J. J. McTIGHE.

Telephone or Speaking Telegraph.

No. 198,406. Patented Dec. 18, 1877.

Fig. 1.

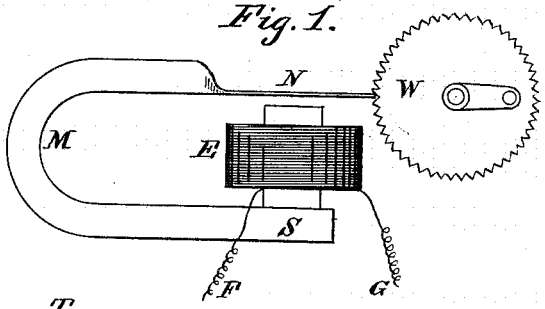


Fig. 2.

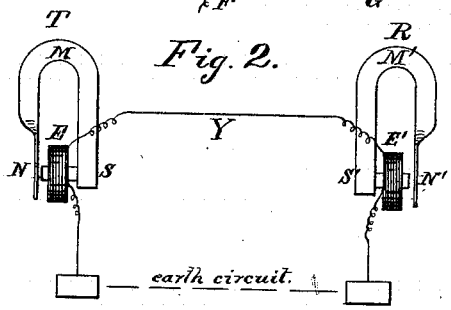


Fig. 3.

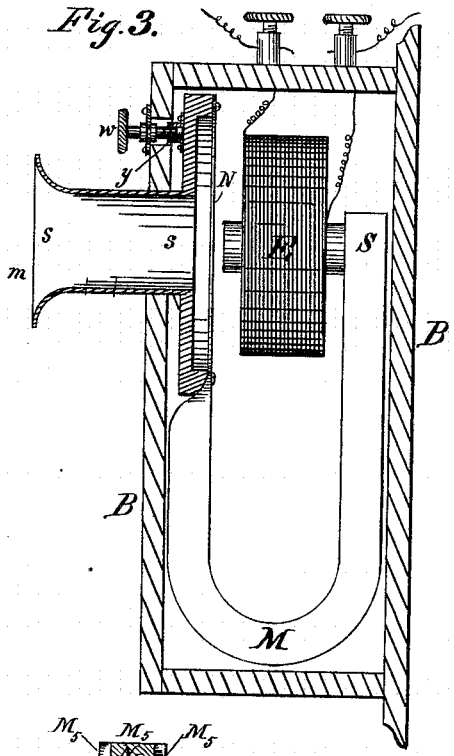


Fig. 4

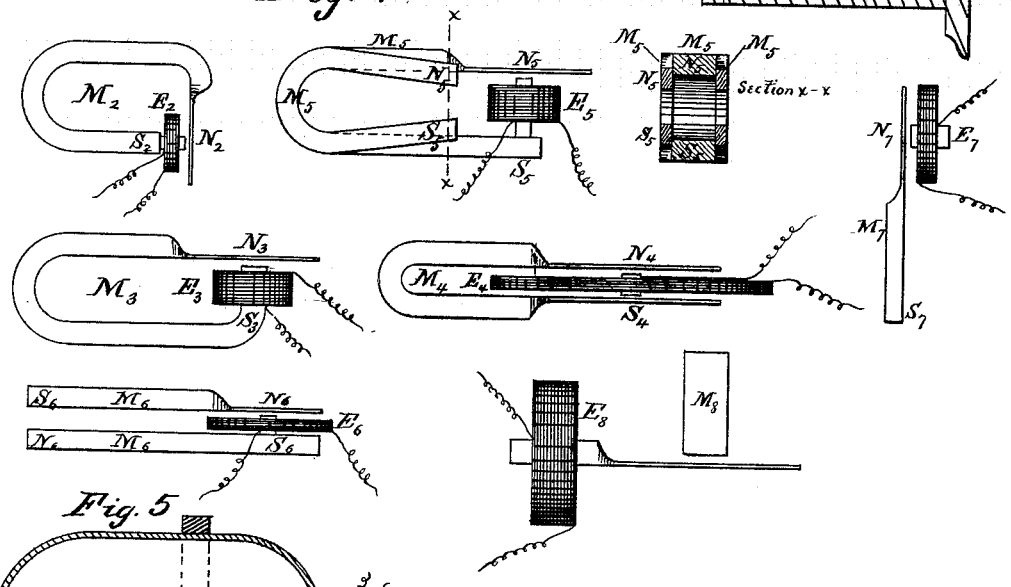
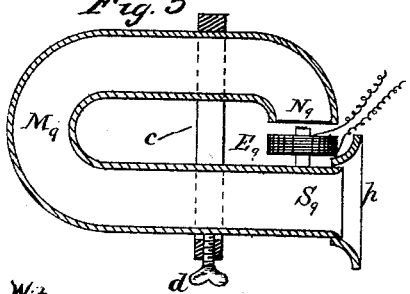


