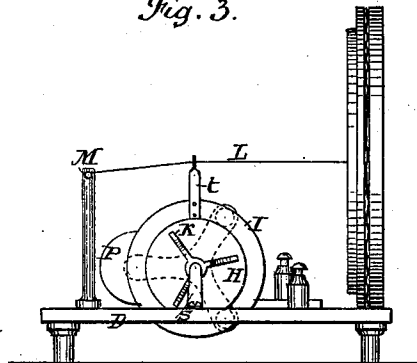
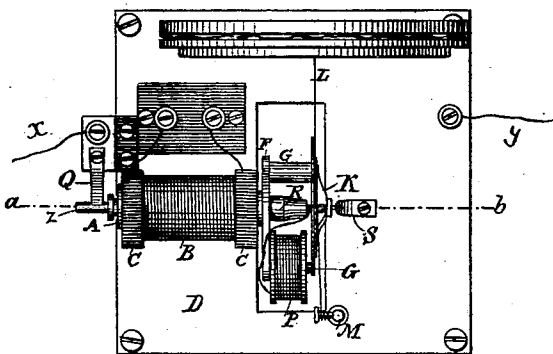
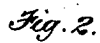
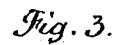
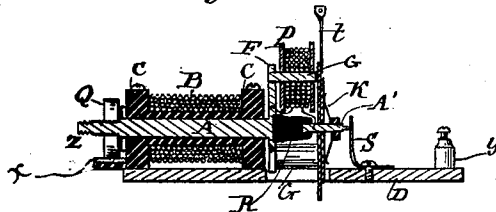
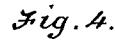
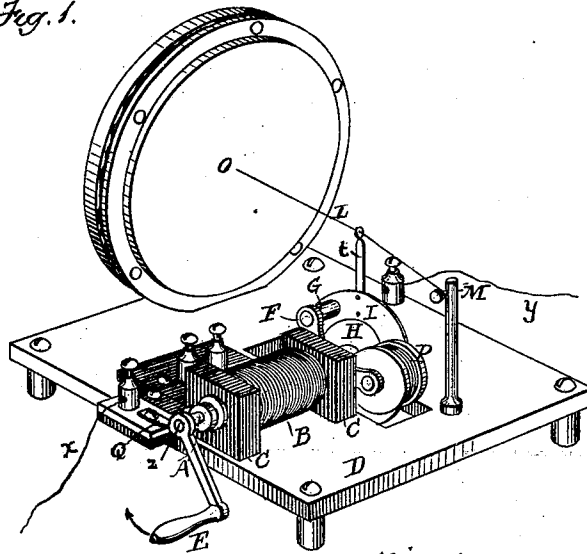


G. L. ANDERS.
TELEPHONE RECEIVER.

No. 253,491.

Patented Feb. 14, 1882.



Witnesses.

Alex. L. Hayes
Geo. W. Pierce.

Inventor.

Geo. L. Anders

UNITED STATES PATENT OFFICE.

GEORGE L. ANDERS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN BELL TELEPHONE COMPANY, OF SAME PLACE.

TELEPHONE-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 253,491, dated February 14, 1882.

Application filed September 12, 1879.

To all whom it may concern:

Be it known that I, GEORGE L. ANDERS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Telephone-Receivers, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to a telephone-receiver in which the diaphragm or other device for producing the air or sound waves is subjected to the strain of a mechanical force which may be generated at the receiving-station, and the pull of which force on the diaphragm is varied or regulated by the telephonic currents. In my invention the connection between the mechanical force supplied at the receiving-station and the diaphragm whose vibrations are to produce the sound-waves is effected by means of the friction between two surfaces, one of which is constantly moved by the local power. The pressure between these two surfaces, and consequently the friction between them and the effect of the moving one upon the other, depends in part or entirely upon the attraction of a magnet whose coil is traversed by the telephonic currents, and thus the amount of force communicated through this device to the diaphragm is regulated by and at every instant corresponds to the force and direction of these currents. Heretofore a telephone-receiver of this general description has been made.

The present invention consists in a novel arrangement and combination of parts in such an instrument, to the end that greater practical efficiency may be secured.

In the accompanying drawings, Figure 1 is a view of my improved telephone-receiver. Fig. 2 is a plan view of the same. Fig. 3 is an end view of the same. Fig. 4 is a vertical section on line *a b*, Fig. 2.

In these several figures the same letters refer to the same parts.

