C. WALKER.

COHERER FOR WIRELESS TELEGRAPH SYSTEMS.

APPLICATION FILED MAY 5, 1909.

968,007.

Patented Aug. 23, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

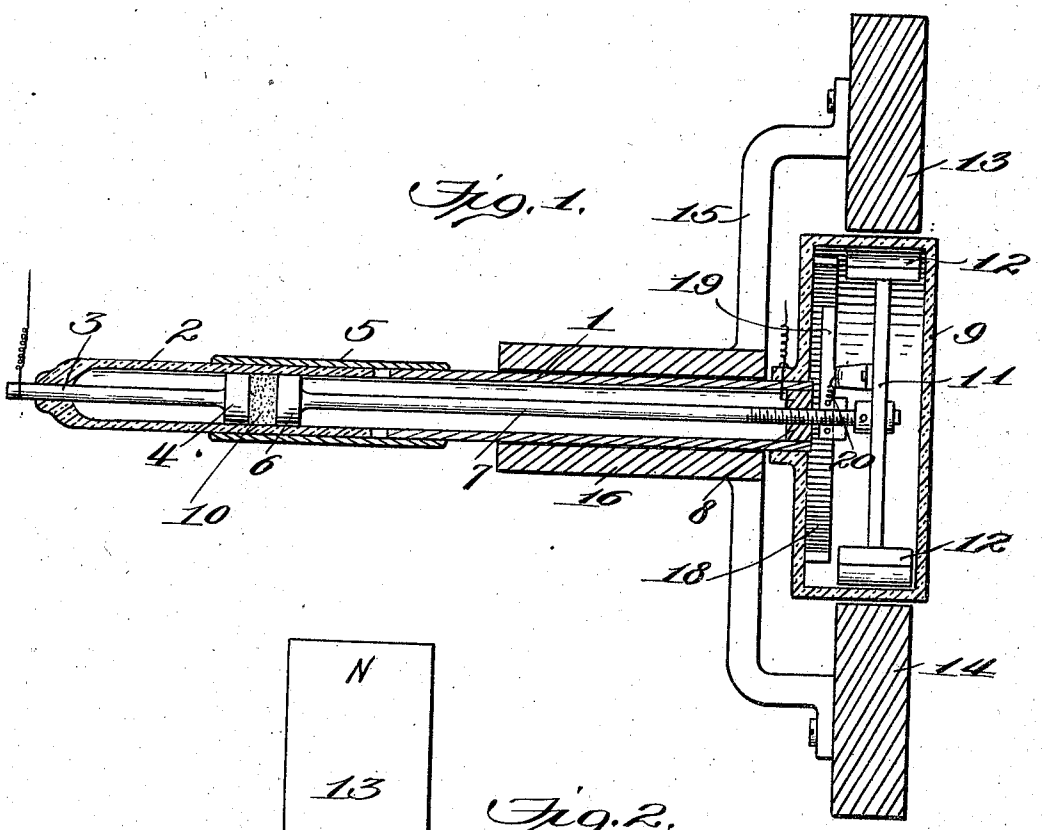
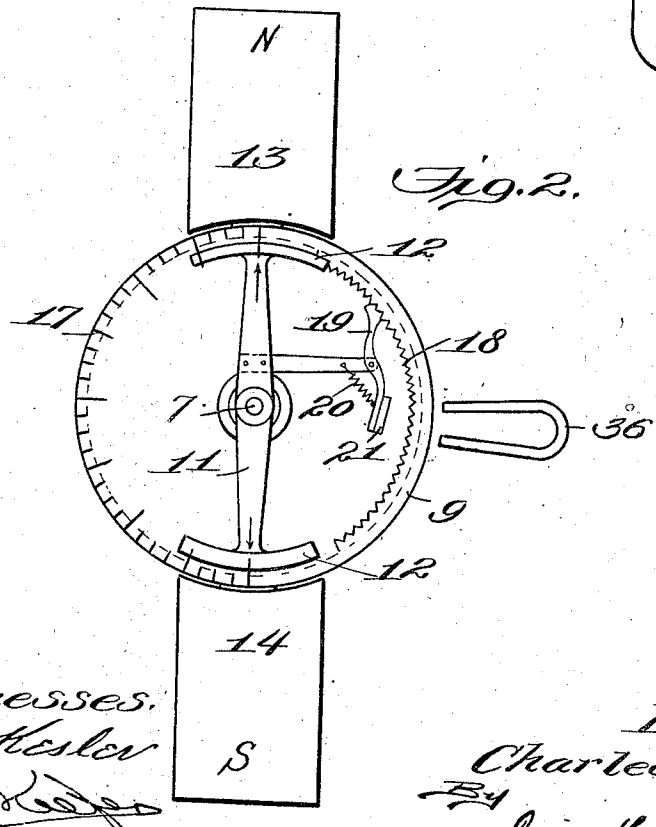


Fig. 2.



