No. 763,894. PATENTED JUNE 28, 1904.

W. S. HOGG.

COHERER.

APPLICATION FILED FEB. 9, 1903.

NO MODEL.

FIG. 1.

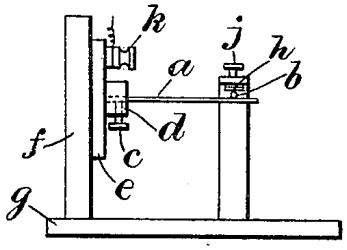
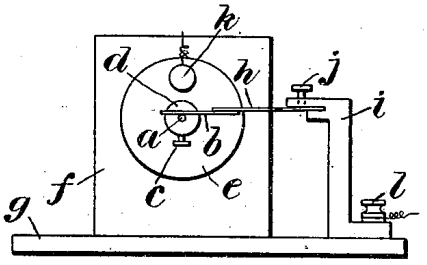


FIG. 2.



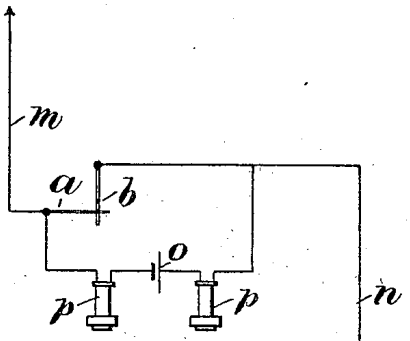


FIG. 3.

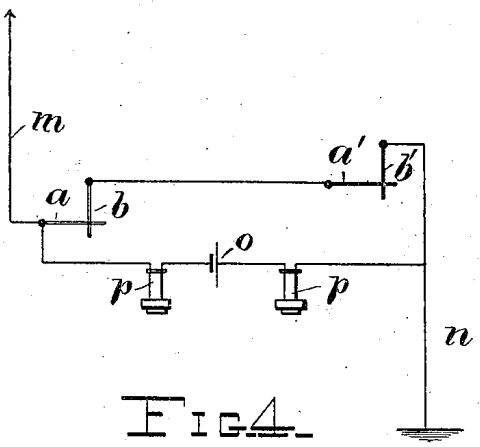


FIG. 4.

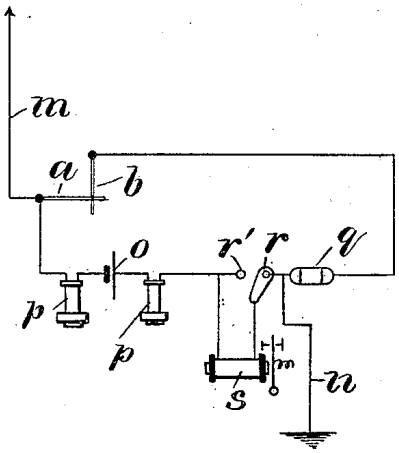


FIG. 5.

Witnesses

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No. 763,894. Patented June 28, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM STETSON HOGG, OF WASHINGTON, DISTRICT OF COLUMBIA.

COHERER.

SPECIFICATION forming part of Letters Patent No. 763,894, dated June 28, 1904.

Application filed February 9, 1903. Serial No. 142,578. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM STETSON HOGG, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Coherers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in receivers of electric waves for use in wireless telegraphy, and more especially to that class of receivers in which with imperfect contact there is an automatic decohering action. This decohering action I attain by the use of metallic or annealed selenium alone or in combination with metals in the form of selenids. Many selenids automatically decohere slowly; but selenids of iron and a selenid of German silver, nickel, copper, and zinc alloyed I have found excellent.

My improved receiver in one form consists of a stiff wire of German silver heated at the tip of the flame of a Bunsen burner, rubbed with selenium, and then heated over the flame to drive off excess of uncombined selenium and mounted in a suitable support in contact with a steel needle, which may be oxidized to a blue color. By treating the German-silver wire as above stated I produce a highly-crystalline mixture of selenids sensitive and self-decohering in action.

