

E. GRAY.
Speaking-Telephone.

No. 204,559.

Patented June 4, 1878.

Fig 1.

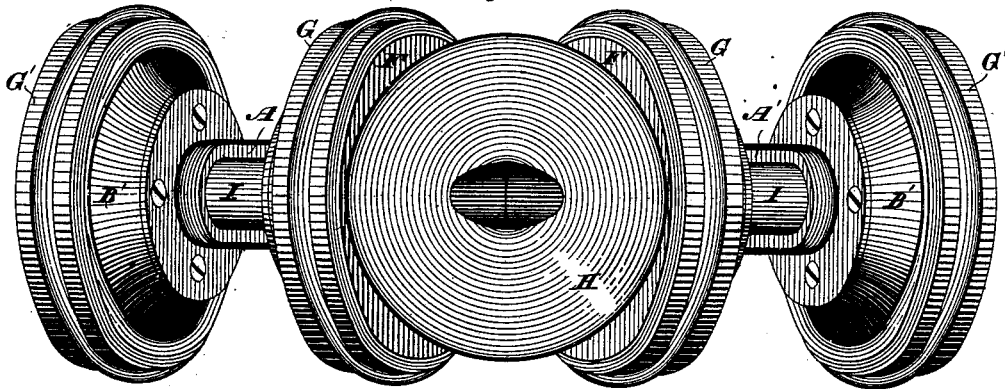


Fig 2.

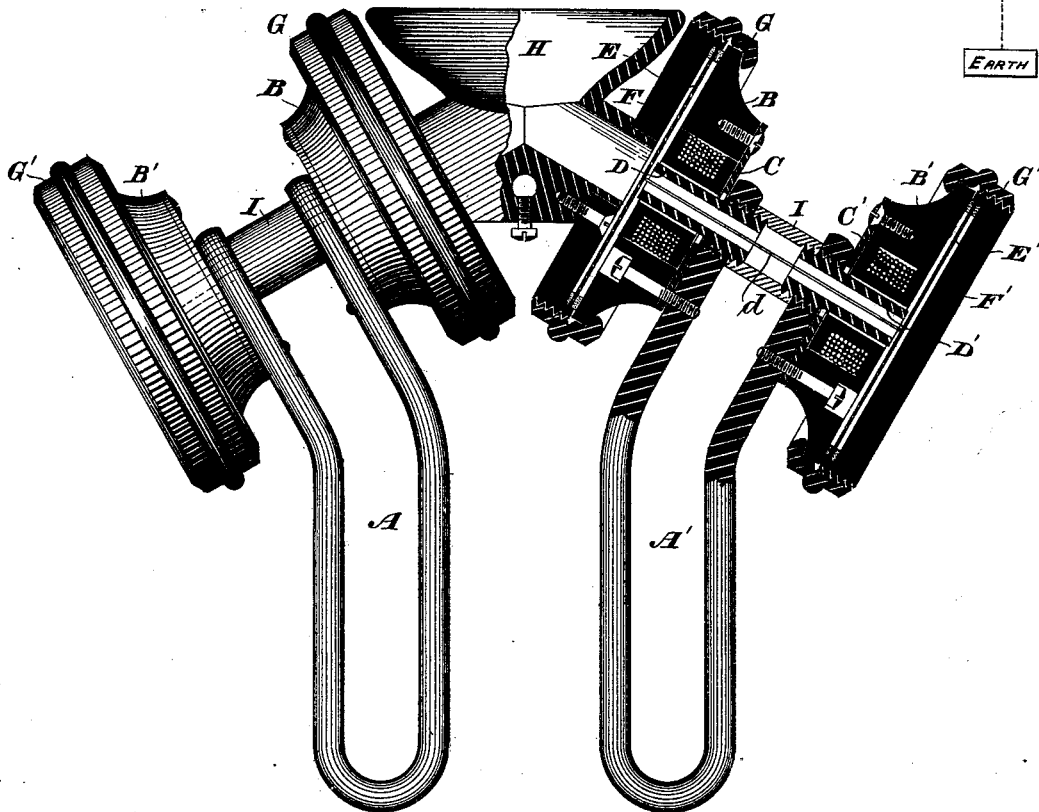
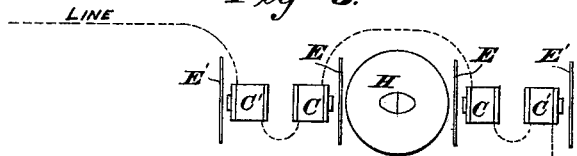


Fig 3.



