(No Model.)

W. A. WEST.

TELEPHONIC TELEGRAPH.

No. 329,984. Patented Nov. 10, 1885.

FIG. I.

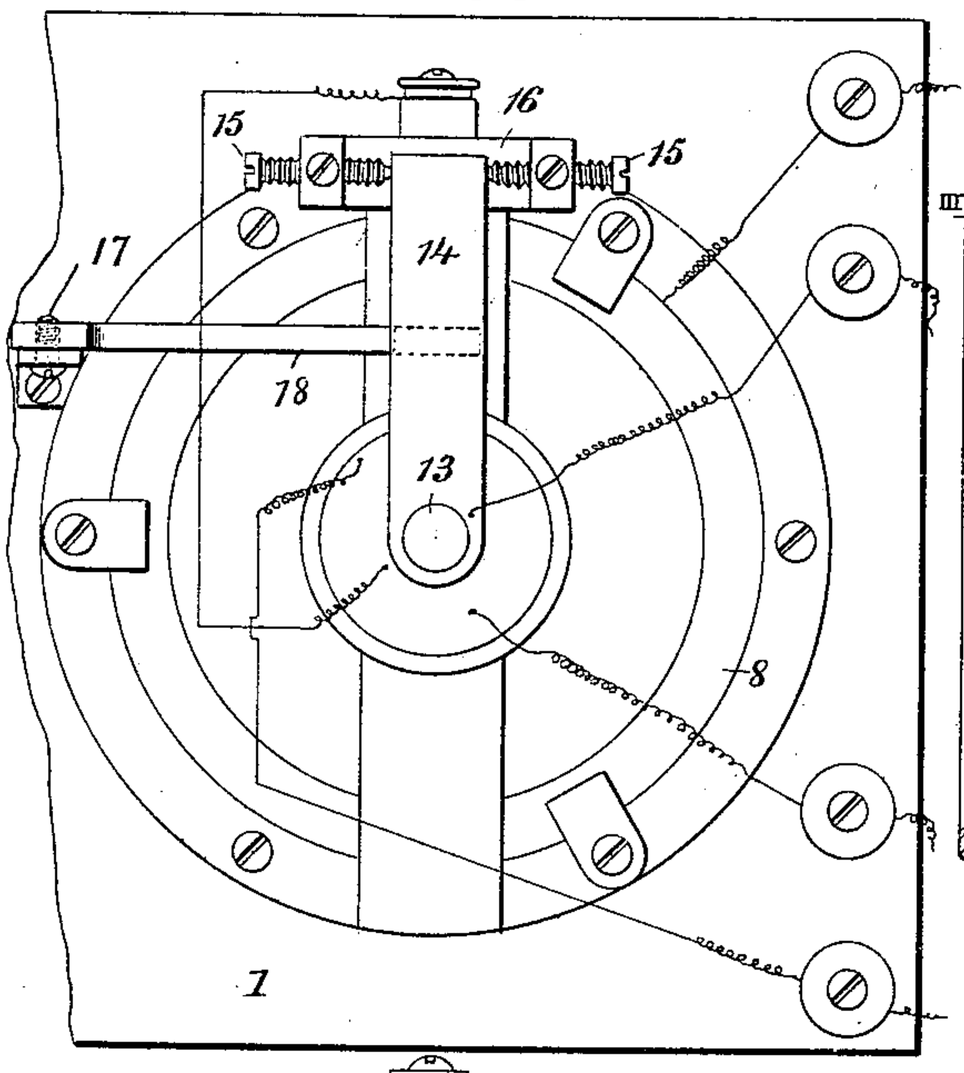


FIG. II.

