S. G. BROWN.

WIRELESS TELEGRAPHY.

APPLICATION FILED JUNE 3, 1904.

934,883.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

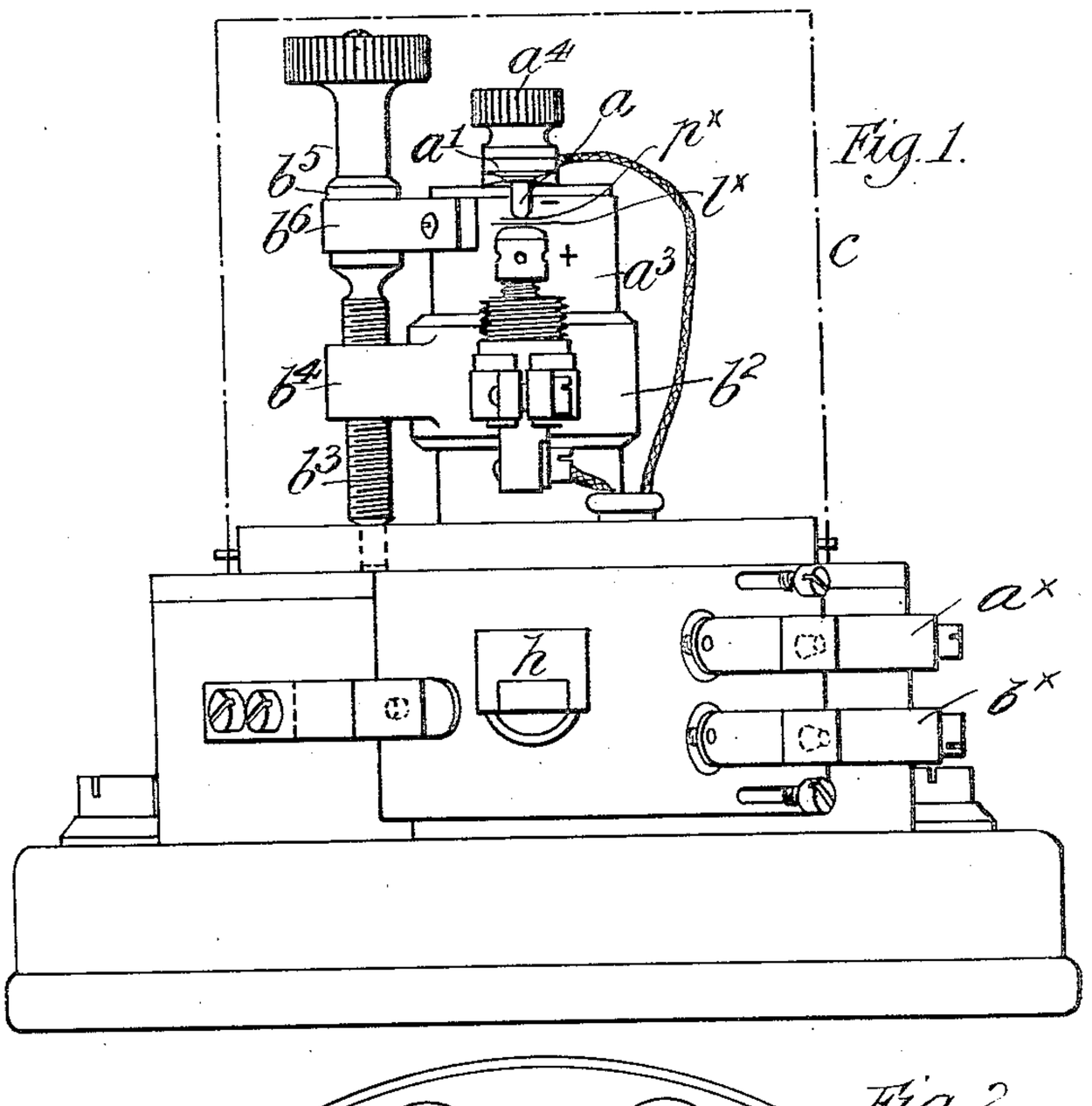

Fig. 1.

