N° 2283 A.D. 1907

Date of Application, 29th Jan., 1907

Complete Specification Left, 29th July, 1907—Accepted, 29th Jan., 1908

PROVISIONAL SPECIFICATION.

"Improvements in, and relating to, Coherers for Wireless Telegraphy."

I, ALEXANDER MUIRHEAD, of The Lodge, Shortlands, in the County of Kent, D.Sc., F.R.S., Telegraph Engineer, do hereby declare the nature of this invention to be as follows:—

My invention relates to coherers, especially those of the type which is described and claimed in the Specification of Letters Patent No. 11575 of 1897 (see page 7, lines 5 to 36) granted to Sir Oliver J. Lodge. In this specification a coherer is described which consists of a "needle point of steel or platinum making a light contact on a flat metallic surface of steel or aluminium or other spring like a watch spring, straight or bent, usually fixed at one end and delicately adjustable by a thumb-screw at some other part, so as to regulate the pressure which it exerts on the fixed needle point." When a telephone is used as the receiving instrument this coherer is found to restore itself sufficiently from the cohesion caused by any electrical stimulus without specially arranged means for effecting decoherence.

The drawback to this coherer is its extreme sensitiveness to tremors and outside disturbances rendering it useless for field purposes.

To overcome this defect is the object of my invention and to achieve it the delicate spring is abolished, both the metallic surface and the needle point are fixed, the latter being adjusted into close proximity to the former by means of a thumb-screw or other means, and the whole placed at the bottom of a column of any suitable heavy viscous liquid, such as heavy paraffin oil, machine oil or glycerine, contained in a suitable vessel.

It is found that the hydrostatic pressure and the elasticity or viscosity of the liquid when of the right amount are sufficient to make the coherer respond well to a rapid succession of electrical impulses without the aid of any outside tremor. Any variation of the viscosity of the liquid due to temperature can be rectified by varying the hydrostatic pressure on the coherer.

Instead of a metallic surface of steel, one of carbon or graphite, or any other suitable material may be used.

A convenient way of regulating the hydrostatic pressure is to mount the vessel which contains the coherer and the liquid employed on pivots at its base and to turn it through an angle until the maximum effect on the coherer is produced when it is exposed to any electrical stimulus in the resonant circuit of a system of wireless telegraphic apparatus.

Sometimes when a louder effect in the telephone receiver is desired the viscous liquid is kept constantly flowing, very slowly, past the needle point of the coherer. In one form of the apparatus designed to carry out this a supply of the viscous liquid is contained in a vessel and the liquid allowed to flow slowly from it through the cell in which the coherer is mounted into another vessel beneath. In another form of the apparatus, one more portable and more suitable for military purposes, the coherer is placed in a narrow tube connecting two closed vessels and the combination is pivotted so that it can be reversed when the supply of the viscous liquid has run out completely from the upper

[*Price* 8*d*.]

vessel into the lower one and thus a continuous flow of liquid past the coherer is kept up.

Sometimes platinum and zinc are used in place of the steel needle and carbon.

Coherers made in accordance with this invention are very useful in the receiving circuit of the so-called 'overflow' system of wireless telegraphy described and claimed in Letters Patent No. 11348 of 1901 granted to Sir Oliver J. Lodge and myself, and by adopting the revolving switch or commutator described and claimed in Letters Patent No. 29069 of 1897 (see page 5, lines 13 to 43 of the specification) in this connection an increased effect on the receiving instrument is produced. The revolving switch in this case is designed only to successively connect the coherer with the secondary circuit of the transformer of the syntonic receiver and the receiving instrument, no means for effecting decoherence being required.

Dated this 29th day of January 1907.

A. F. SPOONER,
323 High Holborn, London.
Agent for the Applicant.

COMPLETE SPECIFICATION.

"Improvements in, and relating to, Coherers for Wireless Telegraphy."

I, ALEXANDER MUIRHEAD, of The Lodge, Shortlands, in the County of Kent, D.Sc., F.R.S., Telegraph Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to coherers of the type which is described and claimed in the Specification of Letters Patent No. 11575 of 1897 (see page 7, lines 5 to 36) granted to Sir Oliver J. Lodge. In this specification a coherer is described which consists of a "needle point of steel or platinum making a light contact on a flat metallic surface of steel or aluminium or other spring like a watch spring, straight or bent, usually fixed at one end and delicately adjustable by a thumb-screw at some other part, so as to regulate the pressure which it exerts on the fixed needle point." When a telephone is used as the receiving instrument this coherer is found to restore itself sufficiently from the cohesion caused by any electrical stimulus without specially arranged means for effecting decoherence.