Witnesses.
C. C. Kesler
W. B. Kesler

Inventor
Charles Walker
By
James L. Norris
Atty.

C. WALKER.

COHERER FOR WIRELESS TELEGRAPH SYSTEMS.

APPLICATION FILED MAY 5, 1909.

968,007.

Patented Aug. 23, 1910.

2 SHEETS—SHEET 2.

Fig. 3.

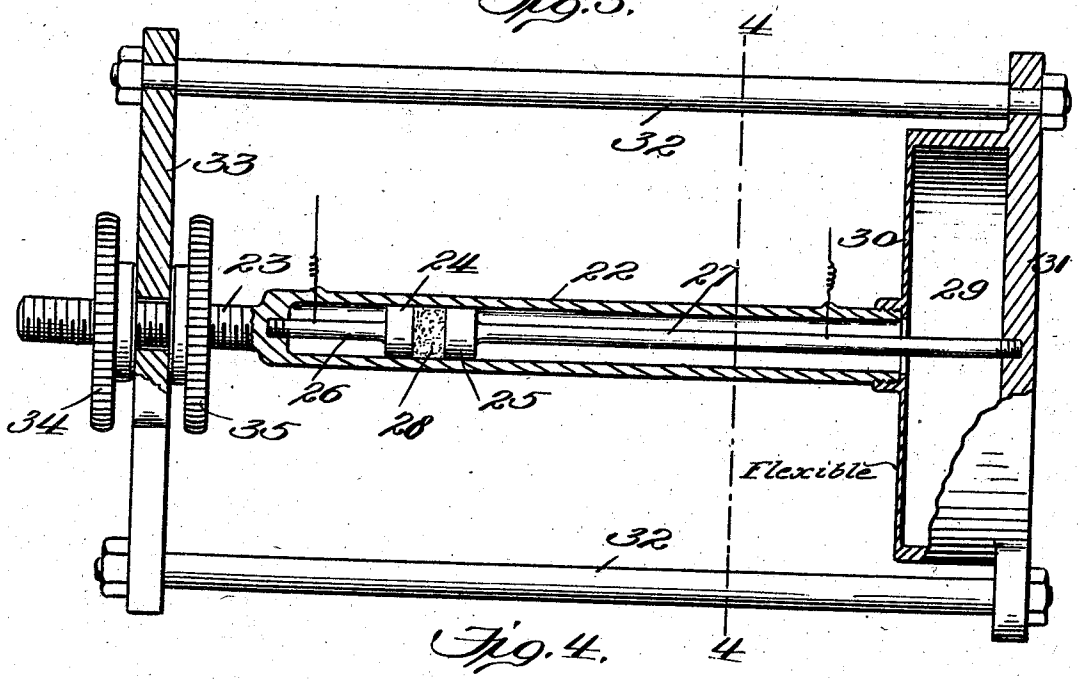
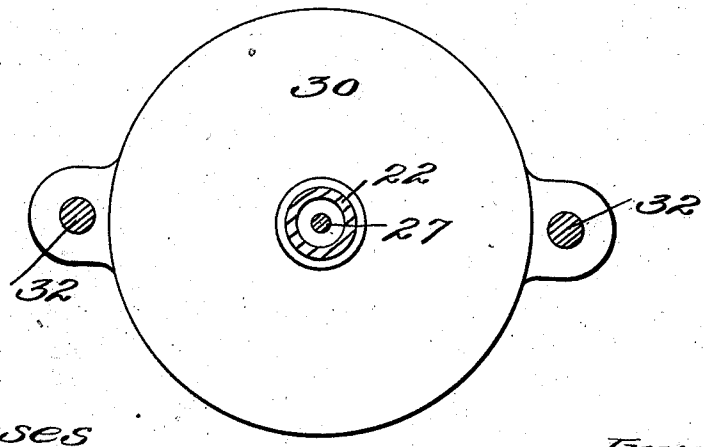


Fig. 4.



Witnesses
C. A. Keesler
W. B. Keesler

Inventor
Charles Walker
By James L. Norris
Atty

UNITED STATES PATENT OFFICE.

CHARLES WALKER, OF KNOXVILLE, TENNESSEE.

COHERER FOR WIRELESS-TELEGRAPH SYSTEMS.

968,007. Specification of Letters Patent. Patented Aug. 23, 1910.