Fig. 5



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UNITED STATES PATENT OFFICE.

JAMES J. McTIGHE, OF ALPSVILLE, PENNSYLVANIA.

IMPROVEMENT IN TELEPHONES OR SPEAKING-TELEGRAPHS.

Specification forming part of Letters Patent No. **198,406**, dated December 18, 1877; application filed October 2, 1877.

To all whom it may concern:

Be it known that I, JAMES J. McTIGHE, of Alpsville, county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Telephones or Speaking-Telegraphs and other apparatus for the production and utilization of magneto-electricity; and I do hereby declare that the following is a full, clear, and exact description of my invention, such as will enable those skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is an elevation of a magneto-electric machine. Fig. 2 shows its application to telephonic purposes. Fig. 3 is a vertical transverse section of the telephone. Figs. 4 and 5 illustrate modifications of the essential features of my telephone.

My invention consists in the novel construction of an inducing-magnet for telephonic and analogous purposes, having one or both its poles reduced to the form of a vibrating diaphragm or plate, and integral with the body of the magnet; and in the combination of such a magnet with an electrical helix or coil, all substantially as hereinafter fully described and claimed.

My invention and the methods in which the same is or may be made to produce great and practical results in electro-physics will be better understood from the following:

As the telephone is nothing more nor less than a diminutive magneto-electric apparatus, I will first describe and illustrate the application of my invention to the construction of magneto-electric machines, and afterward the application of the same to the construction of telephonic or telegraphic apparatus.

In Fig. 1, M is a magnet, (permanent steel or electro, it matters not,) the pole N of which is made sufficiently thin to vibrate when acted upon by a toothed wheel, W, or by any other means of producing vibrations. E is an electro-magnet, (or its substitute—an electrical coil,) one end facing said pole N, and the other end facing or resting upon the pole S. F and G are the ends of the wire of electro-magnet E or coil.

I will here state that in speaking of an electro-magnet any form of electrical helix or coil must be considered its equivalent.

Now, according to the well-known theory of the formation of electrical currents in an electro-magnet, when a magnet approaches to or recedes from the core of said electro-magnet, the vibrating of the pole N will induce currents of electricity in the electro-magnet E, which currents may then be used for any purpose for which magneto-electricity is available.

It is obvious that these currents may be intensified to any degree within the limits of mechanical means or electrical appliances.

The necessary vibrations may be produced also by sound-waves, and both poles, N and S, of the magnet M (the electro-magnet being situated between them) may be given the plate or reed-tongue form, and both vibrated.

Two of the above-described instruments, united in electrical circuit, at once form a most perfect telegraphic, telephonic, or teleharmonic apparatus, both for transmitting and receiving intelligible signals and articulate or musical sounds, provided one pole of the respective magnet of each instrument be made thin enough to vibrate readily under the influence of either sound-waves, and synchronously with said current, so as to thereby produce sound-waves in the air.

Such an apparatus is exhibited in Fig. 2, in which T represents one instrument, and R the other, united on circuit Y, both being alike in construction, and each being capable of acting successively as transmitter and receiver, or simultaneously as both. As before said, every vibration of pole N of magnet M of the instrument T, by whatever means effected, will produce a current of electricity in the wire of the electro-magnet E, which then traverses circuit Y, and, passing through the electro-magnet E^1 of instrument R, causes a change in the attractive force at the time existing between the pole N^1 and electro-magnet E^1, and thereby, being aided by its own resiliency, the pole N^1 is made to vibrate in periods synchronous with the vibrations of pole N; and hence, as experiment proves, if the cause of the vibrations in pole N be articulate sounds, pole N^1 will correspondingly

vibrate, so as to reproduce the same sounds by its action on the air. In this way the apparatus becomes a perfect telephone.

