No. 808,641. PATENTED JAN. 2, 1906.

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## WIRELESS TELEGRAPHY.

APPLICATION FILED MAY 14, 1903.

Fig. 1.

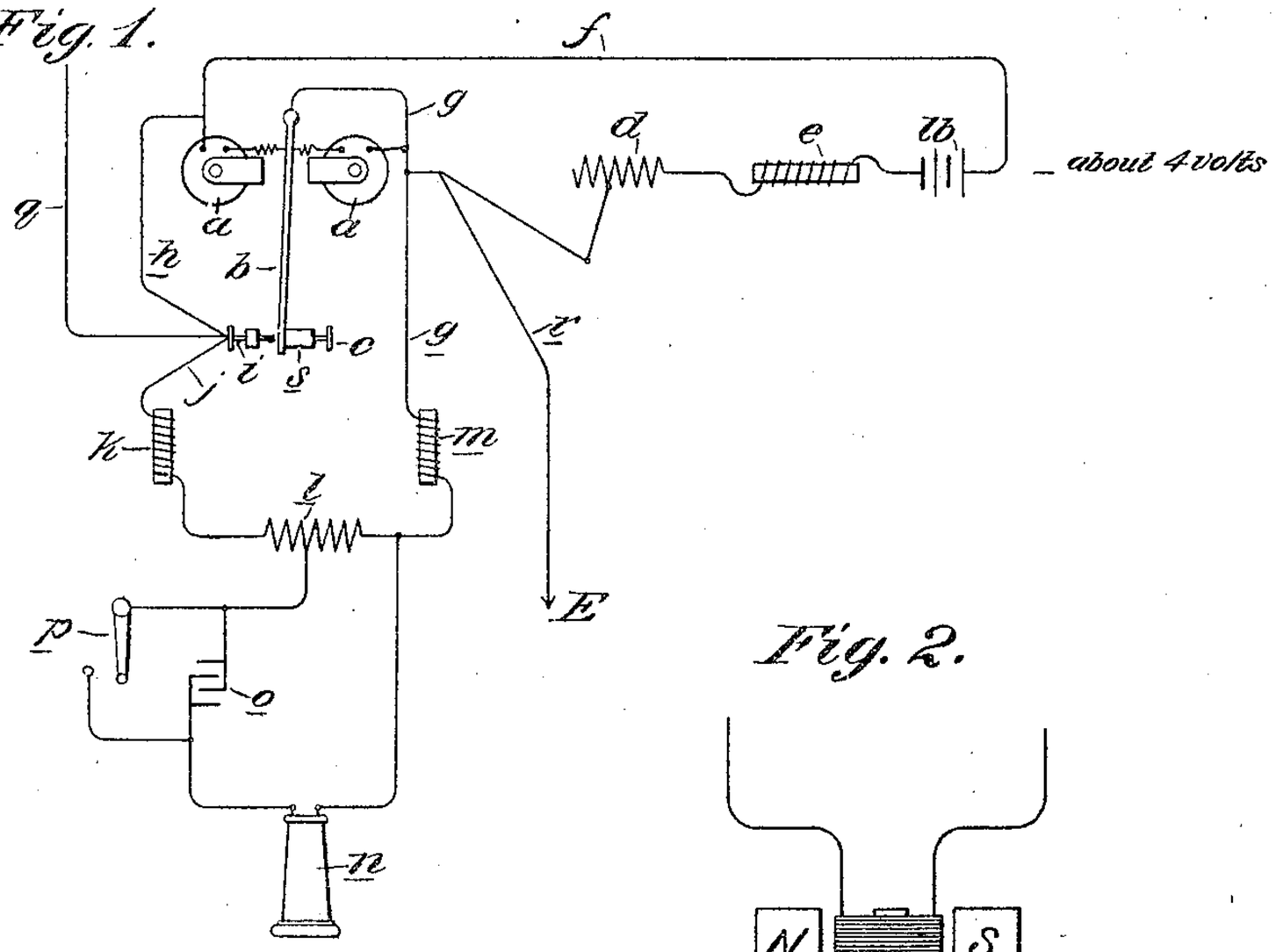



Fig. 2.