Application filed May 5, 1909. Serial No. 494,003.

To all whom it may concern:

Be it known that I, CHARLES WALKER, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented new and useful Improvements in Coherers for Wireless-Telegraph Systems, of which the following is a specification.

My present invention relates to improvements in coherers or receivers for wireless telegraph systems, and it has for its object primarily to provide an improved coherer of this class whereby the terminals or electrodes and also the conducting substance between them may be maintained in a vacuum although adjustment may be made between the terminals from a point exteriorly of the tube containing them without admitting air to the tube that would destroy the vacuum.

Another object of the invention is to provide a coherer or receiver which is capable of compensating automatically for temperature variations whereby the distance between the terminals or electrodes and consequently the conductivity of the substance between them may be maintained constant at all times, irrespective of varying temperatures.

A further object of the invention is to provide a coherer or receiver with means for adjusting it magnetically or by means of magnetic means located exteriorly of the coherer tube, such an arrangement enabling one or both of the terminals to be adjusted without admitting air to the tube which would otherwise destroy the vacuum to be maintained therein.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing:—Figure 1 represents a longitudinal section of a coherer or receiver constructed in accordance with my present invention; Fig. 2 represents an end view of the coherer as illustrated in Fig. 1, the same being viewed from the right; Fig. 3 represents a longitudinal section of another form of coherer which embodies means for compensating for temperature variations to maintain the distance between the electrodes, the electromagnetic adjusting means, however, in this form being omitted and a screw adjustment substituted; and Fig. 4 represents a transverse section of the coherer as illustrated in Fig. 3, the section being taken on the line 4—4 of said figure.

Similar parts are designated by the same reference characters in the several views.

The essential objects of the invention are to provide a coherer or receiver of the type used in wireless telegraphy wherein the results hereinbefore stated may be obtained.

In the accompanying drawing, I have shown two forms of the invention, but it will be understood that these forms are shown merely as examples, and that certain modifications and changes may be made therein in order that the invention may be applied to the best advantage according to the circumstances in each particular case.

In that form of the invention shown in Figs. 1 and 2, the coherer or receiver comprises a tube that is preferably so constructed that a vacuum may be maintained therein and the co-efficient of expansion thereof equals that of the rods carrying the electrodes so that temperature variations will not alter the distance between the terminals with the result that a constant resistance of the substance between the terminals may be maintained. In the present instance, I have shown the tube as composed of a section 1 which may be of copper for instance, a second section 2 which may be composed of glass the end of which is closed and contains a rod 3 which carries one of the terminals or electrodes 4, the rod 3 being hermetically sealed in the end of this tube section 2, and a coupling section 5 is preferably platinum sleeved over the ends of the sections 1 and 2, and it is so joined to these tube sections as to prevent the entrance of air whereby a vacuum may be maintained within the tube. The second terminal or electrode 6 which is opposed to the electrode 4 is carried by a rod 7 which extends toward the outer end of the tube section 1 at which point it is threaded and coöperates with a nut or plug 8 which is tightly fitted into the tube section 1. This end of the tube section 1 in the present instance has fitted thereon a relatively enlarged chamber 9, one end of which is tightly fitted over the tube 1 so as to provide an air-tight joint, and this chamber may be composed of glass or transparent material in order that the operating parts

contained in this chamber may be visible. In this form of the invention, magnetic means is provided for adjusting the distance between the terminals or electrodes, a suitable substance 10, such as metallic filings, carbon, or other suitable material being contained between these electrodes or terminals, the conductivity of which varies according to the distance between the terminals. In the presence instance, an armature is connected to the rod 7 carrying the electrode 6, this armature consisting in the present instance of a cross-arm 11 which is fixed to the end of the said rod and it carries in this instance a pair of pole-pieces 12 which are capable of rotating within the chamber 9. One or more of these pole-pieces may be used although a pair of them is generally preferable and, moreover, these pole-pieces may be composed of either magnetic or dia-magnetic material, either magnetized or otherwise. In the present instance, I have shown a construction wherein pole-pieces of iron may be used. Owing to the threaded connection between the rod 7 and the nut or plug fixed to the tube section 1, a rotation of the armature within the chamber containing it will, obviously, vary the distance between the two terminals or electrodes, and in the present construction all of the operating parts for the adjustable electrode are contained within the hermetically sealed tube and the chamber connected thereto.

