(No Model.)

T. A. EDISON.

SPEAKING TELEGRAPH.

No. 474,232. Patented May 3, 1892.

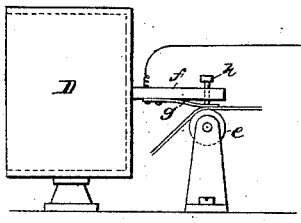


Fig. 1.

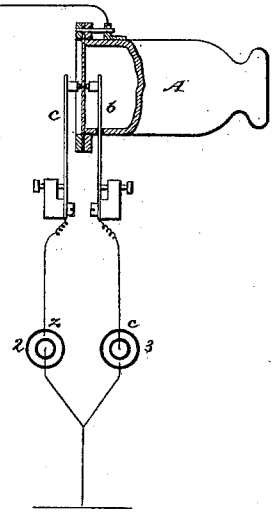


Fig. 3.

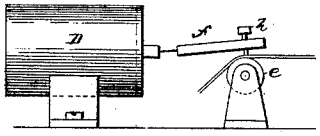


Fig. 4.

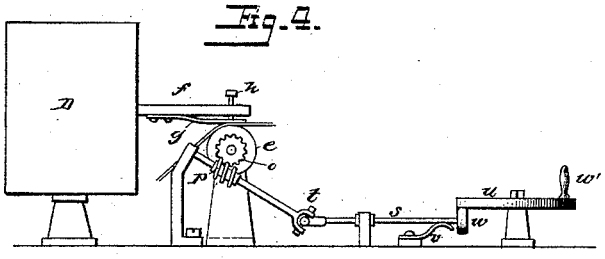
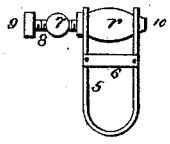


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SPEAKING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 474,232, dated May 3, 1892.

Original application filed July 20, 1877. Divided and this application filed February 18, 1886. Serial No. 192,456. (No model.) Patented in England July 30, 1877, No. 2,909; in Canada October 20, 1877, No. 8,026; in France December 19, 1877, No. 121,687; in Belgium January 11, 1878, No. 43,984; in Austria-Hungary January 15, 1878; in Italy January 19, 1878, No. 9,791; in Germany January 23, 1878, No. 14,308; in Spain May 6, 1878, and in Russia February 15/27, 1882, No. 1,161.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Llewellyn Park, in the county of Sussex and State of New Jersey, have invented an Improvement in Speaking-Telegraphs, (for which I have obtained foreign patents in the following countries: in Great Britain, dated July 30, 1877, No. 2,909; in France, dated December 19, 1877, No. 121,687; in Belgium, dated January 11, 1878, No. 43,984; in Italy, dated January 19, 1878, No. 9,791; in Spain, dated May 6, 1878; in Austria-Hungary, dated January 15, 1878; in Germany, dated January 23, 1878, No. 14,308; in Russia, dated February 15/27, 1882, No. 1,161, and in Canada, dated October 20, 1877, No. 8,026,) of which the following is a specification.

The object of this invention is to transmit the human voice over telegraphic wires for conversational purposes.

This application is a division of my application filed July 20, 1877, Serial No. 141, and said division is made for the purpose of separating from the said original application the feature of invention hereinafter claimed.

This division of my said application relates to the combination, with a diaphragm against which the air-waves act, of a spring forming or carrying one electrode and constantly pressing against the other electrode to maintain the required pressure and to yield to the movements of the diaphragm.

The apparatus shown in the drawings and hereinafter described not only embodies the said invention, but also other features not claimed herein, but which originally formed subjects of claims in my said original application. The particular form of receiver shown and described is not essential to the invention herein claimed.