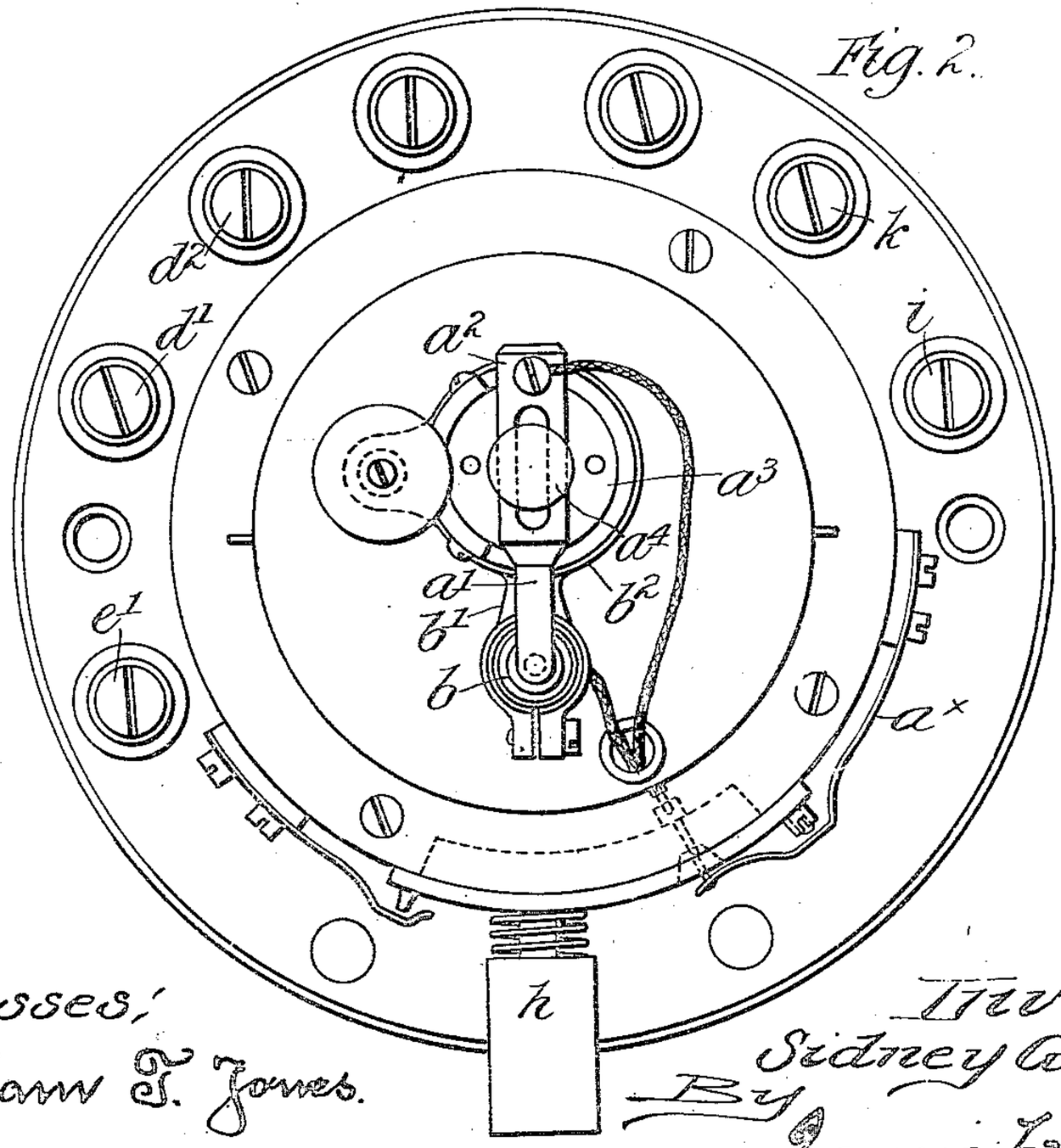

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