A is a shaft of iron, which may be either permanently magnetized or may be rendered magnetic by being surrounded with a helix of wire, B, through which an electric current passes. This shaft is suitably supported in the standards C C, attached to the base-plate D of the receiver, and is capable of being rotated by any suitable mechanical power—as, for in-

stance, as shown in the drawings, by a crank, E. To one end of this shaft A is attached a piece of iron, F, to which are secured three or more metallic parallel cylinders, G, of equal length and at equal distances from each other and from the central axis of the shaft A. These cylinders, if of a magnetic metal, are constantly magnetized to a certain strength by induction from the polarized shaft A, with which, through F, they are in magnetic connection. Upon each of these cylinders may be placed a coil of wire, P, through which the telephonic current passes, in which case—that is, when there is a coil on each cylinder—the cylinders must be made of iron or steel; but, as shown in the drawings, it will be sufficient if only one of these cylinders is provided with this coil, in which case the other cylinders must be made of brass or of some other non-magnetic metal. As shown, the ends of coil P are connected, one with the shaft A and the other with the pin A', fixed in the mass R of insulating material at the end of shaft A, and the wires *x y* are connected with the said coil P, the wire *x* through the spring Q, which is insulated from the metal face O, and through the shaft A, with the reduced extremity *z* of which the said spring Q is in constant contact with spring S.

The standards C C, by which the shaft A is supported, are of insulating material.

Upon the pin A' at end of shaft A, but not turning with it, is a disk composed of two parts, a disk, H, of brass or of some other non-magnetic metal, and a ring, I, of iron, concentric with the disk H and connected to it, and this ring is forced against the ends of the cylinders G by the spider-spring K, or by some other suitable device, so that friction is produced between the surfaces of the ends of the cylinders and the surface of the ring, which friction causes the ring, when the shaft A rotates, to turn with this shaft. This ring is connected by a cord, L, with a diaphragm, O, the said cord being fastened to the arm *t*, projecting from ring I, and also to the diaphragm. A slight tension is produced upon the cord by means of a screw, M, or similar device at the end of the cord farthest removed from the diaphragm, which is of parchment, mica, sheet metal, or any other suitable material suitably stretched upon a frame supported

upon the base-plate of the receiver at right angles to the plane of the disk. When the shaft A rotates in the direction of the arrow this diaphragm is stretched to a certain tension or strain by the movement of the ring I, caused by its friction upon the surfaces of the ends of the cylinders G, and which tension will depend upon the amount of friction.

It is obvious that as long as this shaft is rotating at a constant speed, and the friction between the ring I and the surfaces of the ends of the cylinders G remains constant, the tension of the diaphragm will also remain the same, but that said tension will vary with any variation in the friction, and that the amplitude of the vibrations produced by these variations in the tension exerted upon the diaphragm will be affected by the velocity of the shaft A and the power applied to it, both of which can be increased at pleasure. The telephonic currents transmitted through the coil on the cylinder G will cause the said cylinder to become a magnet, and vary the magnetism of the cylinder G, and thus cause it to attract the ring I with a force and for a time corresponding respectively to the power, direction, and duration of the telephonic currents, and consequently the friction between the end of the cylinder and the rotating ring will be correspondingly increased, thereby causing the diaphragm O to vibrate in correspondence with these telephonic currents, and to produce corresponding air-waves which will have a greater amplitude, and consequently produce a greater volume of sound, than the air-waves produced by the diaphragm of a telephone acted upon directly by the magnet whose coils are traversed by these currents.

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

1. In an electric speaking-telephone, the com-

bination of a diaphragm, a cord connected therewith, a device for regulating the tension of said cord, and consequently that of the diaphragm, and means for causing vibrations in said diaphragm by variations in the friction between a moving magnetic body and a magnetic body connected with said diaphragm and cord, said friction being varied by the varying magnetic attractions between the surfaces of said magnetic bodies caused by a varying current of electricity, substantially as described.

2. The combination, with a diaphragm, of a ring of magnetic material connected therewith, a revolving core, and a helix arranged as explained, so that the friction between the ring and core is varied by electric currents traversing the helix, substantially as described.

3. The combination of the diaphragm O, the iron ring I, mounted so as to be capable of rotation in a plane perpendicular to the diaphragm, and connected at a point on its circumference to the center of the diaphragm, a revolving core, G, in contact at one extremity with the surface of the iron ring I, and the helix P, surrounding said core G, and placed in an electric circuit, substantially as and for the purpose as set forth.

4. The combination of the rotating shaft A, piece F, cylinders G, coil P, disk H, iron ring I, spring K, diaphragm O, and the stretched cord L, connecting the center of the diaphragm to a point on the circumference of the ring I, substantially as and for the purpose as set forth.

In witness whereof I have hereunto set my hand in presence of the subscribing witnesses.

GEO. L. ANDERS.

Witnesses:

ALEX. L. HAYES,
A. H. VINAL.