(No Model.) 2 Sheets—Sheet 1.

N. F. PALMER.

TELEPHONE.

No. 358,940. Patented Mar. 8, 1887.

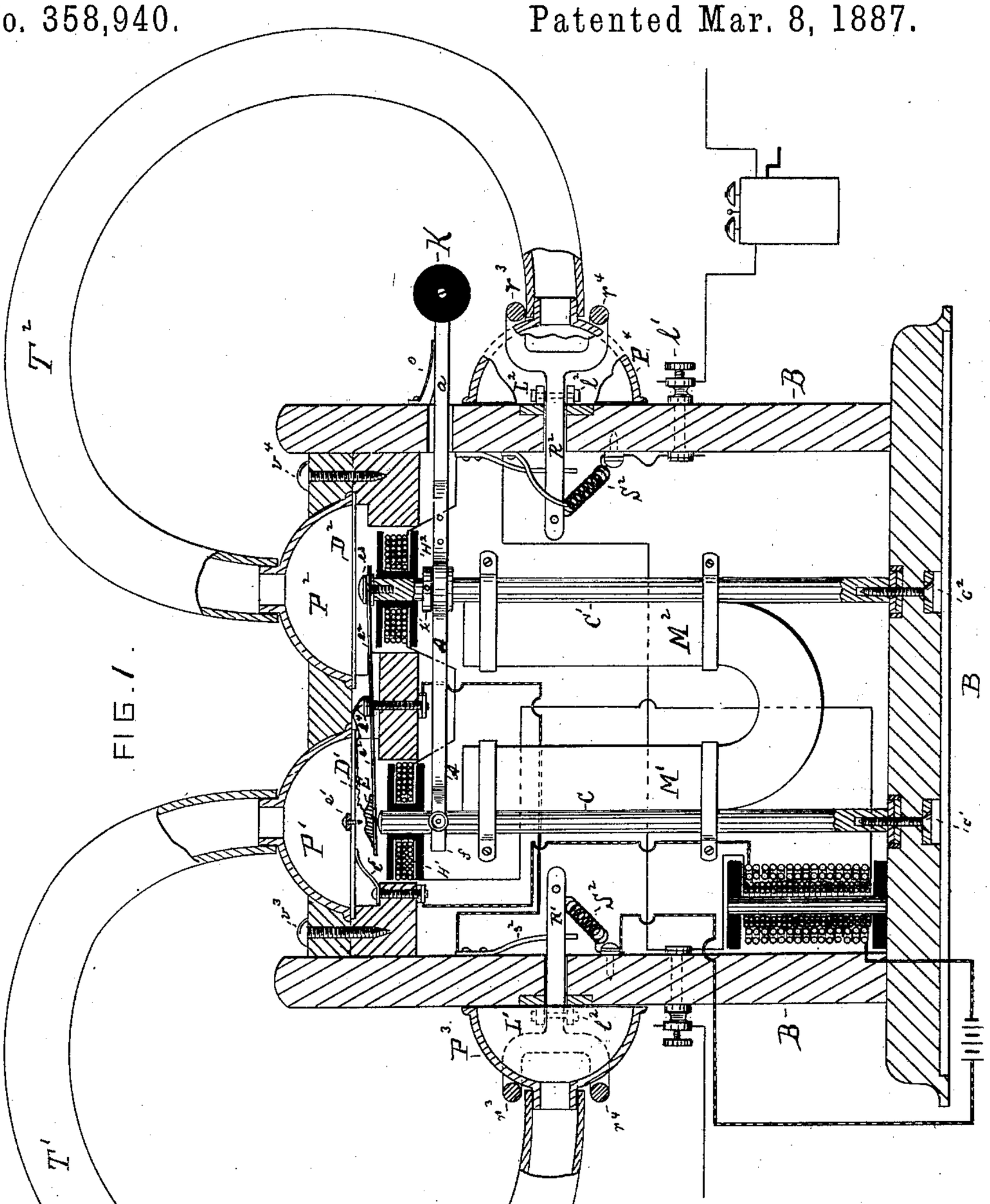