The drawback to this coherer is its extreme sensitiveness to tremors and outside disturbances rendering it useless for field purposes.

To overcome this defect is the object of my invention and to achieve it the delicate spring is abolished, both the metallic surface and the needle point are fixed, the latter being adjusted into close proximity to the former by means of a thumb-screw or other means, and the whole placed at the bottom of a column of any suitable heavy viscous liquid, such as heavy paraffin oil, machine oil or glycerine, contained in a suitable vessel.

It is found that the hydrostatic pressure and the elasticity or viscosity of the liquid when of the right amount is sufficient to make the coherer respond or decohere well to a rapid succession of electrical impulses without the aid of any outside tremor. Any variation of the viscosity of the liquid due to temperature can be rectified by varying the hydrostatic pressure on the coherer.

Instead of a metallic surface of steel, one of carbon or graphite, or any other suitable material may be used.

A convenient way of regulating the hydrostatic pressure is to mount the vessel which contains the coherer and the liquid employed on pivots at its

base and to turn it through an angle until the maximum effect on the coherer is produced when it is exposed to any electrical stimulus in the resonant circuit of a system of wireless telegraphic apparatus.

Sometimes when a louder effect in the telephone receiver is desired the viscous liquid is kept constantly flowing, but very slowly, past the needle point of the coherer. In one form of the apparatus designed to carry out this a supply of the viscous liquid is contained in a vessel and the liquid allowed to flow slowly from it through the cell in which the coherer is mounted into another vessel beneath. In another form of the apparatus, one more portable and more suitable for military purposes, the coherer is placed in a narrow tube connecting two closed vessels and the combination is pivotted so that it can be reversed when the supply of the viscous liquid has run out completely from the upper vessel into the lower one and thus a continuous flow of liquid past the coherer is kept up. Consequently in these two constructions the column of liquid may be assumed as movable, and as stationary in forms where the liquid does not flow.

In a further modification the vessel is provided with a piston device adapted to increase the pressure of the liquid and therefore the pressure on the needle and surface, whereby the loudness of the sound in the telephone receiver is increased.

Sometimes platinum and zinc are used in place of the steel needle and carbon.

Coherers made in accordance with this invention are very useful in the receiving circuit of the so-called 'overflow' system of wireless telegraphy described and claimed in Letters Patent No. 11348 of 1901 granted to Sir Oliver J. Lodge and myself, and by adopting the revolving switch or commutator described and claimed in Letters Patent No. 29069 of 1897 (see page 5, lines 13 to 43 of the specification) in this connection an increased effect on the receiving instrument is produced. The revolving switch in this case is designed only to successively connect the coherer with the secondary circuit of the transformer of the syntonic receiver and the receiving instrument, no means for effecting decoherence being required.

Two constructions embodying my invention are illustrated, by way of example, in the accompanying drawings to which I will now refer, and wherein:—

Figure 1 is a sectional elevation of one form, with the column of liquid stationary; and

Figure 2 is a plan thereof.

Figure 3 is a sectional elevation of the other form, and represents a construction where the column of liquid is movable; and

Figure 4 is a plan of the same.

The same letters of reference are used throughout to designate the same or corresponding parts, and of them *a* is the needle point and *b* is the complementary surface, the two constituting the component parts of the coherer proper, whilst *c* is the vessel containing the viscous liquid. The vessel *c* is rotatably mounted at *d*, *d* in frames *e*, *e* furnished with the customary terminals *f*, *f*, and fixed on a base *g*. The needle *a* is secured to an adjusting screw *h* whose nut *i* serves as one pivot or trunnion *d* of the vessel *c*, whilst the surface *b* is resiliently arranged in a casing *j* forming the other pivot or trunnion *d*, the whole being arranged and set up in the frames *e*, *e* by spring washers *k*, *k*, as clearly shown in Figures 1 and 3.