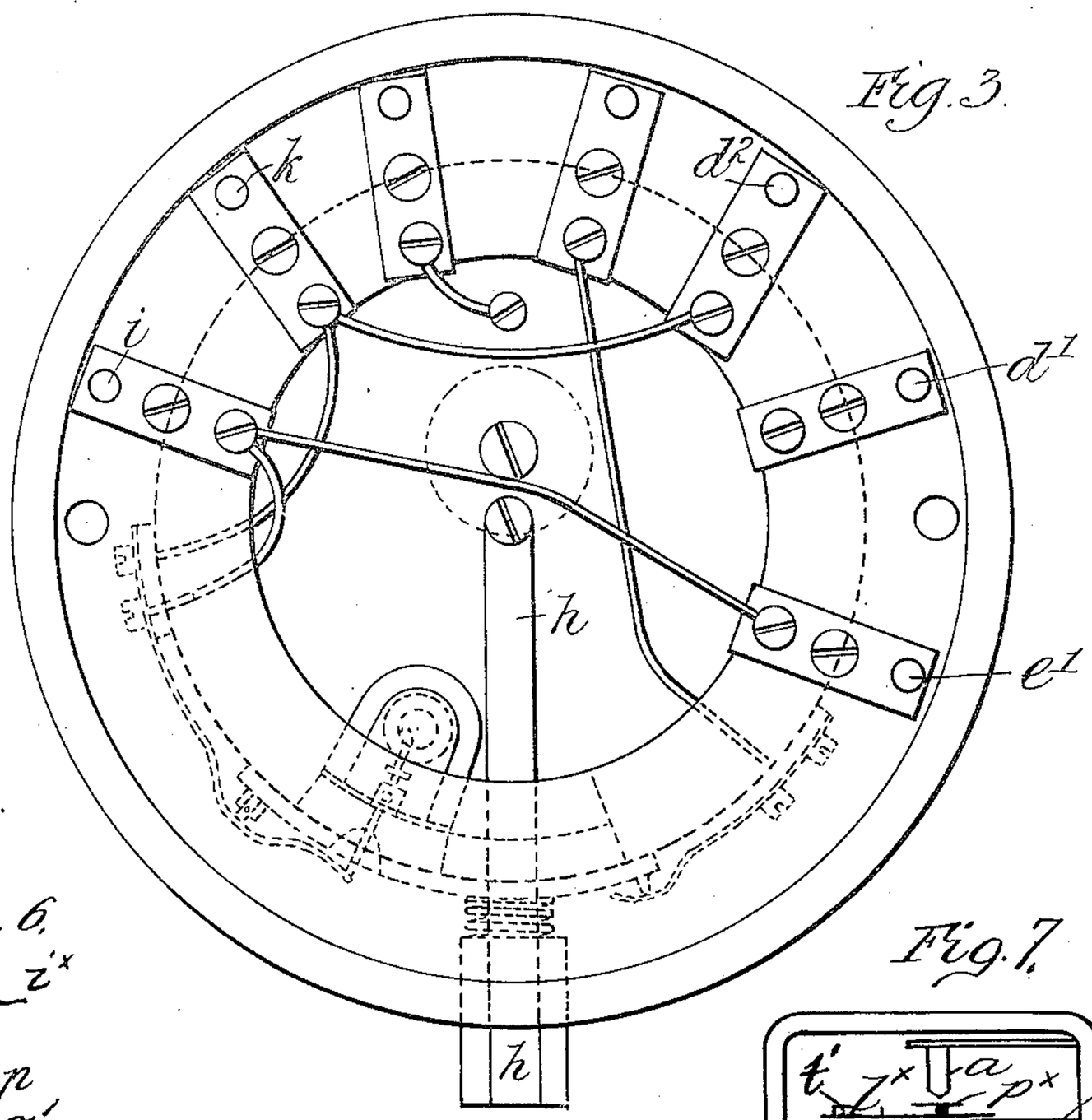


Fig. 6.

