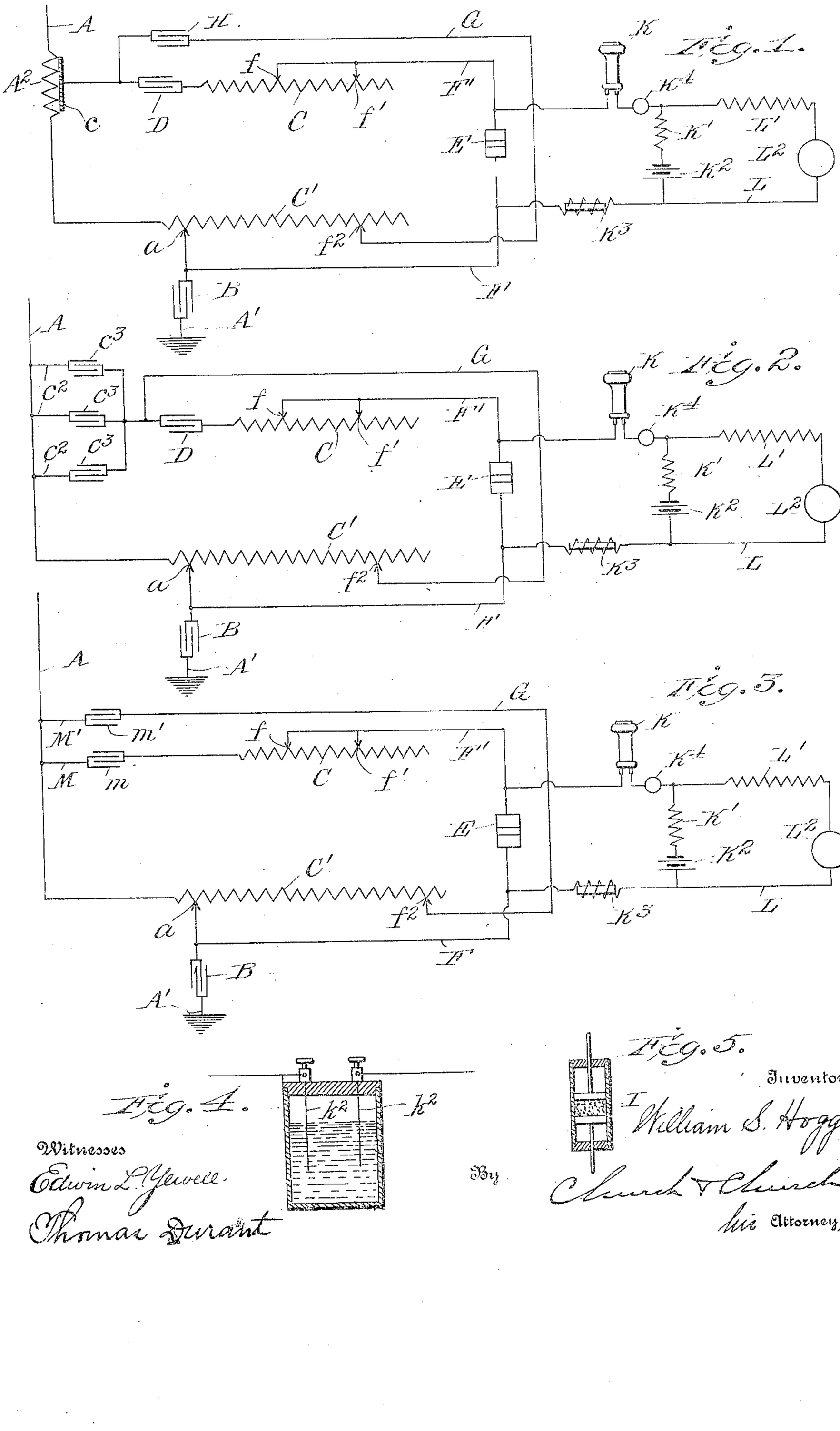

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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SPACE TELEGRAPHY.

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To all whom it may concern:

Be it known that I, WILLIAM S. HOGG, lieutenant-commander United States Navy, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Space Telegraphy; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to space telegraphy or the method of transmitting intelligence from one station to another by waves of energy transmitted through the natural media without the use of artificial conductors connecting the stations.

The objects of the invention are to prevent interference from outside sources; to provide a call at the receiving-station capable of use in connection with a telephonic receiver; to provide for the attuning of the apparatus and to provide an improved medium sensitive to the waves of energy arriving at the receiving-station.

