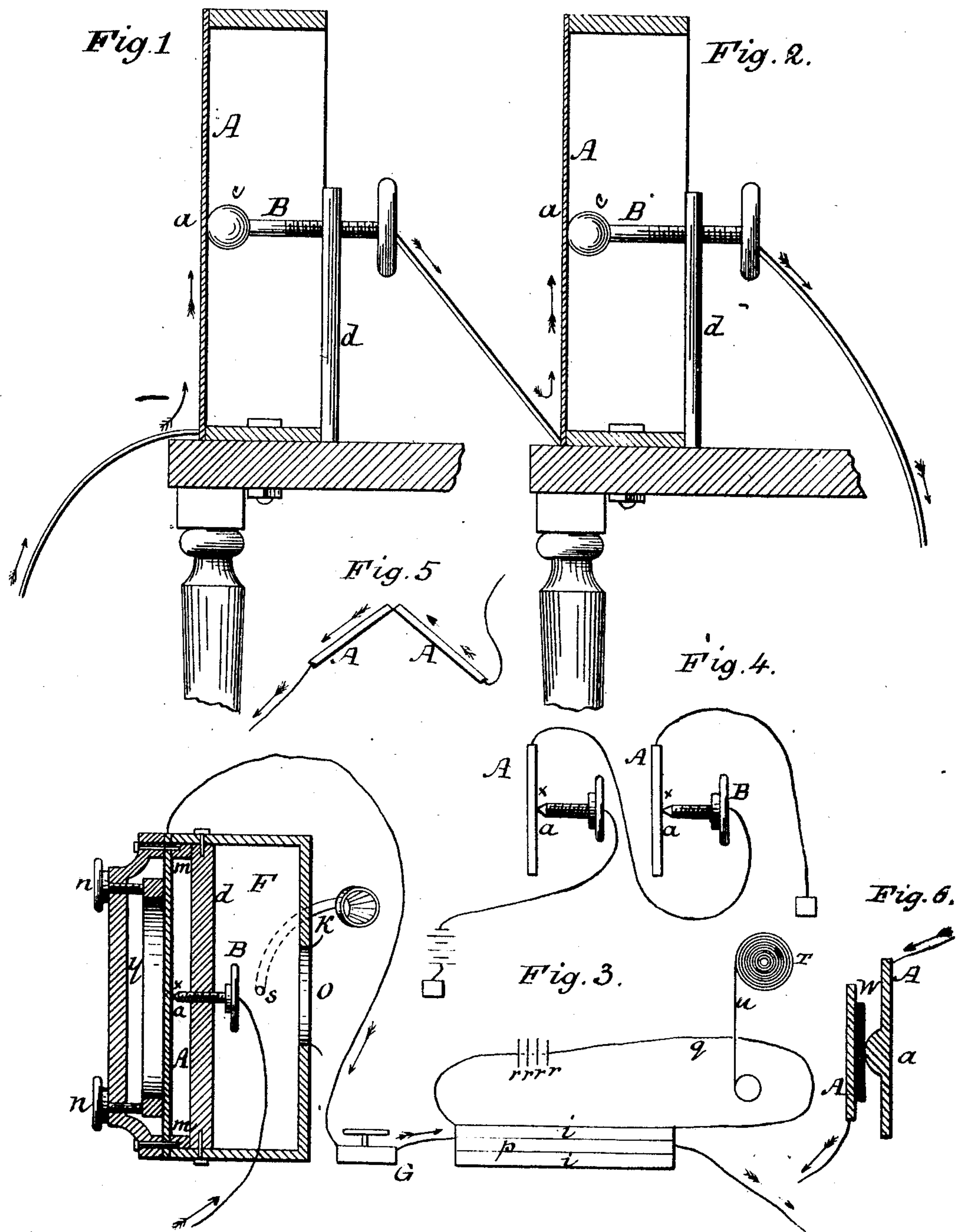


(No Model.)

E. BERLINER.  
Electric Telephone.

No. 233,969.

Patented Nov. 2, 1880.



Witnesses:

E. E. Masson  
Rheinfelden

Inventor:

Emile Berliner  
by A. Pollok  
his Atty



# UNITED STATES PATENT OFFICE.

EMILE BERLINER, OF BOSTON, MASSACHUSETTS.

## ELECTRIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 233,969, dated November 2, 1880.

Application filed September 3, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, EMILE BERLINER, a resident of Boston, county of Suffolk, State of Massachusetts, have invented a new and useful Improvement in Electric Telephones, which improvement is fully set forth in the following specification.