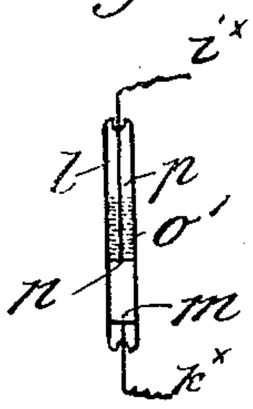


Fig. 7.

Fig. 4.

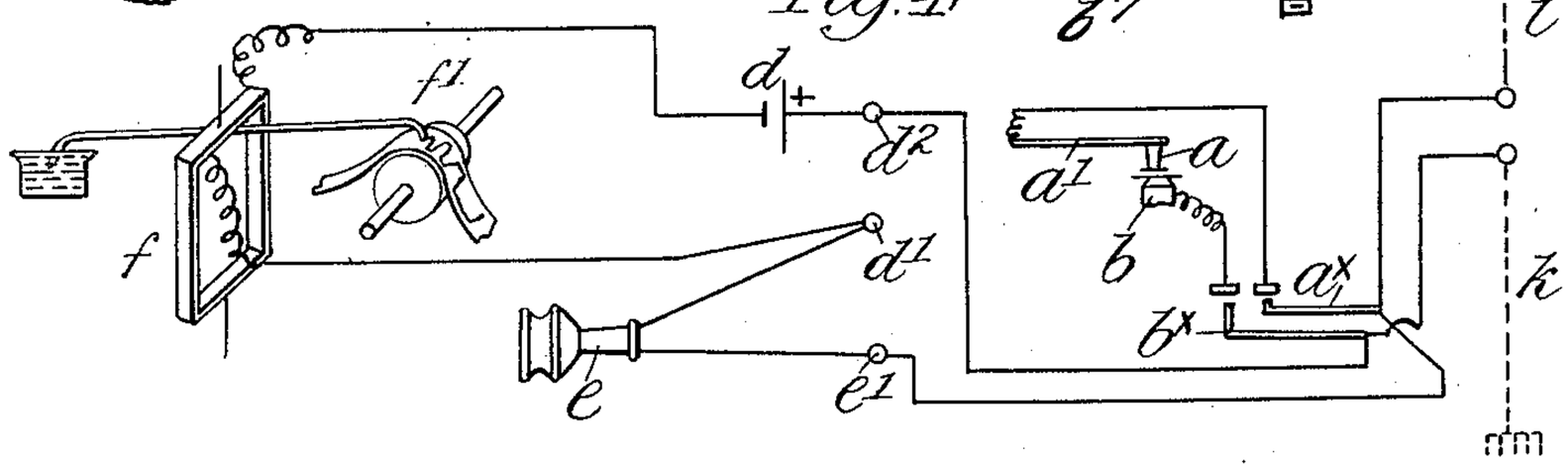
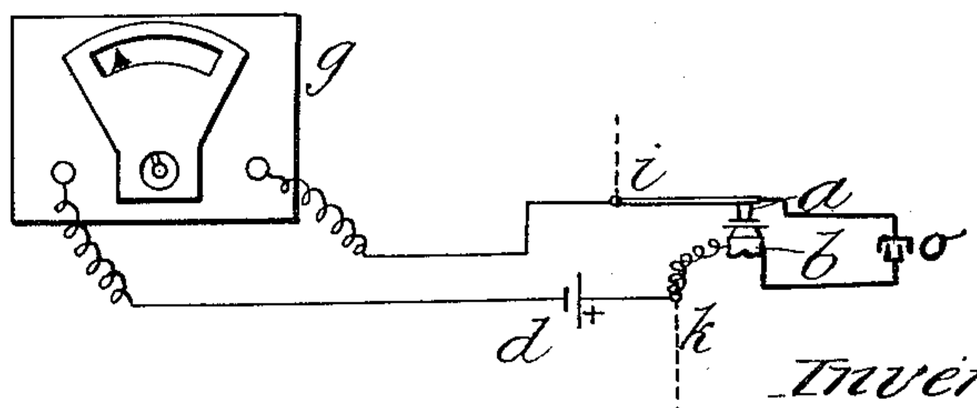


Fig. 5.