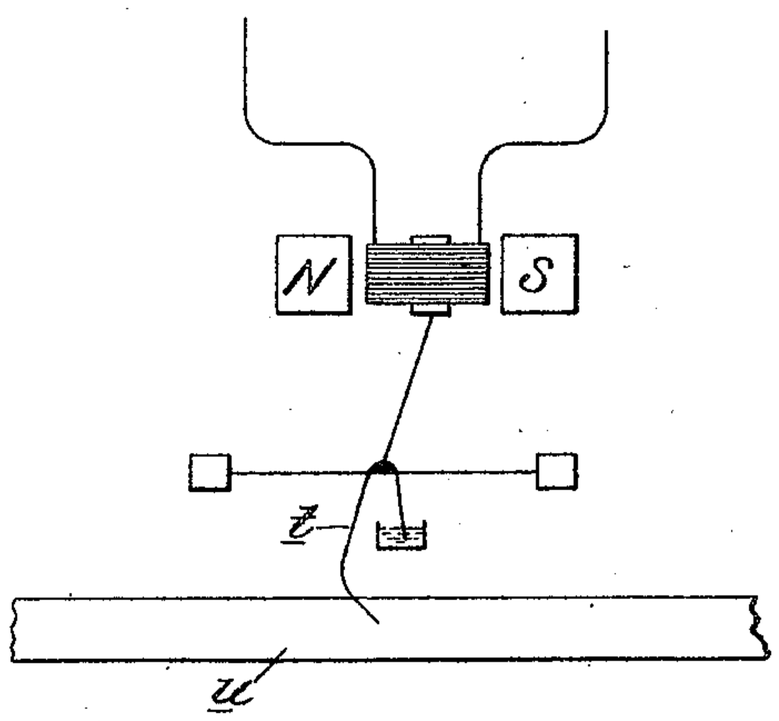
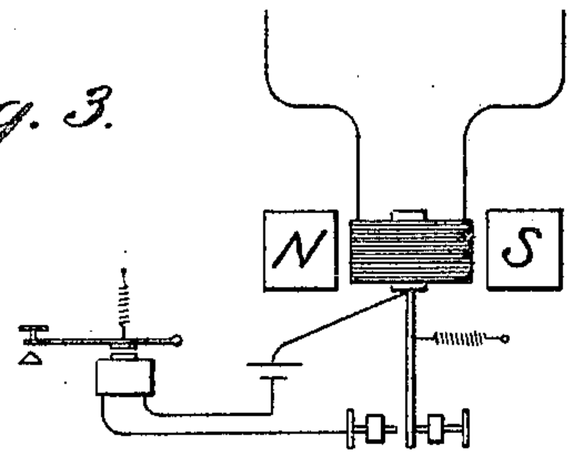



Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## WIRELESS TELEGRAPHY.

No. 808,641. Specification of Letters Patent Patented Jan. 2, 1906.

Application filed May 14, 1903. Serial No. 157,137.

*To all whom it may concern:*

Be it known that I, PATRICK B. DELANY, a citizen of the United States, residing in South Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Wireless Telegraphy, of which the following is a specification.

This invention relates to the reception of electrical or electromagnetic waves, impulses, or oscillations, however transmitted, from a distant station, for the conveyance of signals. To this end the invention contemplates the use of a contact automatically maintained by local control, with rapidly-recurring variations or degrees of pressure, and through which the received oscillations pass to earth, with the effect of more or less modifying or varying the same, and being thereby made manifest in an appropriate receiver apparatus. Such a variable contact might be termed a "microphonic" or "floating" contact; and it may be said that the received waves or impulses act disruptively thereon, and are, for that reason, made manifest in the telephone or other receiver. So far as is known, this mode of reception is new and the manner in which it may be utilized may be varied without departing from the principle of operation. Experience has demonstrated that this new system of reception affords radically improved results in the certainty, sharpness, or definition of the received signals.

In the accompanying drawings: Figure 1 is a diagram illustrating the invention; Fig. 2 shows the use of a siphon-recorder as a receiver; and, Fig. 3 shows a cable-receiver coil controlling a relay which may control any kind of a receiver or effect retransmission into another circuit.

*a* is a relay, preferably polarized, the armature-lever *b* of which is slightly biased toward the spacing side, *i. e.*, toward the adjustable stop *c*.

*lb* is a local battery included with an adjustable resistance *d* and choke-coil *e* in circuit with the winding of the relay and wire *f*. A branch *g* from this local circuit of the battery *lb* is connected to the armature-lever *b*, and another branch *h*, to the active adjustable stop *i*, against which the armature-lever bears with locally-produced rapidly-recurring variation of contact or pressure. From the stop *i*, extends also a circuit connection *j*, which contains a choke-coil *k*, an adjustable resistance *l* and choke-coil *m*, and then connects with wire *g*. The receiver *n*, here shown as a telephone is placed in shunt in series with a condenser *o*, around the adjustable resistance *l*. A shunt around the condenser contains a switch *p*, by which the condenser may be shunted from the circuit when desired, for instance when some other style of receiver is employed. The vertical conductor *q* of the receiver is connected to the stop *i;* and the relay-armature is connected to earth by the ground-tap *r*. The stop *c* is shown as carrying a block of yielding material *s*, as felt or rubber which at all times maintains a more or less perfect contact between the lever *b* and the contact-post *i*.