My invention consists in a new and useful improvement in telephonic receivers for producing sound by means of varying electrical currents, of which the following is a specification.

It is a fact and a scientific principle that if two electrodes be placed in contact to form part of a circuit and a current of electricity be passed through them a repulsion is exerted between them. Based on this fact I have constructed a simple receiver for an electric-telephone apparatus.

In Figure 2 of the drawings, A is a metal plate well fastened to the wooden box or frame, but able to vibrate. Against the plate and touching it is the metal ball *c*, terminating the rod B, which rests on the bar or stand *d* and presses against the plate, which pressure, however, can be regulated by the thumb-screw attached to the ball.

If a current of electricity passes through the plate and the point of contact, or vice versa, a repulsive movement will take place between the plate and the ball, because both are charged with the same kind of electricity. This force of repulsion may be weakened or strengthened by varying the strength of the current. As that strength is varied by any appropriate form of electric speaking-telephone transmitter, (especially that shown at A B of the various figures of the drawings, and more particularly described and claimed by me in another application filed June 4, 1877, of which this is a division,) so will also the force of repulsion at the point in the receiver be alternately weakened and strengthened as many times accordingly, and will therefore cause its plate to vibrate at the same rate and measure. The latter vibrations being communicated to the surrounding air, the same kind of sound as uttered against the transmitter, Fig. 1, will be reproduced at the receiver, Fig. 2, or in as many other receiving-instruments as are situated within the same electric circuit.

In Fig. 2 I have shown the receiver as con-

sisting of a diaphragm in contact with a ball. In Figs. 3 and 4 I show it as somewhat differently mounted, and with the contact-piece in the form of a pin instead of a ball, and in Fig. 6 in a still different form with a carbon contact. In this figure, W is a piece of carbon.

In Fig. 5 two plates in contact at their edges are shown.

In the drawings, the letter A represents a diaphragm or plate, preferably of thin metal of limited conductive capacity, such as iron, steel, German silver, platinum, and also carbon secured in the frame *m m* in the box *f* in any convenient manner.

The letter *y* represents a ring resting against one side of said diaphragm, and capable of being made to bear upon the same with more or less force by means of set-screws *n*, in order that the tension of the diaphragm may be regulated.

The letter B represents a screw or piece of metal or carbon, pointed at one end and mounted in a cross-piece, *d*, in such position that the point will be in contact with the diaphragm A. The diaphragm A is connected with one pole of a battery by means of a wire, and the pin or screw B with the other pole.

Fig. 4 shows the manner in which the complete apparatus, consisting of the transmitter A B and the receiver A B, is connected up in circuit.

It will be observed that the transmitter is of the same construction as the receiver. When a sound is uttered in the neighborhood of the transmitter its plate will vibrate accordingly, and the pressure between the plate and the pin or ball at the point of contact *a* will become weaker or stronger, according to the vibrations, and this variation of pressure will cause the current passing to become weaker or stronger, and thus effect the changes which operate the receiver, as already described.

As shown in Fig. 3, the box *f* is provided with a tube, K, to which the ear of the operator may be applied in order to hear the sounds produced by the vibratory diaphragm when the instrument is employed as a receiver, and a tube, O, through which he can speak when employing the instrument as a transmitter, so that the operator is not in need of moving the instrument or moving his head while carrying on a conversation. This combination,



with the sound-chamber of a telephone provided with the usual sound-passage or mouth-piece, of an additional sound-conveyer or hearing-tube forms, however, no part of the invention.

I claim—

1. The herein-described method of producing sound-vibrations in a plate by causing a varying electric current to pass to the plate, or to an electrode connected therewith, from a second electrode in contact therewith, substantially as described.

2. An apparatus for producing sound by means of a varying electric current, which consists of a plate forming or carrying an electrode placed in contact with another electrode, from one to the other of which the electric current is caused to pass.

3. An electric-telephone receiver to be operated by varying electric currents, and consisting of two contact-pieces within an electric circuit, one or both of which pieces consist of

or are connected with a vibratory diaphragm, whereby one electric current passing through said circuit exercises a repulsion between said two electrodes corresponding to its strength, and thus produces corresponding motions in the diaphragm.

4. A system of two or more telephone-instruments in electrical connection with each other, each consisting of two or more poles of an electrical circuit in contact one with the other, either or both poles of each instrument being connected with a vibratory plate, so that any vibration which is made at one contact is reproduced at the other, substantially as set forth.

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

EMILE BERLINER.

Witnesses:

C. H. GREAVES,  
ALFRED J. MAYO.