WITNESSES

Wm a Skinkle
Geo. W. Breck.

INVENTOR

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By his Attorneys

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UNITED STATES PATENT OFFICE.

ELISHA GRAY, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN SPEAKING-TELEPHONES.

Specification forming part of Letters Patent No. **204,559**, dated June 4, 1878; application filed May 13, 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 Speaking-Telephones, of which the following is a specification:

My present invention more especially relates to and constitutes an improvement upon my "bipolar telephone," for which an application for Letters Patent of the United States was filed by me March 21, 1878, and upon my "duplex bipolar telephone" application, filed May 8, 1878.

The object of my present invention is (while preserving the portable feature of the instrument, so as to enable it to be handled with facility) to secure an increased volume and clearness of sound, which ends I attain by combining, with a common mouth-piece, a series of diaphragms and their magnets, arranged in pairs on the outer opposite sides of the poles of a permanent magnet and in a reverse order relatively thereto, in such manner that the secondary diaphragms and the magnet of each pole will be actuated directly from or by its primary diaphragm, as hereinafter specified.

The subject-matter claimed will hereinafter specifically be designated.

The accompanying drawing represents so much of my improved duplex bipolar telephone 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 is a plan or top view of my duplex bipolar telephone; Fig. 2, a side elevation thereof, partly in vertical central section; and Fig. 3, a diagram showing the arrangement on circuit.

My improved apparatus embodies all that is shown in my bipolar telephone hereinbefore mentioned, having permanent U-shaped or horseshoe steel magnets A A', which constitute the handle of the instrument, rubber disks B B', helices C C', tubular soft-iron cores D D', diaphragms E E', screw-caps F F', clamping-

rings G G', and a mouth-piece, H, with two branches, each branch terminating opposite the center of its respective diaphragm.

A tubular soft-iron core, D D', is mounted upon the outer side of each pole of the permanent magnets, and provided with the usual helices C C', rubber disks B B', diaphragms E E', screw-caps F F', and clamping-rings G G'. These parts, it will be observed, are arranged in reverse order upon the outer opposite side of the opposite poles of the permanent magnet, so that the magnets are interposed between the diaphragms. The secondary cap, F', however, is made solid, with no opening for the mouth-piece. The core D has a small hole drilled through it from end to end, about one-eighth of an inch in diameter, in which is suspended a light rod, d, of wood or some non-magnetic metal—such as brass, for instance—each end of which rod is attached to its respective diaphragms E E', so that the movement of any one from any cause whatever produces a corresponding movement in the other. The space between the poles of the permanent magnet is bridged over with a tubular piece, I, of brass or some other non-magnetic substance. This is to confine the column of air contained in the casing in the core of the magnet. A battery may be employed, arranged on circuit, as shown in my applications respectively filed October 29, 1877, (Case 3,) and January 17, 1878, or as in my Division B, filed May 8, 1878.

The looped portion of the permanent magnets may be united by any non-magnetic or insulating material, and be so covered or shaped as to constitute an ornamental handle.

The operation of my improved telephone will be readily understood from the foregoing description.

I do not broadly claim herein operating one diaphragm from the other, or mounting them upon the same pole of the permanent magnet, as these constitute the subject-matter of another application filed simultaneously herewith, but limit my claims to the organization incident to mounting each set of diaphragms upon both poles of the magnet.

What I claim as of my own invention, and desire to secure by Letters Patent, is—

1. A secondary diaphragm and its magnet

mounted on one pole of a permanent magnet, and operated by a primary diaphragm mounted on the other pole, substantially as set forth.

2. The combination, substantially as hereinbefore set forth, of a permanent horseshoe-magnet, an electro-magnet mounted on each pole thereof, a diaphragm for each magnet, and a mouth-piece for one diaphragm, so as to operate one diaphragm directly from or by the other.

3. The combination, substantially as hereinbefore set forth, of a permanent horseshoe-magnet, an electro-magnet mounted on each pole thereof, a tubular core for each magnet, and an interposed tubular connecting-piece, constituting, with the core and diaphragms, a

closed chamber, through which one diaphragm operates upon the other.

4. In combination, two permanent magnets, a primary diaphragm and electro-magnet mounted on one pole of each permanent magnet, and a secondary diaphragm and magnet on the other pole of said magnet, and an interposed bifurcated mouth-piece actuating the primary diaphragm of each set.

In testimony whereof I have hereunto subscribed my name.

ELISHA GRAY.

Witnesses:

A. G. SWARTWOUT,
D. M. ERSKINE, Jr.