

(No Model.)

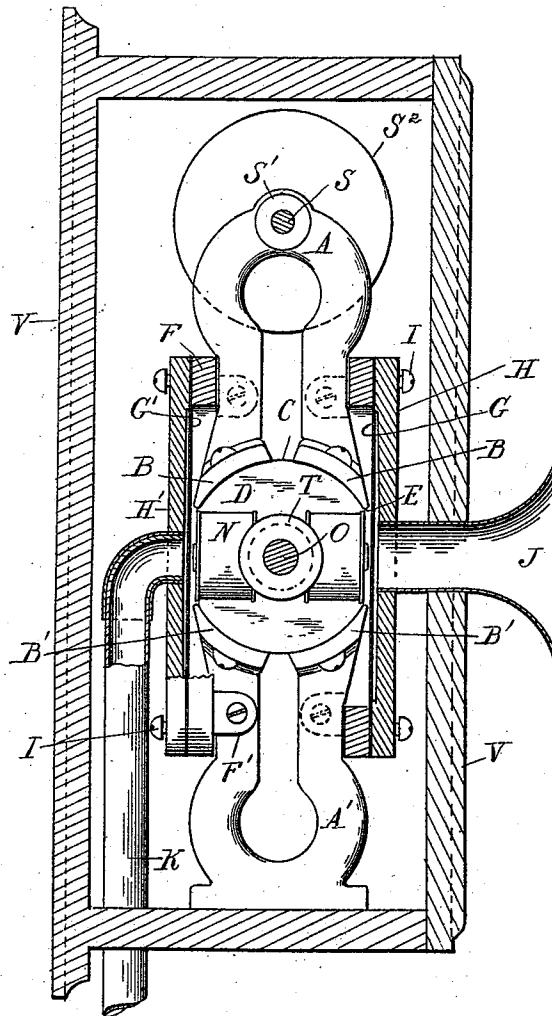
2 Sheets—Sheet 1.

C. J. SCHWARZE.
TELEPHONE APPARATUS.

No. 554,036.

Patented Feb. 4, 1896.

Fig. 1.



Witnesses
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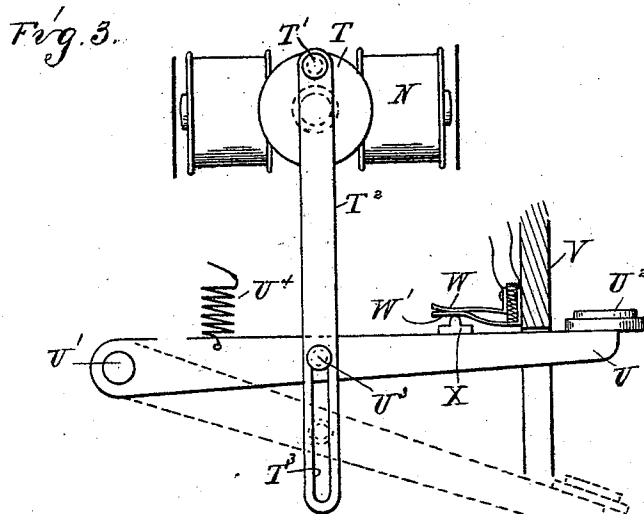
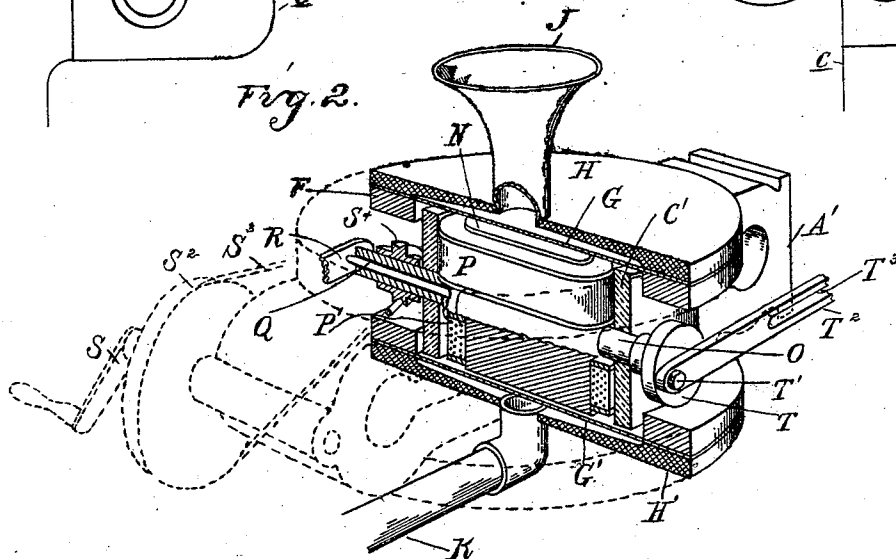
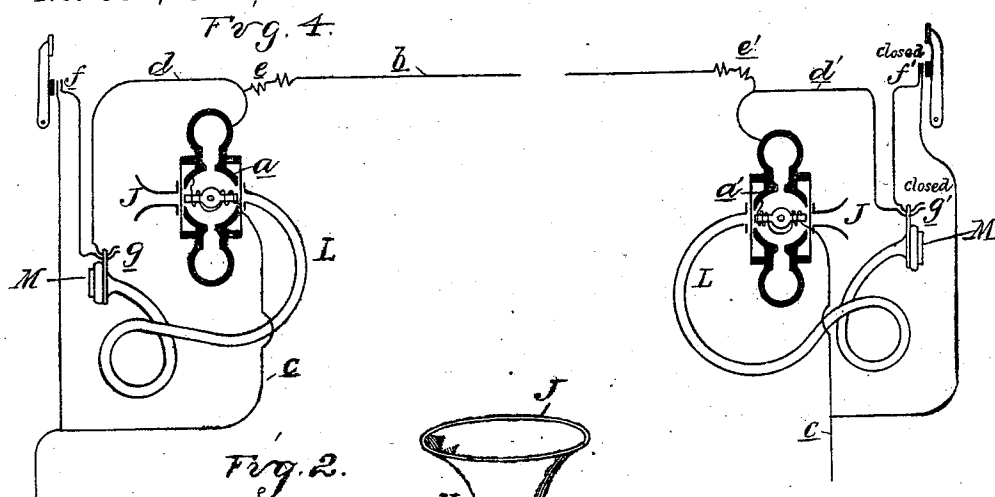
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Witnesses