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UNITED STATES PATENT OFFICE.

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WIRELESS TELEGRAPHY.

934,883.

Specification of Letters Patent. **Patented Sept. 21, 1909.**

Application filed June 3, 1904. Serial No. 211,006.

To all whom it may concern:

Be it known that I, SIDNEY GEORGE BROWN, a subject of the King of Great Britain, residing at 4 Great Winchester street, in the city and county of London, England, electrical engineer, have invented certain new and useful Improvements Relating to Wireless Telegraphy, of which the following is a specification.

This invention relates to wireless telegraphy and consists in providing an instrument of great sensitiveness for receiving the signals or messages.

An essential feature of the invention consists in providing the contacts, or one of them with oxid or peroxid, such as is produced and obtainable from the exposed lead terminal of a storage battery. The said oxid or peroxid may be associated with a lead body; the contact being however effected between any suitable metal, such as lead, copper, mercury, etc. and lead covered with oxid or peroxid, such as found on the + exposed lead terminal of a storage battery. I find by experiment that different results are obtained by the use of oxids or peroxids of this character than are obtained by other means, and although I am at present unable to definitely explain this difference in action, I attribute it to the fact that the properties of electrically deposited peroxid of lead are of a different character from those of lead peroxid obtained in other ways. Electrically deposited peroxid is probably of a finer structure and more homogeneous than other peroxids, being more or less amorphous as distinguished from the crystalline structure of the other varieties.

In order that the said invention may be clearly understood and readily carried into effect I will proceed to describe the same with reference to the accompanying drawings, in which:—

Figure 1 is an elevation of a receiving instrument arranged for operation according to the present invention. Fig. 2 is a plan thereof, Fig. 3 is a view of the under side, the base plate being removed. Fig. 4 is a view illustrating diagrammatically the instrument in connection with a telephone and direct writer. Fig. 5 is a view illustrating the instrument in connection with a galvanometer. Fig. 6 is a diagrammatic view of a modified form of contact, and Fig. 7 is a diagrammatic view of a suitable means for using peroxid for the contacts.

The contacts, which may comprise an adjustable blunt point a and a plate b also capable of adjustment, are preferably superposed; the — being arranged, say, above the +. The + contact b may be lead having a deposition or coating of oxid or peroxid such as found on the + side of a storage battery as before mentioned. The upper or — contact a may be composed of lead coated with the reduced oxid as found on the — pole of a storage battery. The contacts may however comprise two lead contacts such as above referred to having a flake of the oxid or peroxid formed between them. The peroxid may moreover be conveniently deposited upon a thin lead plate and from which pieces may be cut or severed as required. The peroxid should however be disposed uppermost and in contact with the negative or upper contact as shown in the drawings wherein $p^{\times}$ and $l^{\times}$ respectively indicate the peroxid deposit and the lead plate.

The contacts may be inclosed in a metal case c and arranged in such a manner that the one may be pivoted or capable of vibratory or sliding movement and adapted to be adjusted for pressure by means of a spring or other suitable device, while the other may be rendered adjustable by any convenient means so that the position of contact and the degree of resistance may be regulated; the terminals being brought through the side so that connection may be made with the outer contacts. The contacts may be arranged as illustrated, the contact a being shown as mounted upon a plate a' of spring or pliable metal having a slotted portion a^2; the said plate a' a^2 being carried by the post a^3. A clamping screw a^4 is arranged upon the portion a^2 of the plate a' a^2 whereby the contact a may be adjusted in relation to the contact b. The contact b is carried by an arm b' projecting from a collar b^2 encircling the post a^3; the adjustment of the said contact being effected by the screw b^3 which works in the arm b^4 pertaining to the collar b^2. The screw is prevented moving longitudinally by means of the journal portion b^5 which works on the bearing b^6; the latter being attached to the post a^3. If necessary, the battery d may be placed in the inclosing casing c.