In Figures 1 and 2 the column of liquid is, as already stated, stationary in the vessel *c* with regard to the needle *a* and surface *b*, whereas in Figures 3 and 4 the column is movable so that the liquid constantly flows past them; this, therefore, necessitates the duplex form of the vessel *c* represented. Each vessel *c* is connected to a common hollow intermediate piece *l* enclosing the needle *a* and surface *b* and communicates therewith through a nozzle *m* whose area of discharge is controlled by an adjustable needle valve *n* so that the rate of flow of the liquid can be easily regulated. Each vessel *c* is also furnished with

an air vent *o* which can be opened and closed as required by a screw valve *p*. Thus the liquid flows from the upper vessel *c* to the lower one, and when the former is empty the combination is rotated about the points *d*, *d* to obtain the required reversal as previously explained.

Further, by turning either the form of vessel *c* shown in Figures 1 and 2, or that shown in Figures 3 and 4, about the points *d*, *d* it will be seen the hydrostatic pressure of the liquid can be easily regulated, the maintenance of the required position of the vessel *c* being effected by the spring washers *k*, *k* or otherwise suitably.

The needle *a* and surface *b* are made of any of the materials mentioned, and, of course, the other parts are made of any material that may be suitable; whilst the whole is, or may be, enclosed in a box of appropriate metal or other material, the opening or openings for the connecting wires to the receiver being arranged to be closed during the signalling periods.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1 A coherer of the type referred to, having the component parts situated at the bottom of a column of heavy or viscous liquid, for the purposes set forth.

2. A coherer of the type referred to, wherein the component parts are situated at the bottom of a column of heavy or viscous liquid, and wherein the hydrostatic pressure is regulated by varying the effective height of the column of liquid above the component parts.

3. A coherer of the type referred to wherein the component parts are situated at the bottom of a column of heavy or viscous liquid, and wherein the liquid is kept constantly flowing or dripping past the surfaces of contact of the component parts, for the purposes specified.

4. A coherer of the type referred to, comprising the combination with the component parts thereof, of a rotatably-mounted vessel enclosing the said parts and containing a heavy or viscous liquid.

5. The combination of parts constituting a complete coherer, all arranged and operating substantially as described with reference to, and as illustrated in Figures 1 and 2, or Figures 3 and 4 of the accompanying drawings.

Dated this 29th day of July 1907.

A. F. SPOONER,
323 High Holborn, London,
Agent for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1908.

A.D. 1907. JAN. 29. No 2283.
MUIRHEAD'S COMPLETE SPECIFICATION.

(2 SHEET)

[This Drawing is a reproduction of the Original on a reduced scale]

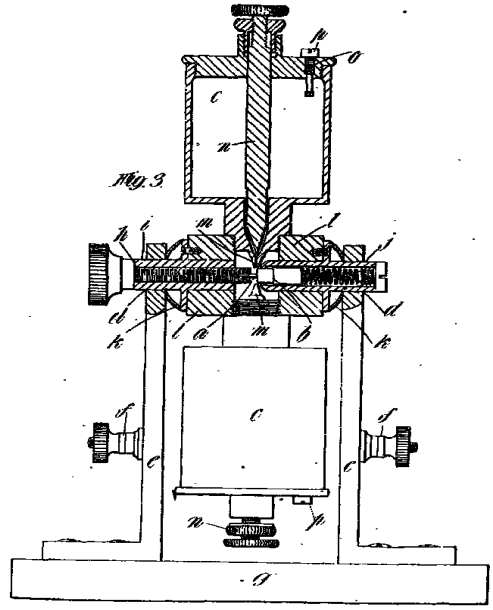

Fig. 3

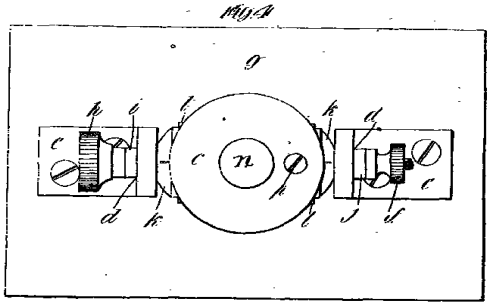

Fig. 4

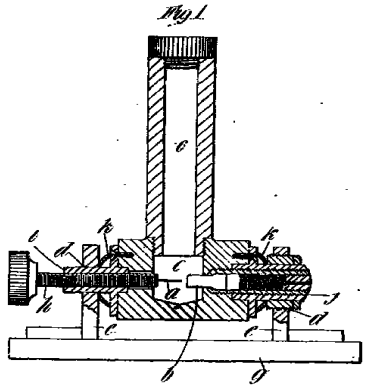

Fig. 1

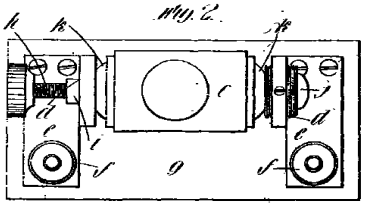

Fig. 2

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Fig. 3.