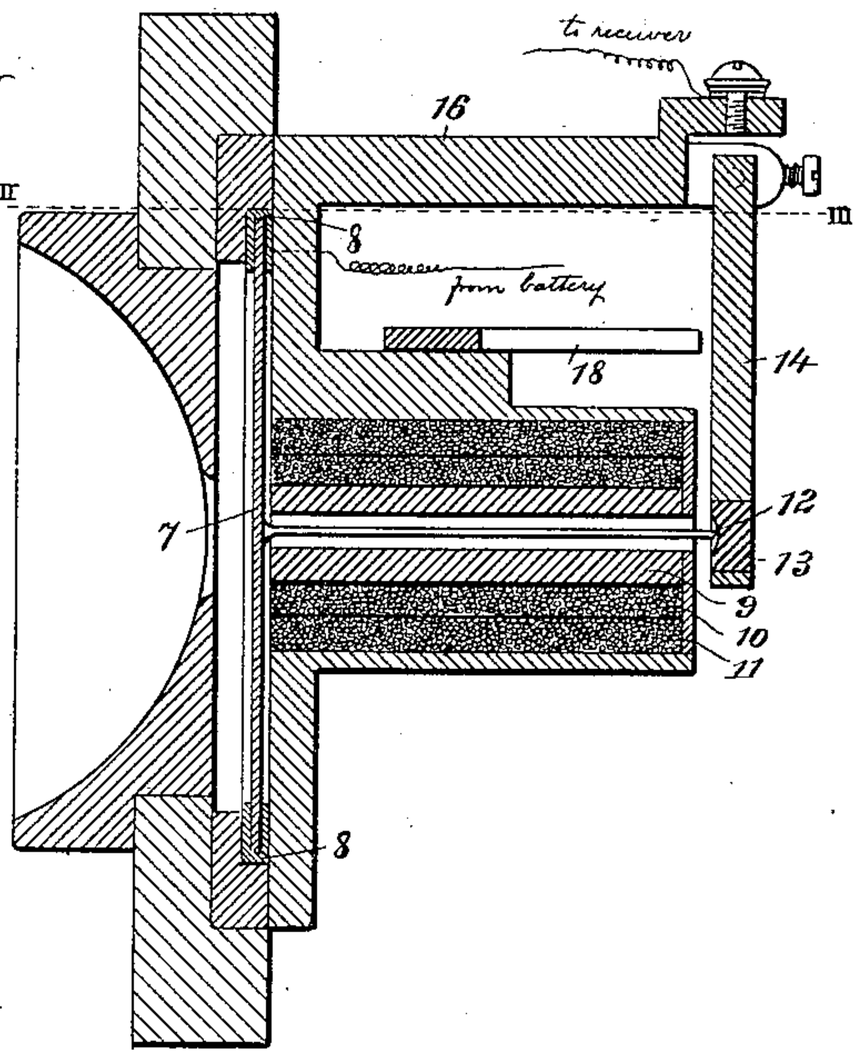


FIG. V.

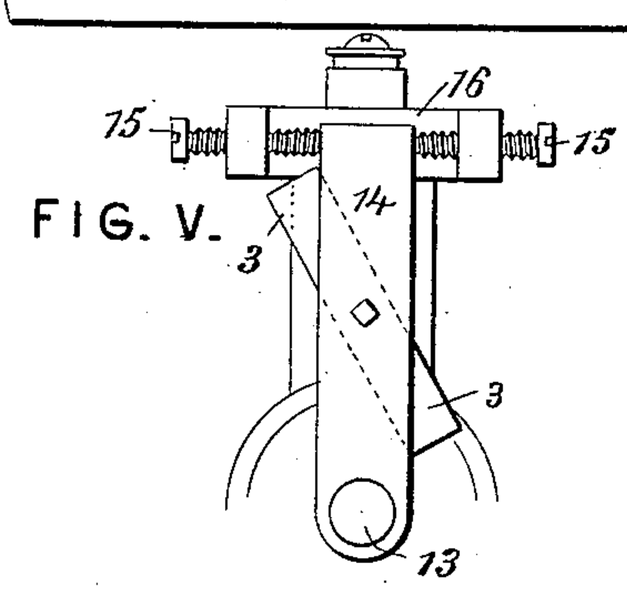


FIG. III.

