

No Model.)

H. W. LIBBEY.
TELEPHONE TRANSMITTER AND RECEIVER.

No. 421,006.

Patented Feb. 11, 1890.

FIG. 1.

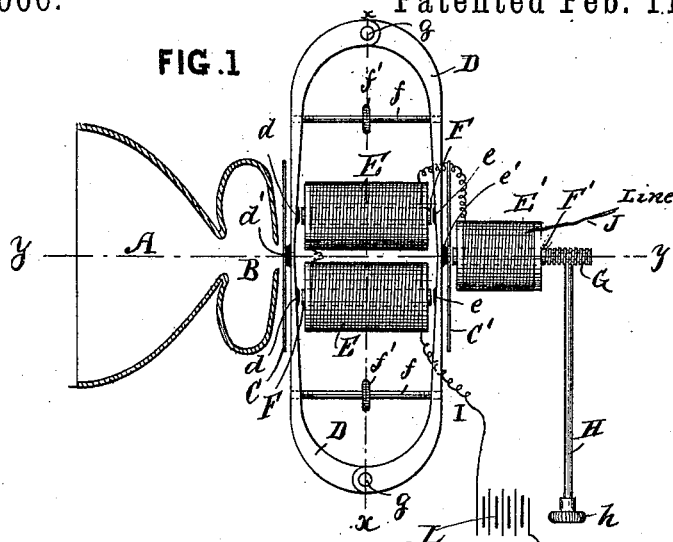


FIG. 2.

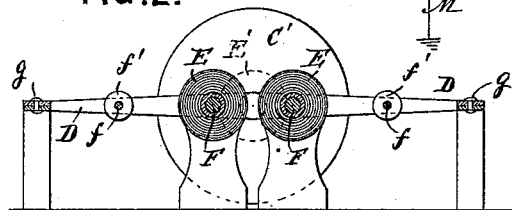


FIG. 3.

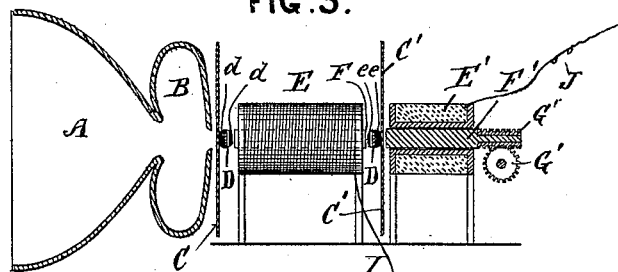


FIG. 4.

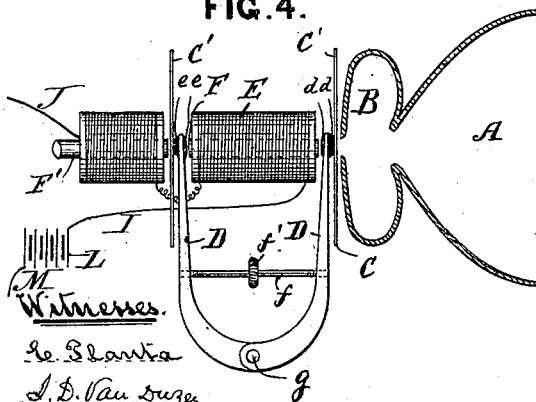
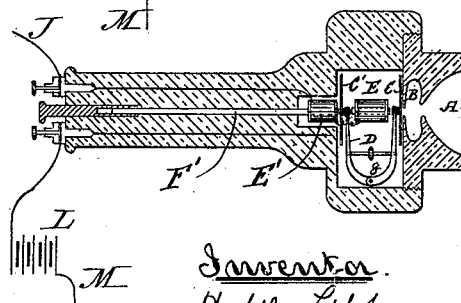


FIG. 5.



Witnesses.
Le Blanche
L. D. Van Duzee

Inventor.
H. W. Libbey
by J. H. Adams
Attorney.

UNITED STATES PATENT OFFICE.

HOSEA W. LIBBEY, OF BOSTON, MASSACHUSETTS.

TELEPHONE TRANSMITTER AND RECEIVER.

SPECIFICATION forming part of Letters Patent No. 421,006, dated February 11, 1890.

Application filed July 1, 1885. Serial No. 170,388. (No model.)

To all whom it may concern:

Be it known that I, HOSEA W. LIBBEY, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Telephone Transmitters and Receivers, of which the following is a specification.

The object of my invention is to produce a transmitter and receiver for telephonic purposes that will concentrate and retain the volume of sound-waves, to produce more distinct articulate enunciations than in telephones now in use, and hold intact the finest vibrations of sound-waves at long distances, and to utilize the vibrative reflections and retain their strength and force in electric currents when transmitting and receiving articulations of the human voice over or through electric wires for telephonic purposes.

The invention consists in certain details of construction, hereinafter fully described, and set forth in the claims.