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UNITED STATES PATENT OFFICE.

CARL J. SCHWARZE, OF ADRIAN, MICHIGAN.

TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 554,036, dated February 4, 1896.

Application filed September 17, 1895. Serial No. 562,777. (No model.)

To all whom it may concern:

Be it known that I, CARL J. SCHWARZE, a citizen of the United States, residing at Adrian, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Telephonic Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a telephonic apparatus in which the transmitting, receiving, and signaling devices are all organically combined in a single instrument, and it is the object of my invention to simplify the construction and cheapen the cost of manufacture as well as to render the instrument more compact.

In the drawings, Figure 1 is a vertical central longitudinal section through my apparatus. Fig. 2 is a sectional perspective view with the outer casing removed. Fig. 3 is an elevation of the setting-lever, and Fig. 4 is a diagram of the apparatus as in use.

A and A' are two permanent horseshoe-magnets, each provided with the segmental pole-pieces B B'. These magnets are oppositely arranged and mechanically secured together by being screwed to the non-magnetic heads C C', forming between the cylindrical space D, with the unlike poles of the two magnets on diametrically-opposite sides thereof, and openings E between the like poles.

F are iron rings secured to the magnets A A' by the lugs F' screwed or bolted to the legs of the magnets. G G' are thin iron diaphragms secured between said rings and the non-magnetic plates H H' by means of the screws I. The plates H H' are centrally apertured, the former being provided with a speaking-funnel and the latter with a tube K connected by the flexible tube L to the ear-phone or receiver M.

N is a revolving armature mounted upon the shaft O, passing through the axis of the cylinder D and journaled in the heads C C'. P P' are coils upon said armature connected in series, one terminal being electrically connected to the shaft and through its bearings with one of the line-wires, while the other terminal is connected to the insulated pin Q, extending out from the end of the shaft and bearing against the contact-spring R. The

armature is provided with a drive connection, preferably comprising the crank-shaft S, journaled in a bearing S' formed in the rear end of one of the magnets, the grooved disk or pulley S² upon said crank-shaft and the belt S³ connecting it with the grooved pulley S⁴ upon the armature.

T is a head at the end of the armature-shaft, and T' is a pin secured eccentrically thereto.

U is a lever fulcrumed at U', being provided at its free end with a finger-piece U².

T² is an arm or connecting-rod pivoted at one end upon the pin T' and provided at its other end with the slotted bearing T³.

U³ is a pin upon the lever U engaging with the slotted bearing T³, and U⁴ is a spring attached to the lever holding said pin against the inner end of said slotted bearing, all so arranged that the pressure of the lever upon the rod T² and through the latter on the pin T' will turn the armature into the position shown in Figs. 2 and 3, in which the poles stand in the spaces E between the pole-pieces D D and D' D' and are in proximity respectively to the diaphragms G and G'.

V is an inclosing box or casing suitably apertured for the passage of the funnel J, the tube L, the crank-shaft O and the lever P.

W and W' are two insulated spring-contacts secured to the casing V.