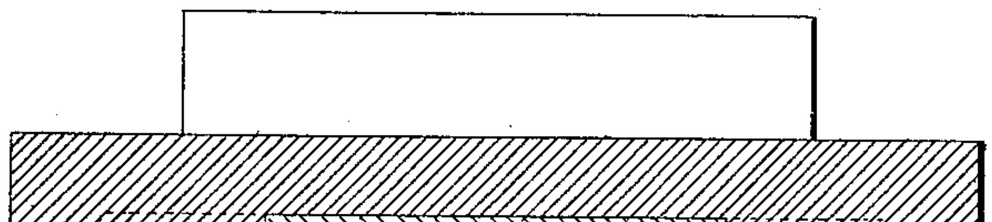
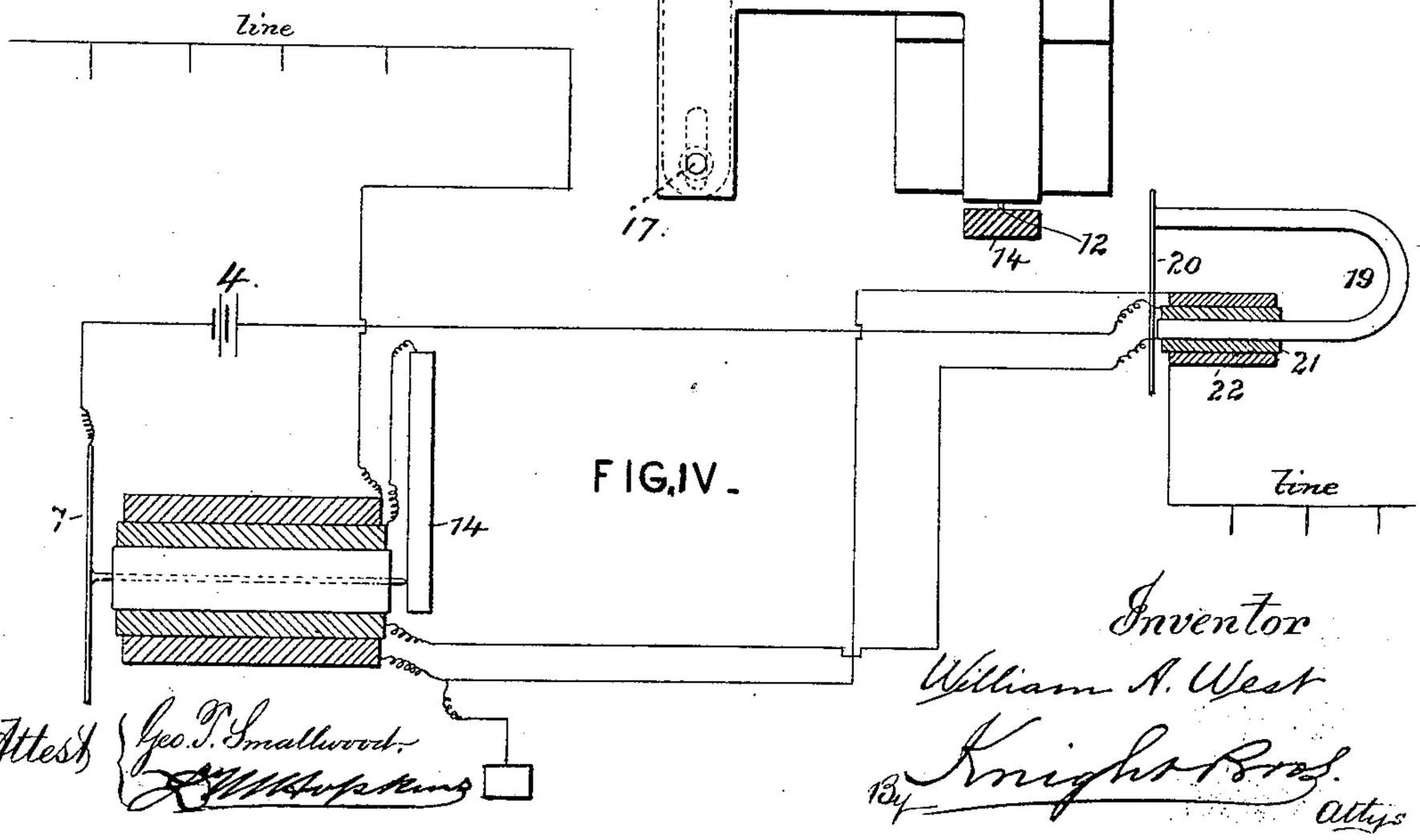


FIG. IV.