An adjustment of the distance between the terminals or electrodes may be readily obtained by placing one or more magnets in proximity to the exterior of the chamber 9 in such a position as to influence the armature and, by producing a relative rotary movement between the magnet and the chamber 9, obviously, the armature under the influence of the exteriorly located magnet will be caused to rotate with respect to the chamber and tube, the threads causing a corresponding axial movement of the adjustable electrode. In the present instance, I have shown a pair of magnets 13 and 14 which are preferably of opposite polarity and are arranged at diametrically opposite points and at opposite sides of the chamber 9. These magnets may be supported in any convenient manner or they might be held in the hand during the adjustment. For convenience, these magnets may be supported by a bracket 15 which in turn is carried by a sleeve or support 16, the latter being rotatable with respect to the tube containing the electrodes and, moreover, this sleeve may be rotatably mounted upon a convenient support. In such a construction, the two magnets influence the armature in such a way as to give it a tendency to occupy a position lengthwise between the magnets and, by rotating the magnets relatively to the tube, the desired adjustment may be readily made. Obviously, the tube may be stationary and the magnets rotatable with respect thereto, the magnets may be stationary and the tube rotatable with respect thereto, or both the magnets and the tube may be rotatable, it being necessary only to provide a relative adjustment between these parts.

If desired, a suitably calibrated scale 17 may be provided on an appropriate part of the chamber 9, this scale being coöperative with an appropriate mark or part of the armature, this scale serving to indicate the different adjustments that may be provided for the electrodes whereby the coherer or receiver may be instantly set according to the different current strengths or distances through which the messages are to travel. Suitable means may also be provided for retaining the electrodes in the different adjusted positions, a suitably toothed rack 18 being provided in the present instance which may be located around the interior of the chamber 9, and a pawl 19 is pivoted to a part of the armature and may be provided with a spring 20 for yieldingly holding one of its ends in engagement with the rack. This pawl is also preferably provided with means for magnetically releasing it, one of its ends being provided in the present instance with an armature 21 with which a magnet placed exteriorly of the chamber 9 may coöperate, the attraction between this armature on the pawl and the exterior magnet serving to hold the pawl in released position while the armature is turned so as to appropriately adjust the electrodes or terminals. By removing the magnet from the influence of the armature on the pawl, the latter may automatically move into locking position with the rack, the terminals or electrodes being thereby retained in the desired adjusted position.

In that form of the invention shown in Figs. 3 and 4, I have illustrated a modified construction wherein the magnetic adjusting means for the terminals is omitted and a screw adjustment substituted and, moreover, the tube containing the terminals or electrodes is of a different construction. In this form of the invention, the tube 22 may be composed of glass or other appropriate material one end of which is preferably closed and has a screw 23 projecting axially therefrom. The terminals or electrodes 24 and 25 are contained within this tube, the terminal 24 being connected to a stem or rod 26 which is preferably fastened rigidly in the closed end of the tube, while the rod 27 for the electrode or terminal 25 projects from the opposite or open end of the tube, a suitable substance 28, of metallic filings or carbon, for instance, being interposed between the two terminals or electrodes. To the open

end of the tube is connected a relatively enlarged chamber 29, one wall 30 of which is preferably flexible or elastic and has a hermetic joint with the tube, while the opposite or rear wall 31 of this chamber is substantially rigid and the terminal rod 27 is fixed thereto. A pair of thermally-influenced connecting members 32 join the relatively rigid wall 31 of the chamber 29 and a cross member 33, the screw 23 passing loosely through this cross member and such screw is provided with a pair of milled or knurled heads 34 and 35 which are threaded on the screw and bear upon the opposite sides of the cross member. By turning the heads 34 and 35 in the appropriate direction, the distance between the electrodes may be varied, these heads acting to move the tube 22 axially with respect to the frame which is made up of the cross member, the rear wall of the enlarged chamber, and the thermally-influenced connecting members, and such an axial movement of the tube with respect to these parts is permitted by virtue of the flexibility or elasticity of the wall 30 to which the tube is connected, and by tightening these milled heads 34 and 35 against the opposite sides of the cross member, the desired adjustment may be maintained. The co-efficient of expansion of the members 32 equals that of the elements of the tube and the electrodes contained therein so that such parts will expand or contract equally and thereby maintain a constant distance between the terminals, irrespective of temperature variations.

In both forms of the invention, the wires which connect the terminals or electrodes with the receiving station circuits are so arranged that air from the atmosphere cannot enter the tubes and thereby destroy the vacuum therein.

In both forms of the invention, a coherer or receiver is provided wherein the terminals or electrodes and the substance between them may be maintained *in vacuo*, although means is provided for effecting a relative adjustment between the terminals, and in both constructions shown, an enlargement is provided toward one end of the tube. Both constructions also provide a coherer or receiver wherein the distance between the terminals or electrodes is maintained, notwithstanding temperature variations.