The contacts are preferably dry and may advantageously be placed under, or soaked in paraffin, oil, wax, or other material having like effects. The top contact may sometimes be composed of mercury.

Assuming the + contact *b* to be furnished with a deposit or coating of oxid or peroxid it may be coupled with the + pole of a two-volt storage battery such as *d*, the — contact *a* being coupled through a telephone, galvanometer, relay, or suspended coil recording direct writer, to the — pole of the said battery *d;* the terminal to the telephone being indicated at *c'*, that of the negative wire of the local battery circuit at *d'* and that of the positive wire of the local circuit at d^2.

In Fig. 4 the contact *a* is shown as coupled through a telephone *e* and the suspended coil *f* pertaining to a recording direct writer *f'*. In Fig. 5 the said contact is coupled through a galvanometer *g*. In both these figures the + contact *b* is coupled to the + pole of the battery *d*. $a\times$, $b\times$ are spring or lever contacts adapted for operation by the Hertz waves. *h* is the arm of a switch whereby the instrument may be rendered operative or inoperative. The aerial wire *i* and the earth wire *k* for working wireless telegraphy may be connected to the — and + contacts *a* and *b* respectively or vice versa. Under normal conditions, current flows through the contacts and around the circuit, having a certain value. Hertz waves however have the effect of increasing the resistance or liberating a back electro motive force of the contact, reducing the current and operating the recorder. It is found by experiment that the current is in unstable equilibrium and in readiness for the preponderating effect of the Hertz waves and hence the instrument possesses sensitiveness to a very great degree. The effect is to simply break the circuit of, preferably, a two volt battery by the peroxid contact which is placed on the positive side of the battery and a clean piece of lead on the negative side; the variation in the current due to Hertz waves or other electrical stimulus being indicated by a suitable instrument, such as a direct writer, relay, telephone, galvanometer, or any other instrument or combination of instruments suitable to employ.

Although I have mentioned certain metals as being appropriate for the purpose of my invention, I may, if found desirable, employ such allied metals as antimony, manganese, binoxid of manganese or the like with similar results.

The peroxid may be deposited on any metal adapted to receive the same. The top contact may as stated above be of mercury. It may be sealed in a suitable tube and by tilting the tube the pressure of the mercury on the peroxid may be varied, as shown in Fig. 6, wherein *l* represents an exhausted vessel which may conveniently be a glass tube of suitable dimensions, *m* a block of lead which is led to earth by a wire k^x, *n* the peroxid contact, *o'* the mercury, and *p* a piece of platinum wire running from the peroxid contact through the mercury and connected to the aerial wire i^x.

I have observed that if both the top and bottom contacts are peroxid, the action under the Hertz waves seems to be nil unless it is that the surface of the peroxid is under slightly different conditions. The effect seems however to vary with the metals employed and particularly with regard to the top contact, and it may be that metals other than lead may be found to be suitable therefor although, at present, clean lead has yielded the best results in practice.

The contact may be shunted by a condenser so as to steady the action and relieve the strain on the chemical as shown at *o* in Fig. 5.

For effectual working it may be necessary to produce the peroxid in commercial quantities. This may be successfully accomplished by electrolytic means and peroxid may be applied to a suitable base, such as platinum.

As stated above, the peroxid was originally discovered on the exposed terminal of a storage battery. If the lead covered with peroxid be cut under the liquid, it requires to be washed to free it from the acid.

When working in a vacuum, the chemical or the lead may be mounted on a spring and have attached an armature so that the pressure may be varied by an outside magnet. A suitable means for this purpose is shown diagrammatically in Fig. 7, wherein *a* and *b* represent the contacts, and p^x and l^x, respectively the peroxid deposit and the lead plate. The lead plate is shown as secured to a spring *t* and as carrying at its extremity an armature *t'* which may be acted upon by an exteriorly arranged magnet to vary the pressure.