The circuit of the relay is closed through wire *f*, relay-winding, adjustable resistance *d*, choke-coil *e* and local battery *lb*, the direction of current being such as to draw the armature-lever *b* against the stop *i*. When this connection is made there is established around the relay-winding a shunt, which may be traced from contact-post *i*, through wire *h*, to one side of relay, and from armature-lever *b* by wire *g* to the other side of relay. The effect of this shunt is to produce rapid, minute vibrations of the lever *b*, resulting in variations of contact or pressure between the contact-post *i* and armature-lever.

The circuit containing the telephone is divided, there being one derived or shunt circuit from the lever *b* and wire *g*, through winding of relay to wire *h;* and another direct from armature-lever *b*, through contact-stop *i* to wire *j*. When, therefore, the lever *b* is normally drawn against *i* with a variable energy, changes in which occur with high frequency; the receiver *n*, will be short-circuited (or sufficiently or substantially so) from the battery-circuit. If however, the contact between *i* and *b*, is modified, or materially raised in resistance by the effect, disruptive or otherwise, produced by received signal impulses, such local-battery current will then flow through the receiver so as to make the received signal manifest. The received impulses or oscillations pass by vertical conductor *q*, contact *i*, lever *b*, and wires *g*, *r* to ground. The choke-coil *e* is placed in the local-battery circuit to force the oscillations through contact *i*, *b*, and wires *g*, *r*, to earth, and prevent them from passing, to any objectionable extent, by wires *h*, *f*, and thence to earth at E. The choke-coils *k*, *m*, are also used to prevent di-

version of received impulses. By adjusting the resistance *d* so as to afford sufficient current in the circuit, or by mechanically adjusting the relay, the contact between *i* and *b* may be maintained in infinitesimal automatic vibration with substantial uniformity, so that such variations thereof as do occur are not particularly noticeable, if at all, when listening at the telephone. When the apparatus is so adjusted a most favorable condition for reception exists. If now, electromagnetic waves or oscillations pass by wire *q*, through the contacts *i*, *b*, to earth at E, there is a change or modification of, or a disruptive effect upon, the contacts that results in such variation of current in the circuit including the receiver-telephone *n*, as to cause the signals to become distinctly audible therein. The relay, which, as stated, is preferably polarized, should be quick-acting and have a sensitive balanced armature. What is commonly known as the "post-office relay" of the British telegraph system has been found very satisfactory. The battery or generator should be comparatively weak. It has been found that one or two wet or dry cells of ordinary type are satisfactory. The adjustable resistance *e* should be such as to afford small variations. Experience has shown that a capacity for variation from one ohm upwardly affords a suitable range of adjustment. The relay-armature vibrating or bearing against the signal contact-stop *i* automatically more or less cuts in and out the relay-winding and varies the resistance at the contacts of the shunt containing the receiver. The automatic vibrations so produced are of exceedingly small amplitude and high periodicity and may reach in pitch a high musical note, and be susceptible of quite a range of adjustment affording an unstable microphonic contact of exceeding lightness and delicacy. The effect of the received waves or impulses is to change the resistance at the contact *f*, *b*, and consequently change the note produced in the receiver by the automatic variation of its shunt at the same time that the relay's own shunt is affected. Apparently, the resistance at the contact is raised by each signal-impulse received, and the change in the note caused thereby enables the operator to perceive the dots and dashes with facility. It has been found that the best results are obtained by adjusting the resistance *d*, so that the note is suppressed, the variations of pressure at the contacts being not particularly manifest, if at all, in the telephone. The signal waves or impulses then received apparently act disruptively upon the seemingly quiet but still imperfect and varying contact, the normal variation of which appears to be so delicate as not to be detected by the ear; and after each disruption, caused by received waves or oscillations, the local current in the coil of the relay causes the armature-lever *b* to be again attracted against contact *i*, with considerable force. These variations, changes, or modifications of the microphonic contact, produced by the signals, are even and distinct and produce in the telephone-receiver well-defined signals. It is apparent that when the automatically variably maintained microphonic contact is so affected as to raise the resistance, a larger volume of current from the local battery will traverse the circuit including the telephone-receiver, and, when the received waves or impulses pass and the contact returns to normal condition, the current from the battery is more effectively shunted from the receiver. A receiving apparatus having this mode of operation may be used in connection with any organization of circuits, plain or attuned, and with any combination or disposition of transformers, condensers, or resonance-producing agencies, and, if desired, the automatically-maintained microphonic contact may be immersed in a fluid or inclosed in a vacuum; or subjected to any of the various subordinate adjunctive agencies or manipulations heretofore proposed for coherers or other delicate contact-receivers.