FIG. 1.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

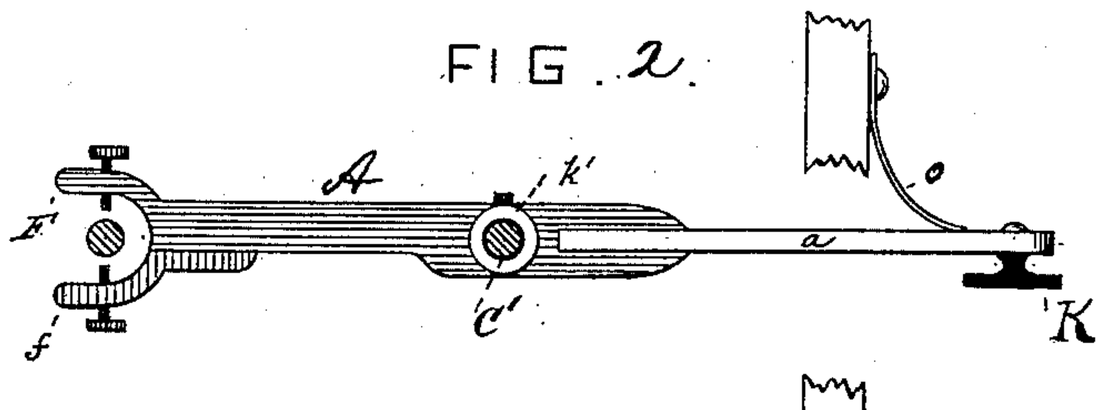


FIG. 3.

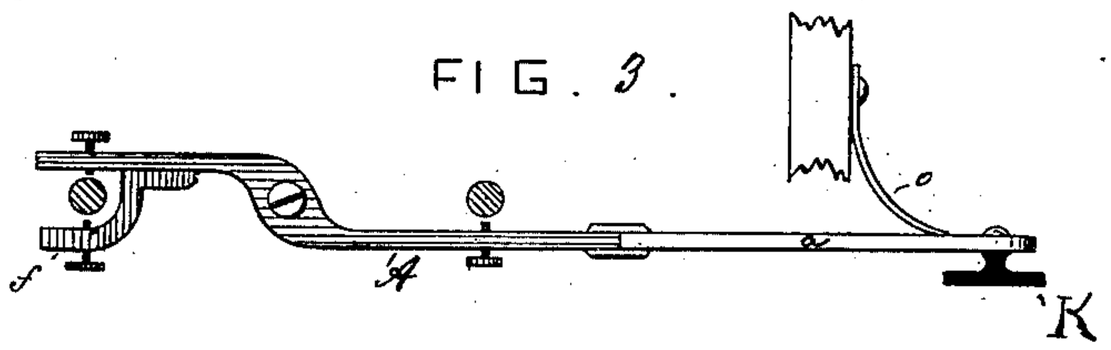


FIG. 4.