A convenient manner of obtaining the peroxid is to place two lead strips each about three inches long and one quarter inch wide for about half their length in a solution composed of one part of sulfuric acid and twenty parts of water, and pass a current from a four volt accumulator battery through the solution from the one strip to the other; no additional resistance being interposed in the circuit. At the expiration of about one hour, that strip which is joined to the positive end of the battery will be found to be covered with a brown coating of peroxid. The strip is removed, washed in clean water, to remove the acid, and then dried. To prepare the same for use in the radioscope, the instrument hereinbefore described, a small piece of the lead covered with the peroxid is cut off; one side is carefully cleaned of

peroxid and placed in the radioscope so that the peroxid makes contact with the top clean lead contact (*a*). The chemical thus produced and prepared is very sensitive and reliable but its useful life is somewhat limited and it may require renewing from day to day.

If it be desired to produce a chemical having a lengthened life, the lead strips are prepared as previously described, but the positive strip—that is to say, the strip which is to receive the deposit of peroxid—is carefully cleaned and burnished so as to present a bright and perfectly smooth surface. The strips are placed as before in a solution such as described and the charging action started; the temperature of the solution being about 60° cent. As soon as the deposit commences to form, the temperature of the solution is raised to boiling point, about 102° C., the latter temperature and the charging being maintained for a period of about one hour. At the termination of this period there will be observable upon the strip a deposit having a black color. The strip should be removed, washed for a few seconds in boiling water to remove the acid when it should be dried. The surface of the peroxid may be rubbed gently with a dry cloth so as to render it more or less polished and to remove any loose particles of peroxid therefrom. It may then be cut and arranged for the radioscope in the manner previously described. In producing the peroxid according to this method it has been found expedient to include a sixty ohm resistance in the circuit of the four volt charging accumulator for the purpose of cutting down the current and insuring the deposit being formed in a firm adherent manner. The chemical thus obtained is composed of an electrical or polarized deposit of peroxid of lead.

I have observed that, in action, the radioscope shows a polarized effect in that, under normal conditions, with a two volt battery, the current will only flow from the peroxid to the top lead contact and not from the top lead contact, that is to say, not in the reverse direction. A very sensitive instrument is thus secured.

Though attended with difficulty in preparing, a similar electrical action has been obtained by the use of peroxid of bismuth.

Care must be taken to prevent the connecting wires from entering the solution or the purity of the chemical is endangered. The chemical being somewhat hygroscopic, it may be kept dry by placing say chlorid of calcium in the chamber, as shown at b^7 in Fig. 7.

What I claim and desire to secure by Letters Patent of the United States is:—

1. For use in wireless telegraphy, a receiving instrument comprising superposed contacts having arranged therebetween an electrically-deposited peroxid of lead which is obtained from the lead terminal of a storage battery.

2. For use in wireless telegraphy, a receiving instrument or radioscope having superposed contacts consisting of a blunt point and a plate having interposed therebetween electrically-deposited peroxid which is obtained from the lead terminal of a storage battery.

3. For use in wireless telegraphy, a receiving instrument or radioscope having superposed contacts consisting of a blunt point and a plate having interposed therebetween electrically-deposited peroxid of lead which is obtained from the lead terminal of a storage battery and means for adjusting the position of contact and degree of resistance of said contacts.

4. For use in wireless telegraphy as a detector of Hertz waves or electrical oscillations and adapted to increase the apparent resistance under the influence of Hertz waves, the combination of electrically-deposited peroxid, platinum, and lead.

5. For use in wireless telegraphy as a detector of Hertz waves or electrical oscillations and adapted to increase the apparent resistance under the influence of Hertz waves, the combination of electrically-deposited peroxid, platinum, lead, and means for adjusting the position of contact and degree of resistance of said bodies.

6. A detector of Hertz waves comprising a peroxid applied to lead and lead upon which the peroxid is deposited electrically and in contact with a platinum contact.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses this thirteenth day of May 1904.

SIDNEY GEORGE BROWN.

Witnesses:
FREDY WARDLE,
WALTER J. SKERTEN.