For adjustment I attach the pole N to the base of tube *s*, and adapt the device *w y* to causing said pole to approach to or recede from electro-magnet E, at pleasure, so as to readily obtain the best results. The whole may be inclosed in a box or casing, B, if desired.

I wish it distinctly understood that I do not in any way limit myself to the specific construction or arrangement, above set forth.

It is obvious that it is but a simple matter of judgment as to the changes of form, size, or arrangement which can be made, all of which would be but mere modifications of the apparatus described. Some of such modifications I illustrate in Figs. 4 and 5, which show the most essential feature—the magnet—in various forms and relations.

M^2 has the thinned pole N^2 bent over in front of the pole S^2, on which latter is placed the electro-magnet E^2. M^3 is a magnet having its pole S^3 bent around so as to face the thinned pole N^3, and having the coil E^3 wound around said pole S^3. M^4 is a magnet having both poles, N^4 and S^4, thinned, and the electro-magnet E^4 situated between them.

Another form is shown in which several magnets, M^5, are compounded, one of the poles being thinned, and the electro-magnet E^5 facing said thinned pole N^5, as shown.

Another form is shown in which two straight magnets, M^6, are placed parallel to each other, the pole N^6 of one being thinned, and the electro-magnet E^6 placed between that and the pole S^6 of the other, as shown.

Another simple arrangement is shown by the magnet M^7, having one pole, N^7, thinned, facing an electro-magnet, E^7.

Another form is shown by extending and flattening the core of the electro-magnet E^8, and placing opposite such extended and flattened core the pole of a magnet, M^8.

A very special modification is shown in one of its forms by Fig. 5. In this I have a bent tubular magnet, M^9, one of whose ends is closed by a thin metallic diaphragm, constituting the pole N^9 of the magnet itself, and the other of whose ends is open, and constitutes the pole S^9, the electro-magnet E^9 facing the pole N^9, as shown. In this way the magnet itself becomes a speaking and hearing tube, and obviates the necessity of their special construction. A non-magnetic mouth-piece, *p*, may be applied to pole S^9, and also the interior may be lined with wood or other material. Adjustment may be effected by a clamp, *c*, and set-screw *d*, embracing the two legs. This form may also be modified, its main feature being the tubular magnet with one pole a diaphragm.

In its relation to telephones or speaking-telegraphs my invention is to be understood as an improvement upon what is shown in the patents to A. G. Bell, March 7, 1876, and January 30, 1877. I therefore disclaim anything shown in said patents.

I claim as my invention—

1. The combination, in an electrical circuit, of two or more telephonic or speaking-telegraphic instruments, consisting each of an electrical coil or helix and a magnet, having a pole of reduced thickness, or of a diaphragm form, and integral with the body of the magnet, whereby it is rendered responsive to sound-waves, or to the equivalent influence of intermittent magneto-electric currents, said coil or helix being within the magnetic field of said pole, by which intermittent currents of magneto-electricity may be produced solely by the inducing power of said pole upon the coil or helix within its influence.

2. As a new article of manufacture, a permanent or electro magnet having one or both poles reduced to the form of a vibrating diaphragm or plate, and integral with the body of the magnet, substantially as and for the purpose described.

3. An inducing-magnet for telephonic or speaking-telegraphic purposes, having one or both poles reduced to the form of a vibrating diaphragm integral with the body of the magnet, in combination with an electrical coil or helix, substantially as described.

4. An inducing-magnet for telephonic or speaking-telegraphic purposes, having one or both poles reduced to the form of a vibrating diaphragm, and integral with the body of the magnet, in combination with a coil or helix, in relation to which said pole or poles are adjustable.

In testimony whereof I have hereto set my hand this 28th day of September, 1877.

JAMES J. McTIGHE.

Witnesses:
S. B. GILL,
D. E. DAVIS.