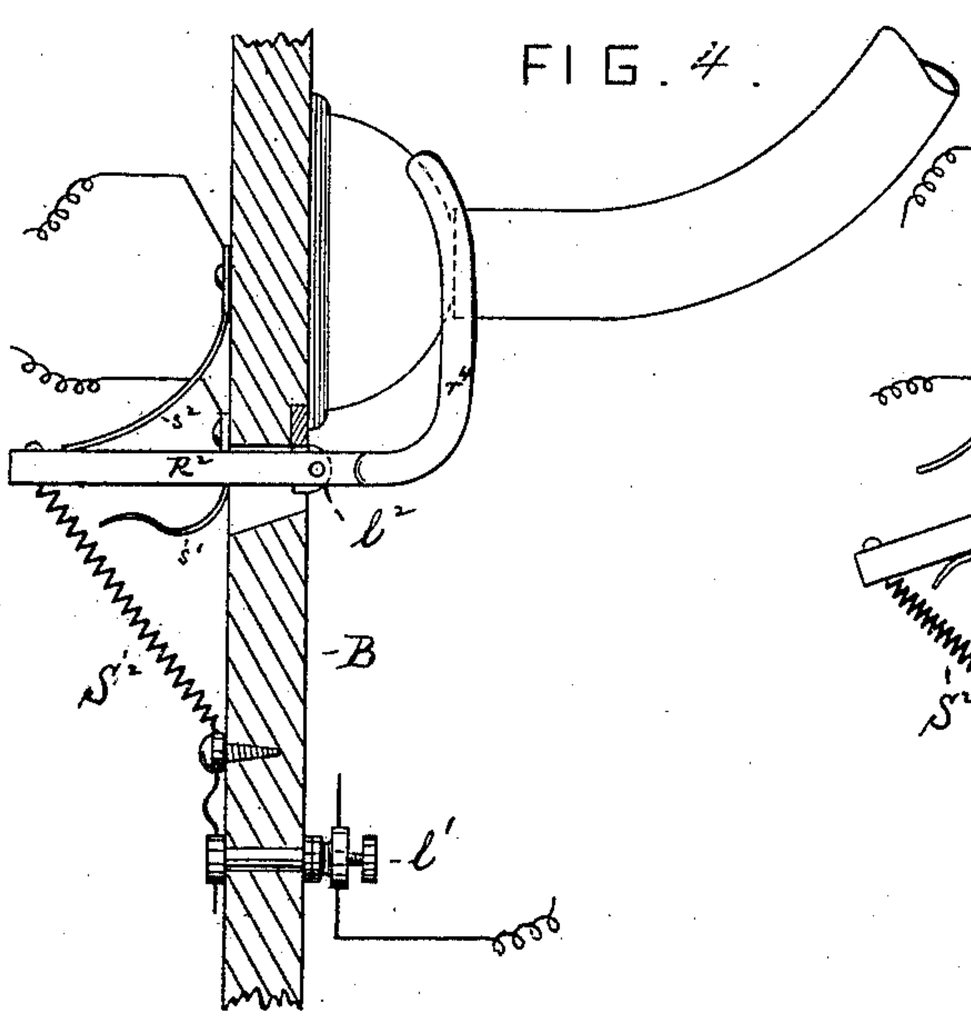


FIG. 5.

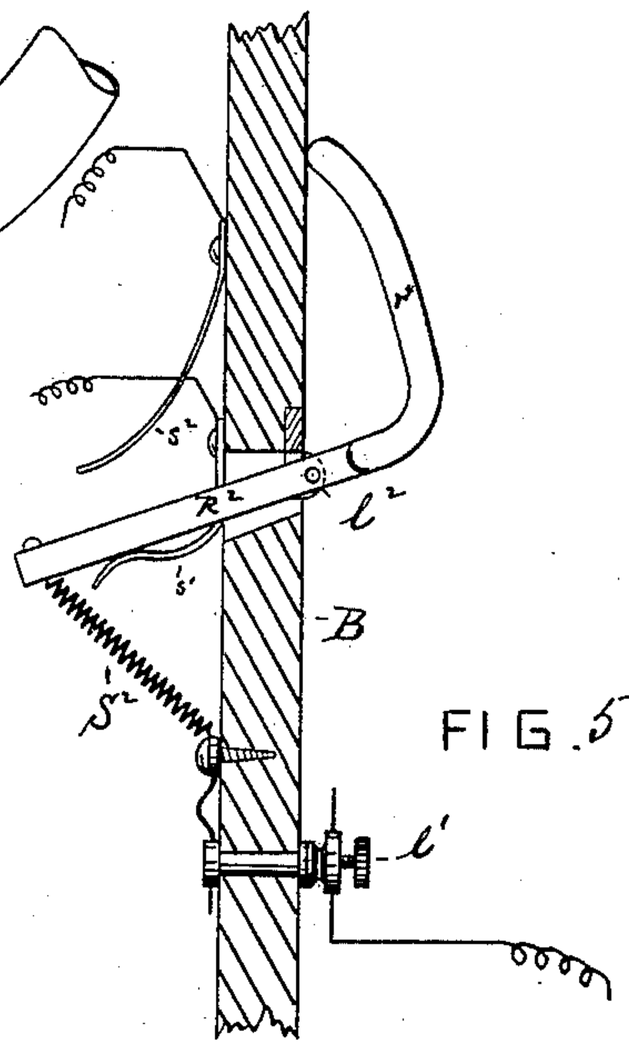
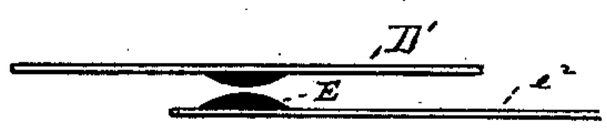


FIG. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

NOYES F. PALMER, OF JAMAICA, NEW YORK.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 358,940, dated March 8, 1887.

Application filed December 30, 1885. Serial No. 187,102. (No model.)

To all whom it may concern:

Be it known that I, NOYES F. PALMER, of Jamaica, Queens county, State of New York, have invented a new and Improved Telephone, of which the following specification is a full, clear, and exact description.

This invention relates to a combined telephone-transmitter and telephone-receiver and magneto-telegraph, the use of a permanent horseshoe form of magnet being made to serve a double instrument.

The invention consists in the various features of improvement, hereinafter more fully pointed out.

In the accompanying drawings, Figure 1 represents a horizontal section of the instrument; Fig. 2, a sectional elevation of the keeper; Fig. 3, a similar view of a modification. Fig. 4 is a side view, partly in section, of the switch, showing it closed. Fig. 5 is a similar view, showing it open. Fig. 6 is a detail view of a modification of electrodes E e'.