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UNITED STATES PATENT OFFICE.

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TELEPHONIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 329,984, dated November 10, 1885.

Application filed April 6, 1885. Serial No. 161,253. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. WEST, a citizen of the United States, residing at Bellefontaine, in the county of Logan and State of Ohio, have invented certain new and useful Improvements in Telephonic Telegraphs, of which the following is a specification.

The main object of my invention is to control the vibrations of the movable contact in telephones, intending by "movable contact" that moving part which, for the purpose of completing the circuit in which it is included, contacts with the contact carried by the diaphragm. If, for instance, we suppose a pendant or freely-moving contact-piece which normally rests against or makes contact with a rigid contact carried by the diaphragm, the vibrations of the diaphragm, due to the sound-waves which strike it, will, through the intermediary of the rigid or fixed contact, put the movable contact-piece into vibration.

It is with a view to controlling this vibratory movement of the movable contact that my invention has mainly been devised.

I find that the result aimed at can be accomplished by exerting upon the pendant an attractive force, which, called into action when the movable contact moves in a direction away from the fixed contact, influences at that time the contact to move in the opposite direction—that is to say, in the direction to reestablish contact between the two contact-pieces; and it is preferred to apply this force in such manner that it shall, as respects the movable contact-piece, be repellent or attractive, according to the conditions of the circuit in which the movable contact-piece is included—that is to say, so long as the contact between the two contact-pieces is undisturbed to exert a repellent force which will about offset the attractive force of the electro-magnet in the transmitter-circuit, but when the movable contact moves outwardly or away from the fixed contact-piece to then exert attractive force in order to restore the normal condition of the circuit.

For the purpose of better enabling others skilled in the art to understand and practice this method of controlling the vibratory movement of the movable contact, I shall now proceed to describe the same more in detail by reference to the accompanying drawings, representing apparatus which I have devised for effectuating the said method. Said apparatus, however, is not here claimed, but forms the subject of another application (of which this is a division) filed November 20, 1884, bearing Serial No. 148,449.

In the drawings, Figure I is a rear view of the transmitter. Fig. II is a vertical section thereof. Fig. III is a longitudinal section on line III III, Fig. II. Fig. IV is a diagrammatic view of a telephone-circuit containing transmitter and receiver. Fig. V is a rear elevation of a portion of modified form of transmitter.

Within the frame 1 the transmitting-diaphragm 7 is fixed by its edges, so as to allow freedom of motion to its center. A rubber band, 8, is preferably employed as a seat on both sides of the diaphragm. Fixed opposite to the center of the diaphragm is the perforated soft-iron core 9, which is wound with the primary and secondary wires 10 11 of an inductorium. Said wires are wound in opposite directions upon the core, so that their poles will coincide. Fixed to the center of the diaphragm is a rigid needle, 12, of any desired conducting material, one end of which rests against a carbon or other suitable contact-button, 13, supported on the lower end of a pendant, 14, preferably of soft iron.

The needle is what I have termed the "fixed contact," and the pendant is the "movable contact." The latter is capable of freely vibrating, and is so supported by its trunnion-screws 15, working in a bracket, 16, fixed to the frame, as to hang vertically, and in this position to contact without appreciable pressure with the end of the needle.

The primary wire 10 of the induction-coil is, in the illustration given in the drawings, in a local circuit, in which are included also the diaphragm and the fixed and movable contact-pieces, the course of the circuit being from battery 4, through diaphragm, needle, pendant, and primary 10 of the induction-coil to the receiver 19, and thence back to battery. The circuit, normally, is closed, and consequently the core 9 is magnetized, and the pendant is attracted thereby. If the helix 10 be wound so as to make a north pole of that end

of the core next to the pendant, the latter will of course be of opposite polarity so long as it is under the influence of the core.