I claim as my invention:

1. A coherer or receiver comprising a tube, terminals or electrodes hermetically inclosed therein, and a screw adjustment connecting the terminals, a part of said adjustment being capable of manipulation from the exterior of the tube and a magnetically controlled device for maintaining such adjustments.

2. A coherer or receiver comprising a hermetically sealed tube, terminals or electrodes inclosed therein, magnetic means for effecting relative adjustments between said terminals, and a pawl attached to one of said terminals and coöperative with a rack for maintaining such adjustments, said pawl being accessible for manipulation from the exterior of the tube.

3. A coherer or receiver comprising a tube containing relatively adjustable terminals or electrodes, and means connecting said terminals and capable of compensating for temperature variations to maintain a predetermined adjustment of said terminals.

4. A coherer or receiver comprising terminals or electrodes and a tube inclosing them, one of said terminals being connected directly to the tube and thermally-influenced means connecting another of said terminals to the tube and capable of maintaining a predetermined adjustment of the terminals irrespective of temperature variations.

5. A coherer or receiver comprising a tube, terminals contained therein and capable of a relative adjustment, magnetic means for effecting a relative adjustment of the terminals, and a locking device coöperative directly with one of said terminals for maintaining such an adjustment.

6. A coherer or receiver comprising a tube, electrodes hermetically inclosed therein, magnetic means for effecting a relative adjustment between the electrodes, and a locking device accessible for manipulation from the exterior of said tube and coöperative directly with one of said electrodes for maintaining predetermined relative adjustments between the electrodes.

7. A coherer or receiver comprising a tube, terminals or electrodes hermetically inclosed therein, magnetic means located exteriorly of said tube for effecting a relative adjustment of the terminals and a magnetically controlled device for maintaining such adjustment.

8. A coherer or receiver comprising a tube, terminals or electrodes contained therein, one of said terminals being adjustable relatively to the other, an armature connected to one of said terminals and hermetically sealed from the atmosphere, a magnetically controlled device for maintaining predetermined adjustments of said terminals, said armature being rotatable relatively to said tube and subject to the influence of a magnet placed exteriorly of the tube.

9. A coherer or receiver comprising a tube, terminals or electrodes inclosed therein and capable of relative adjustment, a relatively enlarged chamber connected to the tube and sealed from the atmosphere, an armature connected to one of the terminals and inclosed in said chamber, a magnet arranged exteriorly of said chamber and adapted to influence said armature to effect a relative adjustment between the terminals and a

magnetically controlled device for maintaining predetermined relative adjustments of said terminals.

10. A coherer or receiver comprising a tube, terminals inclosed therein and having means for effecting a relative adjustment, a rotatable armature connected to one of the terminals, a magnetically controlled device for locking said armature in predetermined positions, and a magnet coöperative with the armature, said magnet and tube being relatively rotatable.

11. A coherer or receiver comprising a tube, terminals contained therein and capable of a relative adjustment, a rotatable armature connected to one of the terminals, a device coöperative directly with said armature for retaining the armature in different adjusted positions, and a magnet coöperative with the armature for turning it and thereby effecting a relative adjustment between the terminals.

12. A coherer or receiver comprising a tube, a pair of terminals located therein and adapted to contain a conducting medium between them, a relatively enlarged chamber connected to one end of said tube, said tube and chamber being hermetically sealed, an armature connected to one of the terminals and movable within said chamber, a device directly coöperative with said armature for retaining the latter in different adjustable positions, and a magnet located exteriorly of said chamber and operative to effect movement of said armature.

13. A coherer or receiver comprising a tube, electrodes inclosed therein and capable of a relative adjustment, said electrodes being adapted to contain a conducting medium between them, an armature connected to one of said terminals and movable to effect a relative adjustment between them, a magnetically controlled device for retaining said armature in predetermined positions, and a magnet coöperative with said armature for effecting movement thereof.

14. A coherer or receiver comprising a tube, electrodes contained therein and capable of relative adjustment, an armature hermetically sealed from the atmosphere and connected to one of said terminals, and a locking device for retaining the armature in different adjusted positions, said locking part having a medium thereon subject to magnetic influence whereby it may be operated.

15. A coherer or receiver comprising a tube closed at one end, electrodes contained within said tube, a relatively enlarged chamber hermetically closing the opposite end of said tube, means located exteriorly of said tube for relatively adjusting said electrodes, and means coöperative directly with one of said electrodes for maintaining predetermined adjustments of said electrodes, said means being accessible for manipulation from the exterior of the tube.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES WALKER.

Witnesses:
M. A. Parker,
Harmon O. Acuff.