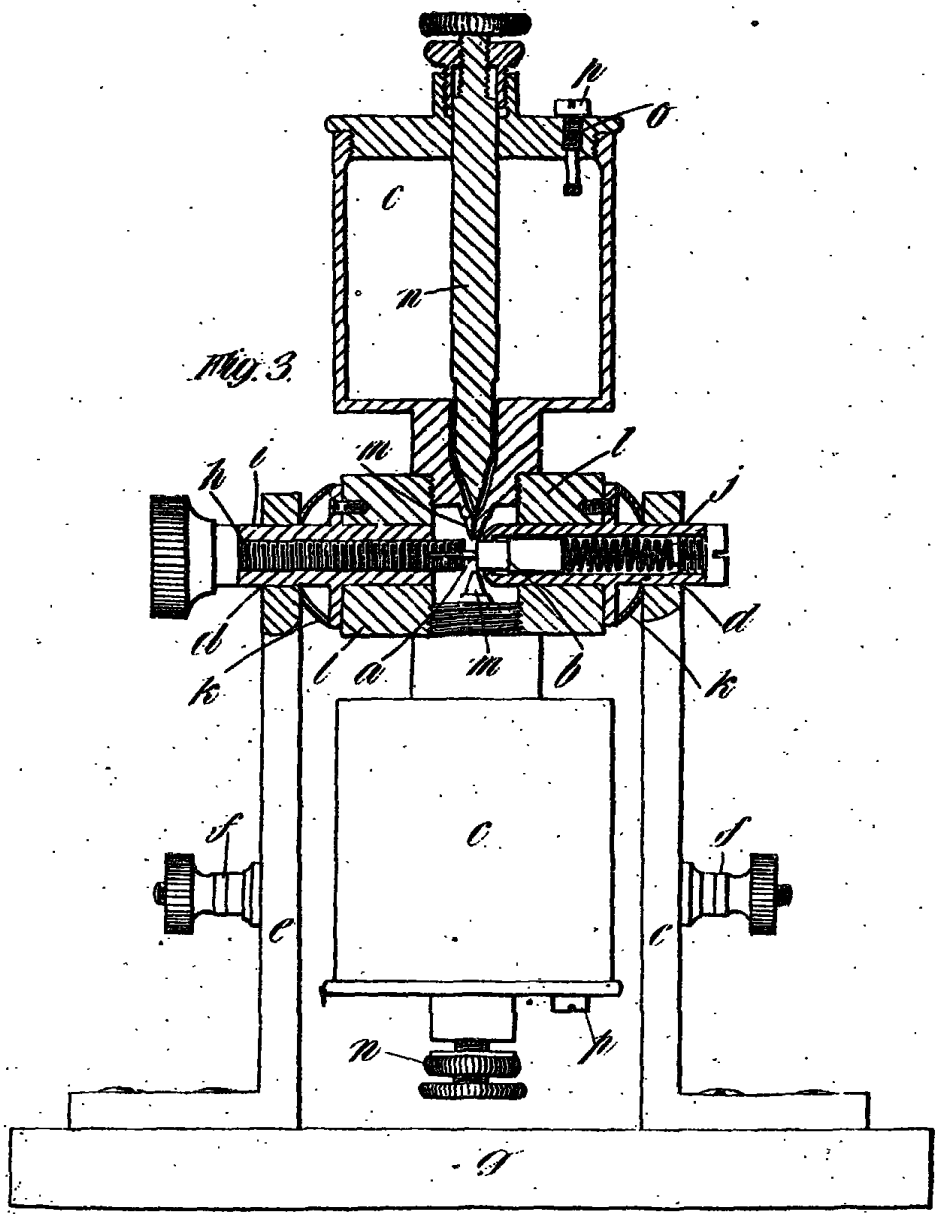


Fig. 4.

