

E. GRAY.
Speaking-Telephone.

Sheet 16

No. 207,269.

Patented Aug. 20, 1878.

Fig 1.

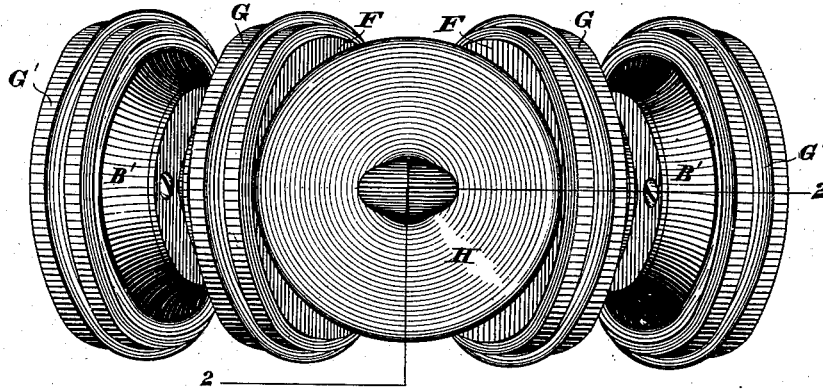


Fig 2.

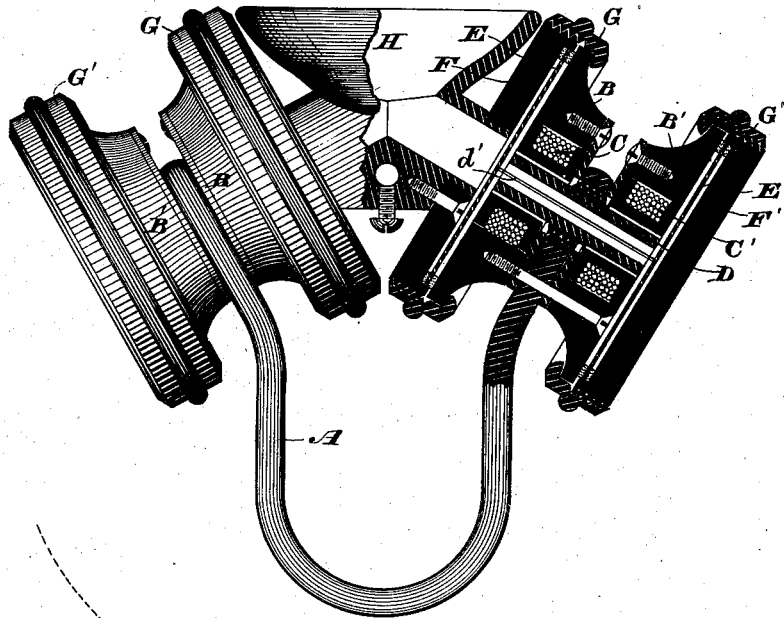
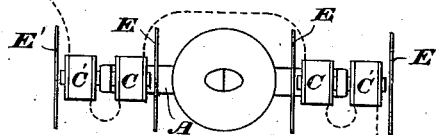


Fig 3.



WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

ELISHA GRAY, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN SPEAKING-TELEPHONES.

Specification forming part of Letters Patent No. 207,269, dated August 20, 1878; application filed June 20, 1878.

To all whom it may concern:

Be it known that I, ELISHA GRAY, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Generating, Transmitting, and Reproducing Rhythmical Vibrations, representing spoken words or vocal sounds, in an electric circuit, of which improvements the following is a specification:

My present invention more especially relates to and constitutes an improvement upon my bipolar telephone, for which Letters Patent of the United States No. 204,029 were granted to me May 21, 1878, which patent shows two telephones so combined with a bifurcated mouth-piece that each is actuated with equal force, thereby greatly increasing the electro-motive force which generates the rhythmical vibrations representing the vocal sounds or words articulated or spoken into the telephone.

The object of my present invention is still further to increase the electro-motive force or rhythmical generating capacity of the telephone, and to secure an increased volume and clearness of sound, while preserving the portable features of the instrument, so as to enable it to be handled with facility; to which ends my improvement consists in certain novel combinations, constructions, and organizations of parts, hereinafter specifically claimed.

The accompanying drawings represent so much of my improved instrument as is necessary to illustrate the subject-matter herein claimed, as constructed in the best way now known to me. Obviously, however, some of the improvements may be used without the others, and in apparatus differing somewhat in its details of construction from those of that herein shown, without departing from the spirit of my invention.