The invention consists first in a system attuned to respond to waves of the character it is desired to receive and also tuned to waves of character other than those it is desired to receive, with means whereby the latter will not cause the receiver to respond and as a consequence the intelligence made manifest will correspond only to that transmitted by the waves of the selected character. The invention further consists in a system having a medium sensitive to the waves of energy transmitted through the natural media, combined with a local circuit including a telephonic or other receiver and having a high-resistance shunt including a call usually in the form of a galvanometer, siphon-recorder relay, or the like.

Finally the invention consists in certain novel arrangements of the circuits and instrumentalities, whereby attuning is facilitated, the calls and signals made distinct and positive and sensitiveness and steadiness secured, all as will be hereinafter described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a diagrammatic view of a receiving-station embodying the present improvements. Figs. 2 and 3 are similar views showing slightly-modified arrangements for preventing interference. Fig. 4 is a sectional view of the preferred form of polarization-cell employed in the present system. Fig. 5 is a sectional view of the cell of sensitive material.

Similar letters of reference in the several figures indicate like parts.

The aerial which may be of any usual or preferred construction is indicated by the letter A, grounded at A′ through a condenser B. Two inductance or tuning coils C C′, preferably performed by zizzag resistance-conductors, are employed in connection with the aerial. That lettered C′ is preferably in direct connection with the aerial and the ground is made through the adjustable connection *a* of the tuning-coil. The other tuning-coil lettered C is connected with the aerial through a condenser D and preferably at a series of points, thus as indicated in Fig. 1 the conductor of the aerial is bent into zigzag form at A^2 and a collector-plate *c* serves to take off the potential at each point, the arrangement, however, may be and under some circumstances preferably is as shown in Fig. 2 where the aerial is provided with a series of widely-separated connections c^2 each of which may have a condenser c^3 therein as shown.

The sensitive medium or coherer indicated at E is located in a local circuit to be presently described and connections between opposite sides of the coherer and aerial are established through adjustable connections with the respective tuning-coils and an additional or primary connection is made with one side through a second adjustable connection with one of said coils whereby through the first-mentioned connections both sides of the coherer may be connected to receive simultaneously waves of a certain character but to which it will not respond, presumably because the waves neutralize each other. The other connection however provides a path for the waves which it is desired shall affect the coherer and to which the local circuit will respond.

Referring to the drawings it will be seen that from one side of the coherer a connection F extends to the ground connection

above the condenser while from the other side of the coherer a connection F′ extends to two adjustable connections $f f'$ with the coil C. From the connection between the coil C and the aerial a connector G leads to an adjustable connection f^2 with the coil C′.

To prevent short-circuiting of the local circuit this connection is provided with a condenser H as shown in Fig. 1, and in Fig. 2 each of the connections c^2 is provided with a condenser c^3.

In operation the connection f is adjusted to attune the circuit containing the coherer with waves of the character it is desired to receive. If interference is manifest or develops, the connections $f' f^2$ are adjusted to attune the circuit-bridging or short-circuiting the coherer to the interfering waves when it is found that the latter waves will have no effect on the coherer as the changes in potential due to them will be the same on both sides of the coherer, especially if the coherer be constructed and arranged in a local circuit as will be now described.

The material of the coherer is of such character as to decohere without the use of a tapper and preferably is formed of a comminuted selinite of copper and nickel indicated at I Fig. 5. The proportions of the ingredients should be such as to form a uniform chemical combination or at least a surfacing of the particles. In practice I have used one part of an alloy of nickel and copper (an ordinary nickel coin) comminuted and mixed with five to ten per cent. by volume of selenium and heated. The ingredients combine with much heat forming a selinid of copper and nickel. It is then ground up or comminuted and is ready for use but in use is preferably mixed with an elastic material such as fine particles of soft rubber which it is found increases the range of adjustment and prevents caking. Obviously the sensitive material may be combined with other metal ingredients, such as mercury without departing from the invention, although advantages might accrue from the addition.

The local circuit in which the coherer is included also includes a telephonic receiver K, a resistance K′ battery K^2, choke-coil K^3 and a polarization-cell K^4. In addition, the said circuit has a shunt formed by a conductor L, said shunt including a relatively high resistance L′ and a call device, such, for instance, as a galvanometer, a siphon-recorder L^2, a relay or other device of like character.

The polarization-cell K^4 is preferably formed as shown diagrammatically in Fig. 4 by two lead electrodes k^2 partially immersed in a sulfuric-acid solution. The electrodes are preferably of fine wire or wire of just sufficient size to prevent material corrosion by the current. The cell with lead electrodes, it is found, acts as a regulator of the current through the telephone and causes the coherer to decohere promptly an effect which is not easily obtained and which does not seem to follow where a polarization-cell having platinum electrodes is employed.

