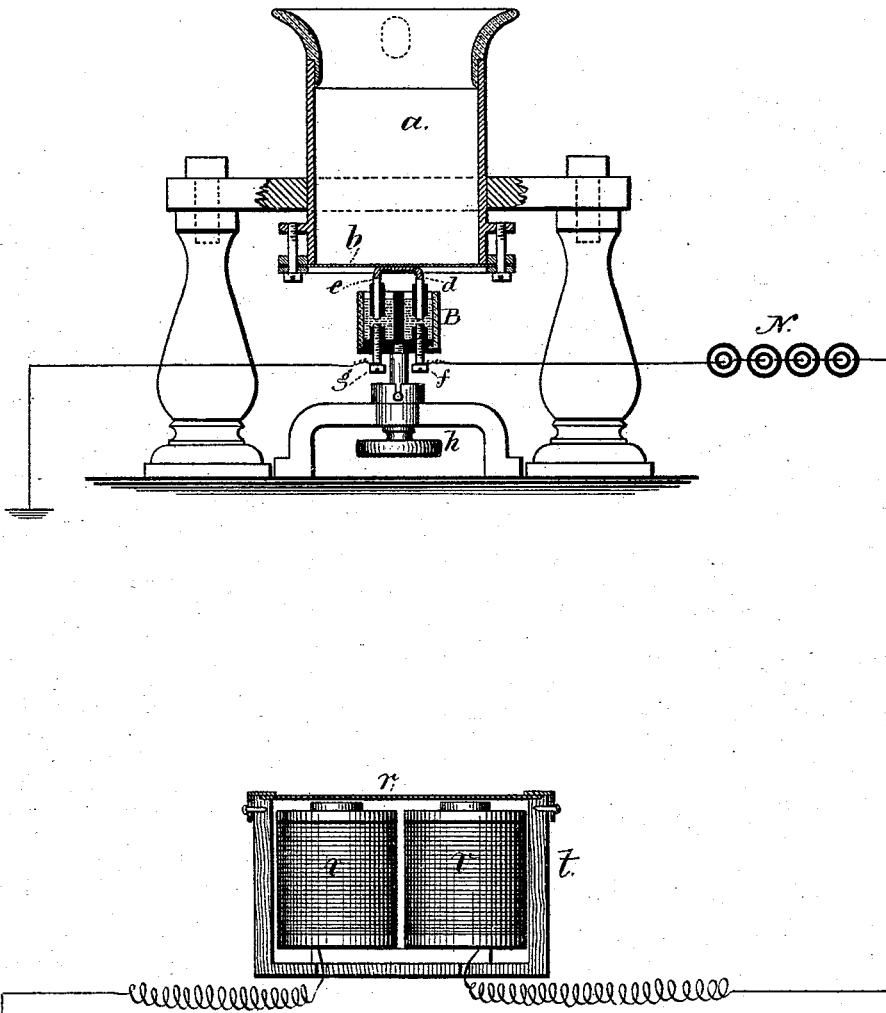


T. A. EDISON.
SPEAKING TELEGRAPH.

No. 492,789.

Patented Mar. 7, 1893.



Witnesses
Chas. H. Smith
Harold Ferrill

Inventor.
Thos. A. Edison.
 per *Lemuel W. Ferrill* atty

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y.

SPEAKING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 492,789, dated March 7, 1893.

Application filed September 5, 1877. 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 Menlo Park, in the county of Middlesex and State of New Jersey, have invented an Improvement in Speaking-Telegraphs, (for which I have obtained Letters Patent 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 and render audible the human voice over telegraphic circuits.

The invention relates to a tympan or diaphragm upon a speaking tube connected with electrodes in an electrolytic fluid, so that the vibrations of the diaphragm cause the electrodes to approach and recede from each other, and vary the resistance in the electric circuit.

The invention further relates to the electrodes insulated except at their extreme ends.

In the annexed drawing *a*, is the speaking tube which may be made in any form; upon the lower end is secured a diaphragm *b*, of cork, mica, metal or other suitable substance, the diaphragm being set in motion by the voice of the person speaking in the upper part of the tube. Secured to the diaphragm is a U shaped piece of metal *d*, *e*, insulated except at its extreme end; these ends dip into the cell B, containing the semi-conducting fluid. Facing the ends *e*, *d*, of the U shaped electrodes are two other electrodes *f*, and *g*, which are also insulated except on their extreme ends where they face *e*, and *d*.

The cell B, is divided by an insulating diaphragm or partition, so that practically there are two electrolytic cells. The cell is secured to an adjusting double thread screw *h*, by which it may be adjusted up or down, hence the electrodes *e*, *g*, and *d*, *f*, can be made to

approach very closely to each other. I will now explain the action of the electric current. When the diaphragm is in a state of rest and the electrodes are adjusted very close to each other, the current from the battery N, passes to the screw *f*, thence through it to the extreme point, thence through the fluid in B to the point *d*, through it to *e*, thence to its extreme point, thence through the fluid to the point *g*, to the earth. The resistance of the fluid between the points is considerable causing the current to be weakened, and this effect is multiplied by the exceedingly strong polarization of these small surfaces especially when polarizing solutions are used. If now the diaphragm is vibrated, it causes the approach and recession of the points to and from each other, and this causes the current to traverse a greater or less amount of the fluid, thus throwing the electric current into waves corresponding to the movement of the diaphragm; by using two electrodes, I nearly double the effect of a given movement, of the diaphragm, for if but one electrode was used a movement of the diaphragm of say one one-hundredth of an inch would shorten and lengthen the fluid conductor to that extent whereas with two electrodes the length of the fluid conductor is doubled. In practice I prefer to use several sets of electrodes in the circuit so that the current must pass successively between the several pairs of electrodes (as in a galvanic battery connected up for intensity). Where a great number of points are used, the combined resistance of the electrolytic fluid in the various cells is great, but is lessened by using a comparatively good conducting solution. The plate *r*, is of iron preferably tinned; it is at the end of the case *t*, within which case is the electro-magnet *v*, the helix of which is connected with the line circuit. The waves thus sent over the circuit cause the electro magnet *v*, to attract the plate *r*, at each vibration, and thus reproduce and render audible the voice of the person speaking into the tube *a*.

The advantages of using a loose plate over a

plate secured at one end, or around the edges, is, that any free diaphragm setting the air in motion will give metallic ringing sounds or harmonics due to its want of homogeneity, while with the loose plate held against the ear, these ringing sounds are dampened, and the sounds due both to the movement of the air and the molecular sounds from the metal due to the motion given by the magnet are very loud and are free from all secondary sounds which tend to destroy the perfect articulation.

By more or less pressure of the plate against the ear, it may be made to approach or recede from the magnet thus increasing or decreasing the volume of the sound.

It is not necessary that the plate should be circular; it may be in any shape or of any material providing it has secured to it an iron armature.

I claim as my invention—

1. The combination with a diaphragm which

is set in motion by the human voice or other sound of two electrodes, which are insulated except at or near their ends and an intermediate fluid for the purpose set forth.

2. In a telegraphic instrument operated by sound employing a conducting fluid as a part of the circuit, the combination with the diaphragm of an electrode immersed in said liquid and insulated except at its extreme end, substantially as described.

3. The combination with a diaphragm set in motion by the human voice or other sound of several pairs of electrodes insulated, except at or near their end, and an intermediate fluid conductor for the purpose set forth.

Signed by me this 31st day of August, A. D. 1877.

THOS. A. EDISON.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.