X is an insulated block upon the lever U adapted in the normal position of said lever to press the spring-contacts W and W' into contact with each other.

The parts being thus constructed and arranged the instruments are connected into circuit, as shown in Fig. 4 of the drawings, in which a a' are two instruments at the opposite ends of the line.

b is the main-line wire and c the ground or return wire.

e and e' are the call-bells.

d d' are shunt-circuits around the instruments a a', each containing two normally-closed breaks f g and f' g', the breaks f f' comprising the contacts W W' and lever U, and the breaks g g' forming the hook upon which the receiver is hung.

To use the instrument, the operator at either end of the line—as, for instance, at a—presses the finger-key U² on the lever U, thereby opening the break f and moving the pin U³ to the

outer end of the slotted bearing T^3 . The crank-shaft S may now be turned, thereby revolving the armature-shaft, the rod T^2 sliding freely upon the pin U^3 . The poles of the armature in revolving pass in proximity to the pole-pieces $B B'$ and generate an electric current in the coils, which passes over the line-wire b , through the bell e' and the shunt d' to the ground or return wire c . The operator then releases the lever U , which is returned by the spring U^4 , pressing the rod T^2 against the pin T' and thereby turning the armature into its normal position—that is, with its poles in proximity to the diaphragms $G G'$. The return of the lever U again closes the break f , but as the operator takes down the ear-phone M the break g is opened. At the same time the person called at the other end of the line in taking down the ear-phone opens the break g' . Thus both shunts d and d' are cut out and the only circuit is through the instrument a and a' .

Although I have shown and described an instrument provided with a revolving armature operating both as a generator for the signal-current and as transmitter and receiver, I do not wish to limit myself to this construction, as I believe I am the first to construct a phone in which transmitting and receiving diaphragms form the opposite poles of the permanent magnet, with a common induction-coil between.

With this construction it will be observed the diaphragms although magnetically connected are acoustically independent of each other. Thus the deafening sound which would be produced in the ear-phone if a single diaphragm were used for the double purpose of transmitter and receiver is avoided.

I also desire it to be understood that I do not limit myself to the precise construction of setting mechanism shown, as I believe the invention includes any means of setting the parts in proper relation to each other to convert the generator into a telephone.

What I claim as my invention is—

1. In a telephone, the combination with the permanent magnet of vibrating transmitting and receiving diaphragms connected to and forming respectively opposite poles of said magnet, and an armature between the diaphragms and constituting in connection with the magnet and diaphragms transmitting, receiving and signaling instrumentalities of the telephone.

2. In a telephone, the combination with a magneto-electric generator for signaling, of two vibratory diaphragms, forming respectively parts of the opposite poles of the generator-magnet to which they are connected and in conjunction with the armature of said generator constituting the transmitter and receiver.

3. In a telephone, the combination with a magneto-electric generator for signaling,

comprising a revolving armature and a vibratory diaphragm adapted in conjunction with said armature, to form a magneto-telephone, of means for automatically setting and normally holding the parts in proper inductive relation to each other to constitute the telephone.

4. In a telephone, the combination with a magneto-electric generator for signaling and vibratory diaphragms adapted in conjunction with said generator, to form a magneto-telephone, of means for automatically setting and normally holding the armature of said generator with its poles in proximity to said diaphragms.

5. In a telephone, the combination with a magneto-electric generator for signaling and vibratory diaphragms adapted, in conjunction with said generator to form a magneto-telephone, of an eccentric bearing upon the armature, of said generator, and an arm pressing upon said bearing adapted to automatically turn and normally hold said armature with its poles in proximity to the diaphragms, and a key or lever for releasing said arm.

6. In a telephonic apparatus, the combination with a magneto-electric generator for signaling, a vibratory diaphragm adapted in conjunction with said generator to form a magneto-telephone, an electric circuit in which said generator is included and a shunt-circuit around the generator, of a combined switch and setting-lever adapted when operated to break the shunt-circuit and mechanism actuated by and upon the release of the lever to automatically set and hold the parts in proper inductive relation to constitute the telephone.

7. In a telephone, the combination of two permanent magnets arranged oppositely to each other and forming with their poles a cylindrical field of force in which the poles of one magnet are opposite the like poles of the other magnet, a revolving armature in said field of force provided with an armature-helix included in the line-circuit, non-magnetic heads secured in the openings between the poles of the magnets and forming bearings for the armature-shaft, two diaphragms connected to the magnets and constituting common north and south poles thereof on opposite sides of the armature, a drive mechanism for the armature and a spring acting through the drive mechanism to hold the armature at rest in a prescribed position in relation to the diaphragms, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CARL J. SCHWARZE.

Witnesses:

ALEXANDER WAHLIG,
ANNA WAHLIG.