Referring to the accompanying drawings, Figure 1 is a plan view of a transmitter and receiver embodying my invention. Fig. 2 is a section taken on line *xx* of Fig. 1. Fig. 3 is a section taken on line *yy* of Fig. 1. Fig. 4 is a plan or top view of the device when used as a receiver alone. Fig. 5 is a sectional view, on a reduced scale, of a receiver and case.

A represents a cup-shaped mouth-piece communicating with a sound-concentrating chamber B, of oblate circular form, such as will receive and emit without resistance through an opening in the rear upon a disk or diaphragm C in concentrated form the sounds or articulations injected therein from the mouth-piece A. The walls of chamber B are continuous and of practically uniform thickness, the material being similar to that of the mouth-piece A.

D D are two permanent horseshoe-magnets, with their poles in contact, or nearly so, and each composed of two sections pivoted together at their central portions at *g*. Each magnet has its sections connected at a proper point by a transverse rod *f*, threaded in opposite directions at its ends, and with said ends engaging threaded openings in the sections. Upon each rod *f* is a thumb-piece *f'*, of non-

conducting material, by means of which the said rod may be turned to either approximate or move farther apart the legs of the magnet, which legs are tapered toward their ends in order to produce suitably fine vibrations.

E E are two twin electric coils surrounding the cores F, and *d d e e* are contact-buttons on the legs of the magnets D opposite the ends of the said cores.

Attached to the ends of the meeting legs of the magnets D by any suitable means are the carbon buttons *d'* and *e'*, respectively opposite the diaphragms C and C', the latter C' being placed between the magnet D and a coil E' wrapped on a core F'. The said coil E' is in line-circuit, its wire connecting with one coil E, which is connected to the other coil E, from which the opposite wire of the circuit extends. The line-circuit includes the ground-wire M, the battery L, the wire *l*, the connected coils E, the coil E', connected to the coils E, and the wire J. It is not necessary to further explain the circuit, as the construction thereof does not differ from that of an ordinary telephone of well-known construction.

The core F' is made so as to be adjusted in relation to the diaphragm C' by means of a worm and wheel G, of non-conducting material, and operated by turning a knob *h* on a rod H, which carries the worm-wheel.

All the coils E E E' are in connection with each other.

In Fig. 4 I have shown the apparatus as when used for a receiver, in which case there is a single horseshoe-magnet D, with one electro-magnet F between the poles of the same, all the other parts being similar to those above described.

In Fig. 5 (which is on a reduced scale) the receiver is shown as applied in a casing of non-conducting material, with the necessary binding-screws for connecting the same to the line-wire, &c., the core F' being adjusted by means of a screw at the rear of the case, as shown, instead of by a worm and worm-wheel, as before described in reference to the transmitter.

The carbon buttons *d'* and *e'* should be in contact with the diaphragms C C', respectively, so that the legs of the magnets will be thereby caused to vibrate with the dia-

phragms. Upon speaking into the mouth-piece A the sound of the voice is concentrated in the chamber B, and the vibrations passing from said chamber, cause the diaphragm C, and consequently the legs of the permanent magnets D, to vibrate, though the said legs cannot come into contact with the ends of the cores because of the buttons *d e*, as explained. The vibration of the poles of said magnets induces currents which alternately strengthen and weaken the normal line-current produced by battery L, and consequently make the enunciation clear and distinct at the opposite end of the line. There is but one steady electric current, which passes through the coils E E and E' in the well-known manner described.

The magnets D are permanent, and the cores of the coils E stand between their ends and the contact-buttons *d d e e* on the legs of said magnets. The said buttons are of carbon or equivalent material and prevent the legs of the magnets from ever coming into contact with the ends of the cores.

I am aware that a telephone has been described in which there was a chamber inside the mouth-piece, part of the chamber being formed by a conical recess in the face of the telephone-box, and the outer part being covered by a cup attached to the mouth-piece. Such I do not claim.

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

1. The double magnets D D, the two parts

being hinged together at the open ends, in combination with the adjusting-rods and thumb-screws *f f'*, substantially as and for the purpose set forth.

2. The combination of the adjustable magnets D, the coils E and cores F, and the diaphragms C and C', substantially as described.

3. The combination of the magnets D D, cores F F, coils E E, the coil E', and the adjustable core F', as and for the purpose set forth.

4. The combination of the cup-shaped mouth-piece A, the oblate circular chamber B, having an opening at the rear, the diaphragm C, the double magnets D D, coils E E and cores F F, diaphragm C', coil E', and adjustable core F', substantially as shown and described.

5. The combination, with the sound-concentrating chamber or resonator of the mouth-piece and the diaphragm inward therefrom, of the coils in the line-circuit having the cores, and the horseshoe permanent magnets having contact-points opposite the ends of the corresponding cores, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOSEA W. LIBBEY.

Witnesses:

J. H. ADAMS,

E. PLANTA.