Figure 1 shows the transmitter and receiver. A is the resonant chamber, over the end of which the diaphragm is stretched, either side of which may be made heavier in the center by a small weight if great amplitude is required of the diaphragm. *b c* are the two contact-springs, having points made of compressed plumbago, mixed, preferably, with gum-rubber, but any substance not liable to rapid decomposition may be used. These points face each other on the opposite side of the diaphragm and make contact with platina disks secured to the diaphragm. The spring *b* passes through a hole or small slot in the side of the transmitter. 2 and 3 are the main batteries. The battery 2 has zinc to the line or point *c* and the battery 3 has copper to the line or spring *b*. When the springs *c* and *b* are adjusted so as to make contact with the diaphragm equally, no current passes to the line; but when the diaphragm is vibrated its movement to one side—say *c*—causes a great pressure upon the plumbago on that spring and a lessening of the pressure on the plumbago on *b*. Hence the balance of the batteries 2 and 3 will be destroyed. 2 being given the advantage will send a negative current to line. Upon the return of the diaphragm the battery-currents will again neutralize each other. The vibration of the diaphragm to the other side causes the pressure to be reversed and the battery 3 will send a positive current to the line. As plumbago decreases and increases its resistance enormously under slight changes of pressure, it follows that the strength of the electric waves will be in proportion as the speaker's voice is strong or weak.

In Fig. 2 is shown the contact-spring, which I prefer to use instead of *c* and *b*, which are used merely to assist in explaining the operations more clearly. 5 is a U-shaped spring secured to the screw 8, which is adjusted back and forward by the thumb-nut 9. 7 is the pillar holding such screws. *r* is a piece of soft rubber or equivalent substance placed between the prongs of the spring 5. 6 is a wire or band, which serves to bind the prongs tightly against the rubber *r*, so as to prevent the prongs acting as a tuning-fork and transmitting harmonic vibrations not desirable. 10 is the plumbago contact-point. The object of the U-spring and rubber is to present a semi-rigid point for contact, so as to prevent a rebound and allow of a slight yield when the plumbago is pressed by the diaphragm. D is the receiver, which consists of a resonant

chamber of any suitable character, either a tube, as in Fig. 3, or as a box, as at D, Fig. 1. *f* is a rigid arm secured to the box and is provided upon its extreme end with an adjusting-screw *h*. Near the end of the arm is secured a spring *g*, whose end rests upon the chemically-prepared paper upon the drum *e*. The under side resting upon the paper is platinized. The screw *h* serves to increase and decrease the pressure of the platina spring upon the paper. When the paper is moved slowly by rotating the drum *e*, the waves of electricity coming over the line pass through the arm *f* to the platinized springs *g*; thence through the paper to the earth. If a negative current passes in the opposite direction, nearly all friction between the platina plate and the paper ceases and the resonant box or diaphragm regains its normal position. When the positive current passes through the same channel, the normal friction of the paper is augmented and the chemical surface, acting upon the platina, serves to give a movement to the resonant box. Thus the mechanical force applied to move the chemical surface acts with the electric current to produce the vibration of the resonant chamber. The principle of this method of obtaining motion by electro-chemical decomposition is described in my Letters Patent No. 158,787, granted January 19, 1875. To facilitate the discharge of electricity from the receiving apparatus, it may be shunted with an electromagnet.

Fig. 4 shows the devices which may be employed to rotate the drum *e* in a noiseless manner, so as to prevent interference with the weak hissing consonants, which form a part of ordinary conversation. *p* is a worm, and *o* the wheel for revolving the roller *e*. *t* is a universal joint connecting to the shaft *s*, the object of the shaft being to carry the actuating-handle to the right side of the machine and the paper-carrying devices to the left-hand side. *v* is a spring, which serves to press the rubber wheel *w* against the under surface of the wheel *u*, which also may be covered with rubber. *w'* is the handle by which to rotate the disk *u*, shaft *s*, worm *p*, and roller *e*.

The mouth of the speaking-tube may be closed except a horizontal slot, through which the vibrations of the voice pass to the diaphragm or tympan, the object of the slot being to increase the power of the hissing consonants; also, the point *b* may be dispensed with on very short lines. When only one of these contact-points is used in combination with the diaphragm, the vibrations of the diaphragm cause a greater or less pressure upon that point, and the strength of the electric waves will be varied in proportion to the movements of the diaphragm actuated by the speaker's voice.

I claim—

A spring forming or carrying one electrode of the circuit of a telephone and constantly pressing against the other electrode and diaphragm to maintain the required initial pressure between the electrodes and yield to the movement of the diaphragm, substantially as described.

THOMAS A. EDISON.

Witnesses:
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