(No Model.) 2 Sheets—Sheet 1.

E. S. HALSEY.

MAGNETO ELECTRIC TELEPHONY.

No. 542,191. Patented July 2, 1895.

Fig. 1.

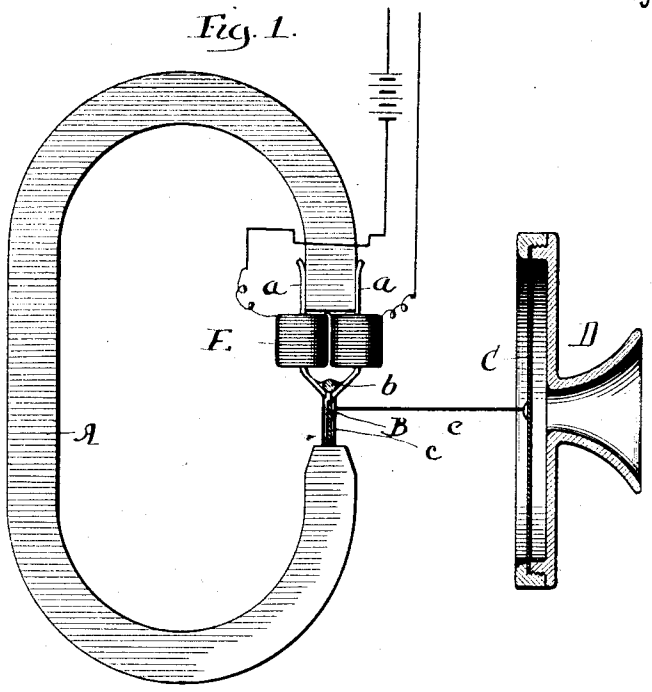
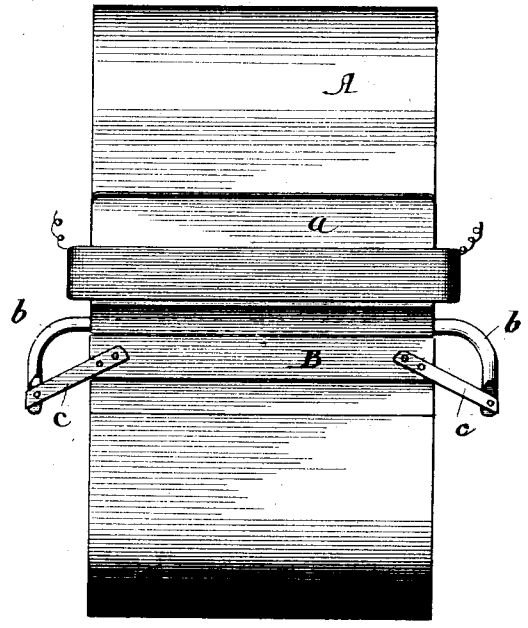


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

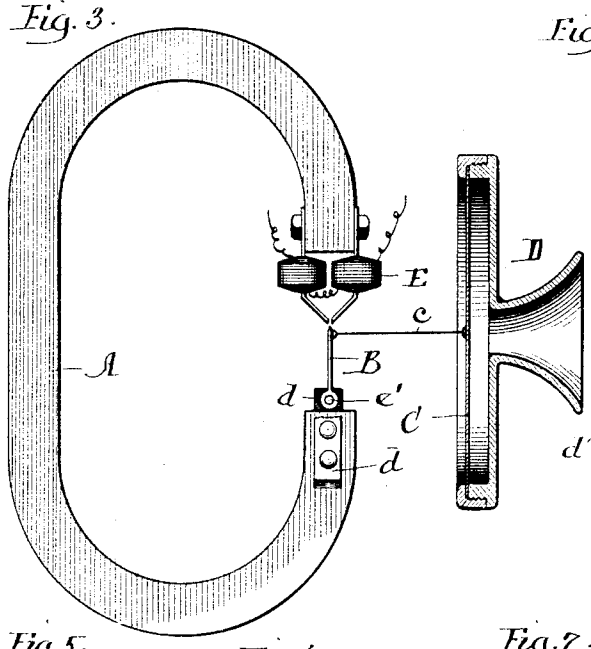


Fig. 4.

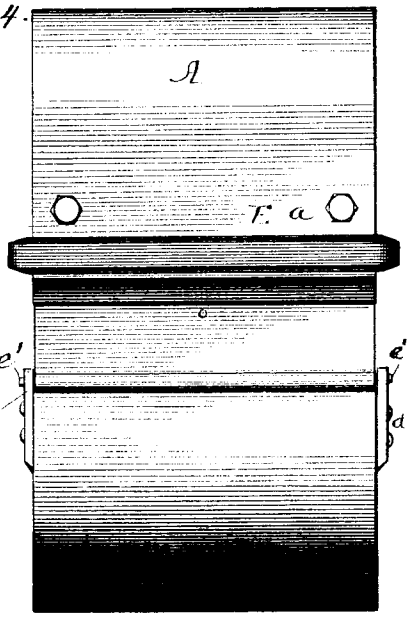


Fig. 5.