I have found that a single contact on account of its ease of regulation is preferable, and selenium with metals farther apart in the thermo-electric scale give the best results. A steel or oxidized-steel needle in imperfect contact with a selenited surface of German silver or a selenited-steel needle in contact with carbon give superior results. Of these two I consider the former preferable on account of there not being the microphonic action occurring in the latter.

My invention consists also in the use of a combination of contacts of a different character from each other, such as selenited steel and carbon and steel and selenited German silver connected in series or shunt with the receiver-battery.

My invention consists, further, in the use of a receiver which will automatically decohere in combination with one which will not automatically decohere or which will only partially decohere—such, for example, as a receiver having contacts of steel and selenited German silver—and one having contacts of steel and aluminium, both receivers connected in series or multiple with the receiver-battery, or I may use instead of the receiver of steel and aluminium a coherer of the ordinary type or, indeed, any coherer which will not entirely automatically decohere.

My invention further consists in the novel combination and arrangement of parts hereinafter described, and more particularly pointed out in the accompanying claims.

Referring to the accompanying drawings, Figure 1 represents a form of my improved receiver in side elevation; Fig. 2, a front elevation of the same; Fig. 3, a diagram showing the receiver connected in a wireless-telegraph circuit; Fig. 4, a diagram showing the use of two receivers connected in the receiver-battery circuit, and Fig. 5 a diagram showing one of my improved receivers connected in circuit with an ordinary coherer.

Similar letters refer to similar parts throughout the several views.

In the forms of my invention shown in the accompanying drawings, *a* represents the receiver-contact, consisting of selenium or selenids of metals—such as iron, German silver, nickel, copper, and zinc alloyed, and others—and *b* the contact, consisting of a steel needle, preferably oxidized to a blue color, or one of these contacts may be selenated steel and the other carbon. The contact *a* is secured by a thumb-screw *c* in a projection *d* of a metal disk *e*, fastened to an insulated upright *f*, mounted upon a suitable base *g*. The contact *b* crosses the contact *a* near its end where the two are normally in imperfect contact. The contact *b* is soldered or otherwise suitably secured to a delicate spring *h*, secured, as shown, in the upper end of the metal upright *i*. The degree of pressure between the contacts *a* and *b* is regulated by means of the screw *j*, which passes through the upper portion of the upright *i* and engages the spring *h*. The wires

are connected to the receiver by means of suitable binding-posts *k* and *l*.

In Fig. 3 I have shown one of the receivers connected in the receiving-circuit, where *m* represents the aerial wire; *n*, the earth-wire; *o*, the local receiver-battery, and *p p* telephone-receivers, one on each side of the battery. The telephone-receivers in this case act also as choke-coils. Obviously I may, if desired, employ only one telephone-receiver.