The letter B represents a frame or case of wood, which is formed with cavities $P' P^2$, opposite to the diaphragms D' and D^2, which parts are held firmly together by binding-screws v^3 and v^4. Connected with the diaphragm-cavities are flexible tubes T' and T^2, which lead, respectively, to the mouth-piece P^3 and ear-piece P^4 of the instrument. In the drawings the mouth-piece P^3 and the ear-piece P^4 are shown in their respective cut-out switches, R' and R^2. Within the case are one or more permanent magnets of the horseshoe form, which are designated by M' and M^2. In contact with the north and south pole of this magnet are bars of soft iron C and C'. Two ends of these bars are let into the bottom piece of the case B, and are provided with set-screws c' and c^2, which serve to adjust the bars C and C' with relation to the diaphragms. The opposite ends or polar-extensions of the soft-iron bars C and C', beyond the magnet-poles, have thereon the helices H' and H^2, and the extreme end of said bars C and C' terminate so as to be in adjustable relation to the diaphragms, respectively. Before the helices H' and H^2 are placed upon the bars the keeper-lever A is inserted, so as to reach from pole-extension to pole-extension. The keeper is pivoted upon bar C' and has a collar, k', and terminates in forks F and f, Fig. 2.

Outside of the case B the keeper is provided with a handle or knob, K, similar to the usual telegraph-key. Near this end of keeper A is an adjustable spring, o, to aid the manipulations of the key.

In Fig. 2 is shown the keeper A, having a shank, a, preferably made of brass, while the parts beyond or toward the forks F and f are of soft iron, except that it is deemed preferable to have one fork, f, of brass, non-magnetic, while the fork F is magnetic; but good results have been obtained in telephones when all parts of keeper A were of soft iron.

At e', Fig. 1, upon diaphragm D', is an electrode, consisting of a brass screw, passing through the diaphragm and terminating in a platinum point or end. Directly opposite to this electrode e' is a carbon or other suitable electrode, E, against which the electrode e' operates, being in adjustable relation thereto by the use of the spring e^2, from which spring e^2 the carbon electrode E is insulated or not, as required. Thus the vibrations of the diaphragm D' may be regulated to produce the best results, and to permit the use of this half of the instrument as a transmitter of speech or other sound-waves, by aid of the electric impulses from battery-current, &c., through the electrodes E and e', as well as the impulses generated by the same diaphragm vibrations as effected by the induced current of electricity through the helix H', as an ordinary magneto-telephone. Good results have been obtained when electrode E acts against a similar electrode on diaphragm instead of against pin e'. At e^5 is shown a spring used to carry the battery-current to the electrodes e' and E, and which serves also to regulate the necessary tension to the diaphragm. Diaphragm D' being attracted by polar extension C, it is clear that the contact between the electrodes may be regulated by approaching said extension to or receding it from the diaphragm. The horseshoe magnet or magnets, with their polar extensions, therefore serve the purpose of operating the two diaphragms under the influence of incoming currents, and also of adjusting magnetically the contact between the electrodes of the transmitter portion of the apparatus.

At e^4 is shown an adjusting-screw, insulated or not, as required, from spring e^2, which reg-

ulates the tension to spring of electrode E, and which also serves as a connecting binding-post for battery-circuit from induction-coil. If electrode E and adjusting-screw e^4 are insulated from spring e^2, a separate electric connection between E and e^4 will be maintained by a wire, as indicated in the drawings. Diaphragm D^2 is in adjustable relation to the pole-extension through bar C′ by the screw e^2 in the case and by the screw e^3, under which a washer is put, which washer can be varied in thickness. Said screw e^3 and washer under it also hold in contact with the pole-extension C′ the end of spring e^2, upon which the electrode E is placed. Spring e^2, screw e^3, and the washer between the same being made of magnetic material, the screw-head will, in effect, constitute the pole of the magnet on this side of the instrument. The helix H^2 is placed on this pole-extension, similar to the helix on the pole-extension C, opposite, both of the helices H′ and H^2 being wound with the usual fine insulated wire, and said wire ends being connected to the line-wires leading to and from the instrument, as shown, the only difference between this connection and that usually used in magneto-telephones being that in this instrument the wire from helix H′ goes direct to helix H^2, instead of to a separate instrument.

At P^3 is shown the mouth-piece of tube T′, resting in the automatic switch L′. At P^4 is shown the ear-piece of opposite tube, T^2, resting in the opposite automatic switch, L^2. Two switches are given, for there are times when an operator may wish to receive but not to send with the telephone; hence by placing tube T^2 to the ear and tube T′ in the switch, this can be done. The position of the switches in Figs. 1 and 4 is such that the line-current is cut out, while the removal of the end of the tubes will cut in the line-current to the receiver and transmitter, respectively, as in Fig. 5.