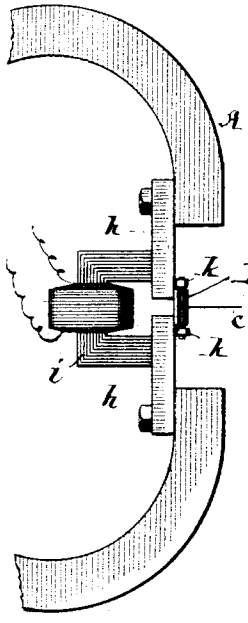


Fig. 6.

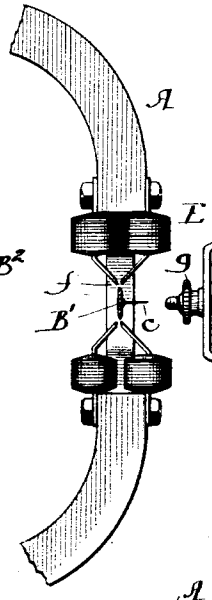


Fig. 7.

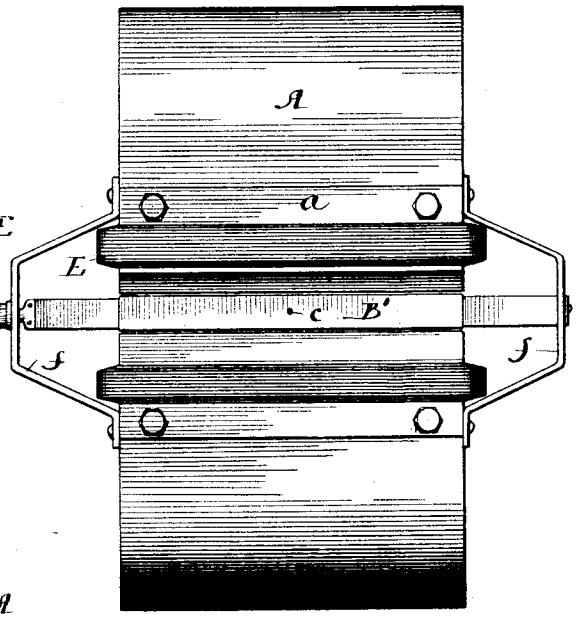
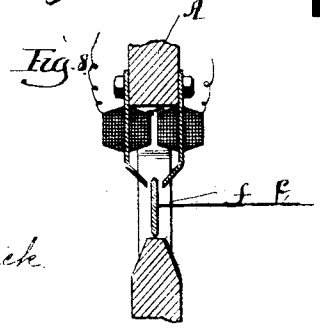


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDWARD S. HALSEY, OF SOUTH EVANSTON, ASSIGNOR OF ONE-HALF TO WILLIAM J. PHELPS, OF CHICAGO, ILLINOIS.

MAGNETO-ELECTRIC TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 542,191, dated July 2, 1895.

Application filed April 20, 1894. Serial No. 508,273. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. HALSEY, a citizen of the United States, residing at South Evanston, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Magneto-Electric Telephony, of which the following is hereby declared to be a full, clear, and exact description sufficient to enable others skilled in the art to make and use the same.

In the magneto-telephone transmitter of familiar construction the production of the electric impulses which pass to line depends primarily upon changes in resistance in the magnetic circuit. The resistance varies in keeping with the shift of the diaphragm, which latter as it approaches or recedes tends to reduce or enlarge the distance traversed by the lines of force to complete the circuit, and by so much modifies the effective strength of the magnetic current. The electric induction is developed in exact keeping with these disturbing variations in the magnetic current itself.

By my invention the design is to maintain the magnetic flux practically constant and to effect the electric induction by variably diverting the current through two paths at some part of the magnetic circuit, the coils of the electric circuit being exposed to the inductive action which is due to modified shift of the magnetic current through the dual paths.

The nature of the improvements will appear in detail from the description following, and be thereafter more particularly pointed out by claims at the conclusion thereof.

In the accompanying drawings, like parts of structure are denoted by like designation throughout.

Figure 1 is a view in longitudinal section of one form of magneto-telephone embodying the invention. Fig. 2 is a view of the same in front elevation, the mouthpiece and diaphragm with its connector being removed. Fig. 3 is a longitudinal section of another form of the improved magneto-telephone, and Fig. 4 a view of the same in front elevation, the diaphragm and its connector being removed. Figs. 5, 6, and 8 are views in longitudinal section showing still other modified forms of the invention. Fig. 7 is a view in front elevation of the variant shown at Fig. 6.