In Fig. 4 I have shown two receivers *a b* and *a' b'*, connected in series in the receiving-circuit. In this case the contacts used in one of the receivers may be different from those used in the other. For example, the contacts *a b* may be selenited German silver and steel, respectively, and the contacts *a' b'* selenited steel and carbon. If it is desired to have the contacts *a' b'* remain cohered and not automatically decohere, these contacts may be made of steel and German silver, respectively, or any other substances which will cohere, but not automatically decohere. I may also use as the non-decohering receiver a coherer of the ordinary form—that is, an ordinary filings-coherer without a tapper or other device to make it decohere. The effects of adding the second receiver *a' b'* or ordinary coherer are, among other things, to increase the resistance of the battery-circuit and, in case the contacts of the added receiver are of dissimilar thermo-electric metals, to more readily effect changes in electromotive force, since at such dissimilar thermo-electric contacts there are changes of electromotive force as well as of resistance, and actual experiments have shown in such a case there is a relatively greater sound effect in the telephone-receiver. With a comparatively small resistance in the battery-circuit the batteries run down quickly and the responsive contacts of the receivers change their microphonic action, with the results that the sounds in the telephone-receivers lose much of their clearness. With the high resistance there is a steady flow of current of very small amperage, which affects the batteries very slowly, and I have found that any changes of current or electromotive force are in this case much more readily detected by the telephone-receiver. Moreover, the changes in current, as actually shown by a milliampere-meter, are much less sudden and a great deal more regular with the high added resistance of the coherer or other receiver than without, so that a relay or its equivalent can be operated in the receiving-circuit as well as a telephone-receiver. This enables me to use a relay for producing the preliminary call and the telephone-receivers to receive the message, though the relay may, if desired, be made to record the message. Such an arrangement is shown in Fig. 5, where I employ as the non-decohering receiver the ordinary filings-coherer *q*, connected through a cut-out *r*, in circuit with a relay *s*, the telephone-receivers *p p*, battery *o*, and receiver *a b*. Assuming that both receivers *a b* and *q* are decohered and the switch *r* placed as shown in the diagram, then when an oscillation is developed in the vertical wire—say the oscillation intended for the call—this will traverse both receiver *a b* and coherer *q* and pass to earth by wire *n*, causing said receiver and coherer to cohere, whereupon current from the battery *o* will operate the relay *s*, which latter may be made to produce the call-signal or other signal in any desired manner. After the reception of the call-signal the switch *r* may be thrown over on contact *r'*, where the relay will be shunted. The telephone-receivers will then respond to the receiver *a b*, while the coherer *q* remains cohered. Any other receiver which will not automatically decohere may be substituted for the coherer *q*. Likewise any suitable receiver may be substituted for the telephone-receivers herein shown, since these constitute no part of my present invention.

What I claim as my invention is—

1. In wireless telegraphy, a receiver having one or more responsive contacts consisting of a selenid of a metal.

2. In wireless telegraphy, a receiver having one or more responsive self-restoring contacts embodying selenium.

3. In wireless telegraphy, a receiver having a self-restoring contact formed by a solid body embodying selenium.

4. In wireless telegraphy, a receiver having one or more responsive contacts consisting of a selenid of a metal and one or more responsive contacts consisting of a metal of a different character.

5. In wireless telegraphy, a receiver comprising one or more responsive contacts of carbon and one or more responsive contacts of a selenid of a metal.

6. In wireless telegraphy, a receiver comprising one or more responsive contacts of steel and one or more responsive contacts of a metallic selenid.

7. In wireless telegraphy, a receiver comprising one or more responsive contacts containing selenium and one or more responsive contacts of steel.

8. In wireless telegraphy, a receiver comprising one or more responsive contacts of carbon and one or more responsive contacts of selenited steel.

9. In wireless telegraphy, receiving apparatus comprising two or more wave-responsive contacts consisting respectively of oxidized steel and selenited German silver, and two or more wave-responsive contacts consisting respectively of selenited steel and carbon.

10. In wireless telegraphy, receiving apparatus comprising two coacting wave-responsive devices, one of which is self-restoring, and the other of which is not self-restoring.

11. In wireless telegraphy, receiving apparatus comprising two coacting wave-responsive devices, one of which is self-restoring, and the other non-self-restoring, and a signal-indicating device connected in circuit with both devices.

12. In wireless telegraphy, receiving apparatus, comprising two coacting wave-responsive devices one of which is self-restoring, and the other of which is non-self-restoring, a circuit common to both devices and a translating device connected in said circuit.

13. In wireless telegraphy, receiving apparatus, comprising two wave-responsive devices, one of which is self-restoring, and the other of which is non-self-restoring, a circuit common to both devices, a relay connected in and operated by said circuit, and a telephone-receiver also connected in said circuit, said relay being adapted to produce the preliminary call, and means for rendering said relay non-responsive after the reception of the call, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM STETSON HOGG.

Witnesses:
J. STEPHEN GIUSTA,
A. B. STELLE.