The switch consists of two handles or fingers, r^3 and r^4, which rest, as shown in Fig. 1, on either side of ear-piece P^4. These handles r^3 and r^4 terminate in a lever, R^2, and said lever R^2 is pivoted at l^2 in a metal frame securely fastened to the case B. At the end of said lever R^2 is attached a spring, S^2, the latter running to the binding-post l' in the case. A spring, s', is connected to the lever R^2 (when ear-piece P^4 is removed) by the tension of the spring S^2, and this connection carries the line-current from lever R^2 to spring s' and thence to the helix. The closing of the switch, or rather the replacement of ear-piece P^4, changes to spring s^2, which cuts out the helix and carries the line-current to the ground or distant station. A similar action is given to switch at P^3, except in this action, when the part P^3 is placed in switch, the current from battery is broken, the spring s^2 operating against lever R′ and acting to close the circuit only when part P^3 is removed from the switch. These removals are necessary to use the instruments, and hence an automatic switch movement is obtained.

Such being the preferred construction of my device, the operation will be readily understood by those skilled in the art.

It is evident that when the instruments are properly connected by the line-wires they will operate as ordinary magneto-telephones in transmitting and receiving sounds that are made to operate upon the diaphragms; and in the use of said instruments it will be found that if difficult hearing results, (as is common to the use of all telephones,) then this difficulty is greatly overcome by placing both of the tubes to the ear—one to each—and the simultaneous vibrations of the diaphragms affect the nerves of hearing in the ears, and all other extraneous vibrations and sounds are cut off by having both ears covered and in use only for the sounds from this instrument. The form of mouth-piece, also, is such that a low conversational tone by the sender is concentrated in sound-waves directly to the diaphragm, and gives more privacy to the use of the instrument.

When it is desired to use the instrument as a transmitter and receiver of telegraphic signals, the magneto-key or keeper-knob is vibrated similar to the vibrations of the ordinary telegraph-key, and this vibration of the keeper alternately closes and breaks the short circuit around the magnet, which alternately increases and decreases the strength of the magnetism in the core of the helix, and thus the variations in the line-current are caused to operate on the distant receiving-instrument; hence the instrument is serviceable for telegraphic-code signals, and as far as the telephone can operate this will operate and perhaps at a greater distance, according to the strength of the magnets, and limited only by the power of the magnets and under circumstances when the telephone fails to be operative, so that an operator, failing in telephonic operations, may resort to telegraphic signals, or perform either at will. This service, also, can be combined, as the writer has done, with the use of ordinary telegraph instruments and batteries, being operated over the same wire, by the use of a switch from line to either set of instruments, as required.

I do not wish to be confined strictly to the exact construction of this keeper, for I have constructed and had good results when the keeper was pivoted upon pole-extension C and came in contact with pole-extension C′. I also had similar good results when the keeper was pivoted to the case B and came in contact with one or both pole-extensions, and also have obtained good results when the keeper was pivoted between the pole-extensions centrally and came in contact with both pole-extensions simultaneously, all of which keeper movements produced the same results—*i. e.*, closing and breaking the short circuit around the magnet. Again, I have obtained good results by a slight change in line-connections in the telephone-

electrodes, &c., when they were identical in construction with either of those shown in the drawings—that is, when D′ e' and E and e^2 of cavity P′ were identically the same as those in the opposite cavity, P^2, and when D^2 e^3 in cavity P^2 were identically the same as those in the cavity P′. In other words, the cavities P′ and P^2 had twin parts from the helix to the diaphragm, similar to either shown in the illustration.

I claim as my invention—

1. A compound magneto-receiver and microphonic transmitter, both provided with diaphragms, in combination with a magnet, one pole of which is in adjustable inductive relation to the diaphragm of the receiver and the other to the diaphragm of the transmitter, substantially as described.

2. A telephonic apparatus consisting of a magneto-receiver and microphonic transmitter provided with separate diaphragms, a magnet having adjustable pole-pieces, one of which is in inductive proximity to the receiver-diaphragm and the other to the transmitter-diaphragm, in combination with a keeper to the magnet having one end forked and embracing one pole-piece and the other pivoted to the other pole-piece, substantially as described.

3. A compound magneto-receiver and microphonic transmitter, each provided with a separate diaphragm consisting of a horseshoe-magnet, one pole of which is in inductive relation to the diaphragm of the receiver and the other to the diaphragm of the transmitter, in combination with microphonic contacts operated by the transmitter-diaphragm, substantially as described.

4. A telephonic apparatus consisting of two diaphragms and a horseshoe electric magnet acting upon both, combined with a key for magnetically short-circuiting the magnet, whereby telegraphic signals may be sent and received.

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