Referring to Figs. 1 and 2, the permanent exciting-magnet A is bent in familiar horseshoe form, and at one end has secured thereto on opposite faces the plates *a*, usually of soft iron. These plates are bent, as shown, so as to approach nearly together, and are soldered in place in conjunction with a rod *b* of non-magnetic material, (ordinarily brass,) extending across the junction and secured at its ends, as by flexible braces *c*, to a movable keeper B. This keeper, as shown by Fig. 1, is in contact with one pole of the magnet A and thus constitutes the terminal thereof. It is made of iron or steel, and by virtue of its position in the magnetic circuit in near relation to the dual terminal *a* at the opposite pole affords a path for the flow of the magnetism, which proceeds thence variably through the terminals *a* in changing course, according to the position of the keeper B in its relation thereto. The position of the keeper B is made to vary through means of the connector *e*, (usually of phosphor-bronze or aluminum,) secured thereto and at its opposite end joined to the vibrating disk or diaphragm C. The diaphragm C is mounted with the familiar mouthpiece D, as usual, and can be made of aluminum or other suitable vibrating material.

The parts being in the position shown, it is clear that the vibrations of the diaphragm C are transmitted through the connector *c* to the movable keeper B, which responsively changes its position thereupon in its relation to the pole-terminal *a*. By reason of such change in relation, the flow of the magnetism, although practically constant in quantity, is changeably diverted in its course through the paths afforded by the dual terminals *a*. The coil E for the electric circuit, being located within the field of the magnetic flow, responds inductively to the changes in direction of such flow, so that the electric impulses thence derived exactly reflect the multitude of variations in the flow of the magnetism.

As appears at Figs. 3 and 4, the main features of structure are retained; but the keeper B is pivoted, as by rod *e'*, to the lugs *d*, which are secured to the body of the magnet. The pivotal connection by the rod *e'*, in lieu of the flexible braces *c*, Fig. 2, affords like freedom of play for the keeper B, but the keeper is

not in contact with the magnet, as in the structure shown by Fig. 1, and by so much is the magnetic resistance increased.

In Figs. 6 and 7 the movable keeper B′ is mounted at its ends in brackets *f*, and may be furnished with a tension-screw *g* to set the keeper taut in position. Each pole of the magnet is furnished with dual terminals, and the movable keeper B′ is located between them.

In Fig. 8 the brackets *f*, to sustain the keeper B, are employed; but in lieu of double sets of pole-terminals confronting each other, one set is dispensed with and the keeper B rests in contact with the simple pole at one side of the magnet. The keeper extends between the edges of the opposite pole-terminals, and in such position serves to divert the flow of the magnetism variably between the two paths presented for that purpose.

In the form shown by Fig. 5, the opposite pole-plates *h* extend in near proximity to each other, and on one side are permanently approached by means of the laminated iron plates *i*, upon which the coil E for the electric circuit is mounted. In brass ears or lugs *k*, on the opposite face of the pole-terminals *h*, is pivotally set the vibrating keeper B^2, which is joined by its connector *c* to the diaphragm. Ordinarily the laminated plates *i* afford a superior path for the flow of the magnetism; but if the keeper B^2 approaches the pole-terminal *b* during its vibratory play, it affords a supplemental path, and by so much diverts the flow from the plates *i*. This diversion is manifestly reflected in the coil of the electric circuit.

Obviously the details of structure can be varied, according to the skill of the mechanic, without departing from the essential features of the invention.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In magneto-electric telephony the method of transmission which consists in compelling a magnetic current practically constant in quantity and direction to be diverted variably through dual paths included by the magnetic circuit in responsive keeping with the air vibrations due to vocal sounds and thereupon exciting inductively in the electric circuit at the local path or paths derived impulses responsive to the shifts in the magnetic flow at such path or paths, substantially as described.

2. In magneto-electric telephones, the combination with a vibrating diaphragm, of an exciting magnet having dual terminals of like polarity constituting diverse paths for the magnetic current, an inductor included in the electric circuit and located within the magnetic field at such path or paths, a movable keeper interposed in the magnetic circuit at near proximity to the dual pole terminals and with the single end thereof shifting to and fro between such terminals, and a connector extended from such keeper to control the same in accord with the vibrations of the diaphragm, substantially as described.

3. In magneto-electric telephones, the combination with a vibrating diaphragm, of an exciting magnet having a movable pole terminal and opposite dual pole terminals confronting the same with the coil for the electric circuit within their inductive field, and a connector located between the diaphragm and the movable pole terminal whereby the latter shifts in keeping with the shifts of the diaphragm, substantially as described.

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