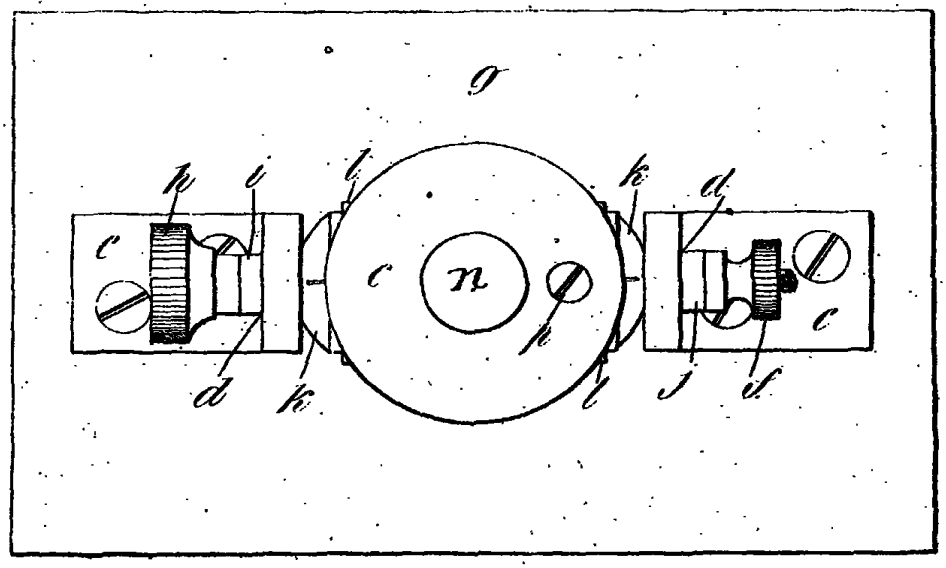


Fig. 1.

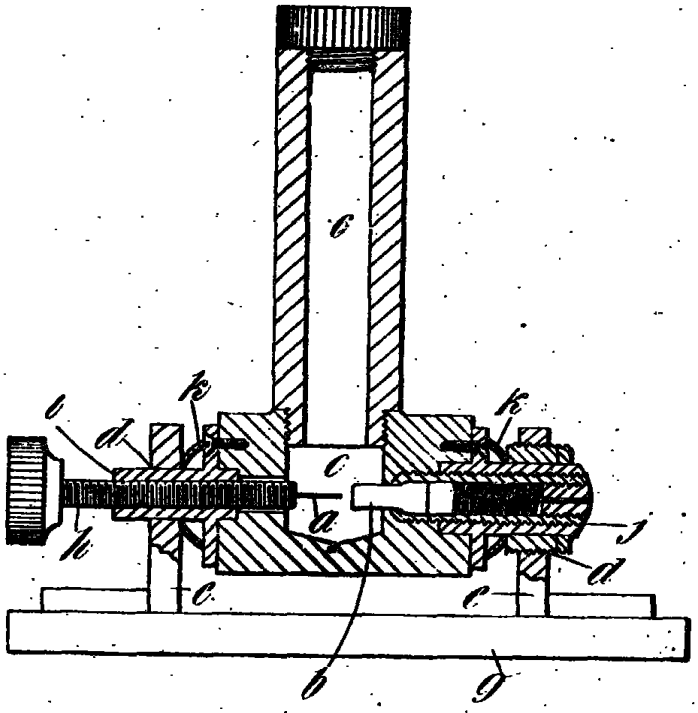
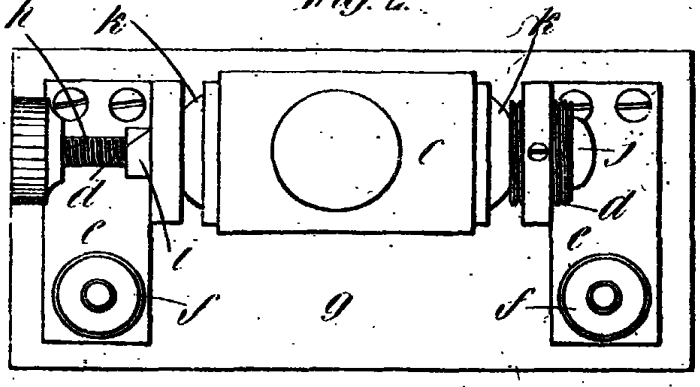


Fig. 2.



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