Under the arrangement thus far described, the vibration of the diaphragm, caused by speech or other influences, will, through the needle, impart vibratory movement to the freely-swinging pendant, with the effect of causing the two contacts to recede from and approach each other so long as the vibrations continue. Amplitude and regularity of vibration of the pendant are determined by the loudness of speech, the proximity of the speaker, and other conditions, and unless some corrective be applied these causes are apt to produce irregular and undue vibrations of the freely-swinging pendant, with the result of producing similar irregularity in the impulses transmitted over the circuit.

The corrective I apply consists, as hereinbefore stated, of an attractive force, which, called into action when the contacts recede, acts at that time to draw the movable contact in a direction to re-establish the normal condition of the circuit, and this force is preferably so applied that it will be repellent to the movable contact as soon as the circuit is normal. In the arrangement shown in Figs. I, III for bringing about this result a permanent magnet, 18, is employed, fixed to the main frame by a set-screw, 17. This magnet, preferably of horseshoe form, is so placed as to present to the pendant a pole of similar polarity to that of the pendant. For instance, if, as already supposed, the pole of core 9 presented to the pendant be N when the core is magnetized, the pendant will be of S polarity when the circuit is normal. Consequently the S pole of the permanent magnet 18 should be presented to the pendant. Care should be taken to adjust the magnet so that its repellent force upon the pendant will not more than neutralize or offset the attractive force of the core 9, and this can be easily determined by experiment. If the permanent magnet should be placed too near to the pendant—in other words, if the repellent force should exceed the other—the permanent magnet would alternately repel and attract the pendant, with the effect of alternately making and breaking contact between the pendant and the needle, thus putting the pendant into rapid vibration, and virtually making a rheotome of the instrument.

Other ways of obtaining the result can be employed. For instance, the magnet 18 can be dispensed with, and the pendant may itself be a permanent magnet. Such an arragement is indicated in Fig. V. In this case the S pole of the pendent magnet should be presented to the S pole of the core 9, and said pendent magnet should be provided with a pivoted keeper, 3, or its equivalent, by means of which the strength of said pendent magnet can be adjusted with relation to the core 9, so as to obtain as nearly as possible an equilibrium of forces between the two so long as the local circuit is normal.

The secondary coil 11 of the transmitter is in the main-line circuit, as shown. Impulses sent over the line from a distant station act, through the coil 11, to disturb the equilibrium of the magnets 9 and 18, thus causing corresponding vibrations of the pendant, which, through the local circuit, are conveyed to the receiver 19, whose primary coil 21 is in said local circuit. To intensify this action, I prefer to surround the primary coil 21 of the receiver with a secondary helix, 22, included in the main circuit, as shown. This, however, is not indispensable, for the receiver may be in the local circuit only. In any event, however, my transmitter is interposed, as indicated, between the distant transmitter and the home-receiver, with its primary coil in circuit with the primary coil of the receiver.

For long lines, on which great confusion of the messages is caused by induction, I have found it best to shunt to ground, as shown at 23, all the original current received from line, depending upon the induced changes in the current of the local circuit alone to affect the diaphragm of the receiver. By actual experiment I have found that with such an arrangement the strong induced currents on the line were rendered entirely nugatory in any action on the receiver, while the changes in the line-circuit due to the voice were retained in full force.

What I claim herein as new and of my own invention is—

1. The described method of controlling the vibratory movement of the movable contact of a telephone, consisting in subjecting the same to an attractive force called into action by the separation of the two contacts, and influencing at that time the movable contact to move in a direction to re-establish the normal condition of the circuit in which it is included, substantially as and for the purposes hereinbefore set forth.

2. The method of controlling the vibratory movement of the movable contact of a telephone, consisting in subjecting it to the action of a magnetic or electro-magnetic force, which is repellent or attractive with respect to said movable contact, according as the circuit in which said contact is included is made or broken, substantially as and for the purposes hereinbefore set forth.

WILLIAM A. WEST.

Witnesses:
J. W. CHIPMAN,
HARRY E. KNIGHT.