Obviously the arrangement of the tuning-circuits may be varied considerably from the arrangements shown in Figs. 1 and 2 without departing from the invention and in Fig. 3 a variation is shown wherein the two tuning-circuits are connected with the aerial at different points, indicated at M and M′, condensers $m m'$ of course being interposed to prevent short-circuiting of the local circuit of the receiver.

In operation a small proportion only of the current from the local battery passes through the shunt and call. Variation in the main local circuit will cause a fluctuation of relatively wide range in the sensitive call located in the shunt and give indications to the attendant who will then take the message by means of the telephone-receiver as usual.

The call night be used also to take the message especially if it be a siphon-recorder but if it has a sluggish action the speed would be limited. Obviously both may be used and constitute a check upon each other.

I do not wish to confine the invention to any particular theory of operation as the application is based upon the results of practical demonstration, thus while non-interference may be due to a neutralization of the interfering waves in the coherer, it may on the other hand be due to the provision of an attuned path to ground or to a combination of the two. So too in the local circuit the resistance in the main and shunt circuits preferably bear the proportion of one hundred to ten thousand ohms but it is obvious that these proportions may be widely departed from and the proportionate resistances may be secured by the instruments such as the call, telephonic receiver, coherer, &c., without the use of special resistance-coils although the latter are preferably employed owing to the facility of adjustment to vary the relation between the main and shunt circuits.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In space telegraphy, a receiving-station system embodying an aerial, a local circuit including a battery and material sensitive to waves of energy received through the aerial and two circuits connected with the aerial, one attuned to the waves to which the sensitive material is to respond and the other attuned to interfering waves; substantially as described.

2. In space telegraphy, a receiving-station system embodying a sensitive material, an aerial, an attuned circuit connection from the

aerial to each side of the sensitive material, and a second attuned circuit connection from the aerial to one side of said sensitive material.

3. In space telegraphy, a receiving-station system embodying a grounded aerial, a sensitive material in a local receiver-circuit, separate attuned circuit connections from the aerial to opposite sides of the sensitive material, and a second attuned circuit connection from the aerial through said sensitive material to ground.

4. In space telegraphy a receiving-station system embodying a grounded aerial, a sensitive material in a local receiver-circuit, two tuning-coils connected with the aerial and connected respectively with opposite sides of the sensitive material, an adjustable connection between one of said coils and one side of said sensitive material and a ground connection with the opposite side of said sensitive material.

5. In space telegraphy a receiving-station system embodying an aerial, two tuning-coils connected therewith a sensitive material in a local receiver-circuit and included in circuit connections between said tuning-coils and a ground connection with one of said coils; substantially as described.

6. In space telegraphy, a receiving-station system embodying an aerial, a sensitive material in a local circuit, separate attuned circuit connections leading from the aerial to opposite sides of the sensitive material, a second attuned circuit connection leading to one side of said sensitive material and a ground connection with the opposite side of said sensitive material.

7. The described improvement in space telegraphy to prevent interference from outside sources, which consists in a sensitive material and circuit connections on both sides of the sensitive material attuned to accord with the interfering waves, the circuit connections on one side of said sensitive material being also attuned to accord with the waves it is desired to receive.

8. In space telegraphy, a receiving-station embodying a local circuit including a coherer, telephone-receiver and battery, and a high-resistance shunt around the battery including a call device.

9. In space telegraphy, a receiving-station embodying a local circuit including a sensitive material formed of a comminuted selinid of a metal, a receiver, battery and polarization-cell.

10. In space telegraphy, a receiving-station embodying a local circuit including a coherer, receiver, battery and a polarization-cell formed of electrodes having lead as a base immersed in an acid solution.

11. In space telegraphy a receiving station embodying a local circuit including a sensitive material formed of a comminuted selinid of a metal, a receiver, battery and a polarization-cell formed of lead electrodes immersed in an acid solution.

12. A receiving system for space telegraphy embodying a local circuit including a coherer, telephone-receiver, polarization-cell, resistance-coil and battery and a high-resistance shunt around the battery and resistance-coil and including a call.

13. In wireless telegraphy a receiving-station embodying an aerial, coherer, attuned circuit connections from the aerial to opposite sides of the coherer, an attuned circuit connection from the aerial to one side of the coherer, a local circuit including said coherer, a telephone-receiver, polarization-cell and battery and a shunt from said local circuit including a call.

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