As indicated in Fig. 2, the telephone-receiver is replaced by the oscillating coil of a cable-receiver operating a siphon-recorder *t*, making a record upon a traveling tape *u*.

In Fig. 3, the oscillating cable-coil is shown as controlling the local circuit of a relay *v*, which may appropriately control any kind of a receiving or recording instrument, or serve the purpose of retransmission into another circuit.

The elastic cushion *s* of the instrument *a* may be omitted, and instead of a relay, polarized, or otherwise, the instrument may be of any appropriate character to serve the purpose, or effect the result herein described; and if of such character as to directly make manifest the received signals, may itself be the final receiver, the telephone-receiver *n* being then omitted.

I claim as my invention—

1. In a wireless-telegraph system, a microphonic contact, in the path of the received waves or impulses, electromagnetic means, for variably maintaining the microphonic contact at a high periodicity, comprising a local circuit controlled at said contact, and a receiver whose circuit is controlled at such contact, modification of the contact by the received waves or impulses effecting manifestation of the signals by the receiver.

2. In a wireless-telegraph system, a receiver comprising the combination of a relay whose winding is in closed circuit with a battery, a shunt-circuit around the relay-winding, completed at the contact of the relay, a second shunt-circuit around the relay-winding divided at the same contact, one division

including the local battery and a resistance, and the other division a receiving instrument.

3. In a wireless-telegraph system, a receiver comprising the combination of a relay whose winding is in closed circuit with a battery, a shunt-circuit around the relay-winding, including the battery and a receiver which is cut in and out of said shunt-circuit at the contact of the relay to which the armature-lever is attracted.

4. In wireless telegraphy, a receiving apparatus comprising a normally maintained contact constantly varied locally by shunting at a high rate or periodicity, the modification of such contact by received signal waves or impulses causing a manifestation of the received signals.

5. A system of wireless transmission of signals, comprising a receiver apparatus having a normally maintained path for the received waves or oscillations, means, comprising an electric circuit completed through such path, acting to vary the latter at a high rate of periodicity, the modification of such path by such waves or oscillations causing manifestation of the signals.

6. In wireless telegraphy, a receiving apparatus comprising a normally maintained variable contact, variations of which are automatically self-effected at a high rate of periodicity and controlled at said contact, through which latter the circuit of a receiver is affected by the action upon said contact of received signal impulses.

7. In wireless telegraphy, a receiving apparatus comprising a normally maintained contact, means controlled at such contact for automatically rapidly varying it, and a receiving instrument in a circuit controlled by said contact which is affected by received signal impulses to make the latter manifest by the receiver.

8. In wireless telegraphy, a receiving apparatus comprising a normally maintained contact, means controlled at such contact for automatically electromagnetically varying it at a high rate of speed, and a receiving instrument in a circuit controlled at said contact, the contact being affected by received signal impulses to thereby make the signals manifest in the receiving instrument.

9. In wireless telegraphy, a receiving apparatus comprising a receiving instrument the circuit of which is divided, one branch thereof containing a source of current, and the other not, and a contact automatically normally maintained and constantly varied by shunting at which the branches of the receiver-circuit are controlled and which are so affected by received signal impulses as to make the latter manifest by the receiving instrument.

10. In wireless telegraphy, a receiving apparatus comprising an electromagnetic instrument having a movable part automatically maintained in vibration by variation of its circuit at its contact-points, a circuit containing a receiver and controlled at said contact-points which are affected by received signal impulses so that the latter are made manifest by the receiver.

11. In wireless telegraphy, a receiving apparatus comprising a part automatically normally vibrated, normally maintaining a variable electrical contact and normally producing a continuous sound or note, said variable contact controlling the vibration of the normally self-vibrated part and being in the path of received signal impulses which so affect the contact as to make the signals manifest by changes in the sound or note.

12. In wireless telegraphy, a receiving apparatus comprising a normally maintained microphonic contact in the path of received oscillations, an electromagnetic automatic vibrator acting to vary, and controlled by said microphonic contact, and an electrical circuit containing a receiver controlled at said contact.

13. In wireless telegraphy, a receiving apparatus comprising a normally maintained microphonic contact in the path of received oscillations through which contact an undulatory local current is normally passed, means for automatically varying said contact and a receiver whose operation is controlled at the contact.

14. In wireless telegraphy, a normally maintained contact comprising a vibrating member, means controlled by such member and acting to vary the contact at a high rate of periodicity, and a receiving instrument in a circuit controlled by said contact.

In testimony whereof I have hereunto subscribed my name.

PATRICK B. DELANY.

Witnesses:

KATHARINE MACMAHON.

WILLIAM A. STAHLIN.