Figure 1 represents a plan or top view of a bipolar telephone with its diaphragms and electro-magnets duplicated, and arranged in reverse order on each side of each of the poles of its permanent magnet. Fig. 2 represents a side elevation, partly in section therethrough, on the line 2 2 of Fig. 1, showing the details of the method of constructing and connecting each pair of the diaphragms. Fig. 3 repre-

sents the arrangement upon circuit of my improved apparatus.

The details of construction of the present apparatus are substantially the same as those of my bipolar telephone hereinbefore mentioned, and my improved instrument embodies all that is therein shown, with certain additions, hereinafter mentioned.

The instrument shown in the drawings may be used as a transmitter, in combination with any of the ordinary known telephones, and consists, essentially, of a permanent horseshoe or U-shaped steel magnet, A, (which, preferably, constitutes the handle of the instrument, and may be highly ornamented or polished,) soft-iron cores D, helices C C', diaphragms E E', rubber disks B B', screw-caps F F', clamp-rings G, and a bifurcated mouth-piece, H.

The soft-iron core D is made tubular, and extends through the pole of the permanent magnet on each side, so as to receive a supplementary helix or wire coil, C', in addition to the usual one on the opposite side of the pole.

A secondary diaphragm, E', is mounted in front of the supplementary electro-magnet in precisely the same manner as its corresponding diaphragm, E. The arrangement of the secondary magnet and its diaphragm relatively to the pole is, however, it will be observed, reversed, so as to bring the electro-magnets next the pole and between the diaphragms. The secondary cap F, which protects the diaphragm E', is made solid—that is, it has no opening for a mouth-piece, such construction being unnecessary in this instance.

The core D has a small hole drilled through it from end to end, about one-eighth of an inch in diameter. A light rod, d', of wood or some non-magnetic metal, (such as brass, for instance,) passes through this opening, in which it is capable of moving freely endwise. Each end of this rod is attached to its respective diaphragm E E', so that the movement of one from any cause whatever produces corresponding movements or vibrations in the other.

The obvious advantage of my improvement is, that I am enabled, under the organization of parts above described, to vibrate two diaphragms in front of two electro-magnets, both

of which are charged from the same pole of the permanent magnet, without making any change in any respect in the bifurcated mouth-piece shown in my bipolar patent, above mentioned.

I have demonstrated by experience that by this method I can generate much greater electro-motive force than could be done by the employment of a single diaphragm, and am, consequently, enabled to produce a much louder and clearer sound.

A similar apparatus is attached to the other pole of the permanent magnet, and I am thus enabled to vibrate four diaphragms instead of two, as in my bipolar telephone, above mentioned, and still retain the same relation between the diaphragms and mouth-piece, as in the aforesaid instrument.

The arrangement upon circuit which I deem most advantageous is one which keeps all the magnets permanently charged, which is preferably done (where a permanent magnet is not used) by working with what is known as a "closed circuit," such as that shown in Letters Patent of the United States No. 186,340, granted to me January 16, 1877, or in two applications for Letters Patent of the United States, respectively filed by me October 29, 1877, (Case 1,) and January 17, 1878.

The operation of the apparatus will readily be understood from the foregoing description.

I do not broadly claim herein vibrating a secondary diaphragm from a primary one, nor the combination of a magnet, two diaphragms, and an interposed air-tight chamber, as these subjects-matter are embodied in another application filed by me May 8, 1878, of which this is a division, but limit the claims to the combinations specified.

I claim as my invention—

1. A secondary magnet, in combination with a secondary diaphragm, actuated by a primary diaphragm through the intervention of a connecting-rod, substantially as hereinbefore set forth, to increase the electro-motive force of the vibrations.

2. In combination, a permanent magnet, diaphragms mounted thereon, and electro-magnets interposed between the diaphragms, so that the diaphragms are actuated by two magnets of similar polarity.

3. In combination, a permanent magnet, a tubular soft-iron core mounted on each of its poles, a wire coil or helix on each side of each pole, and a diaphragm for each helix.

4. The combination, substantially as hereinbefore set forth, of a mouth-piece, a primary diaphragm, a secondary diaphragm actuated thereby, and a solid cap or cover inclosing the secondary diaphragm.

5. The duplex bipolar telephone hereinbefore set forth, consisting of the combination of a permanent horseshoe-magnet, electro-magnets mounted in pairs on each pole thereof, diaphragms similarly mounted, and a bifurcated mouth-piece, with one branch terminating opposite the center of one diaphragm of each set, whereby two diaphragms are operated from each branch of the mouth-piece.

In testimony whereof I have hereunto subscribed by name.

ELISHA GRAY.

Witnesses:

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