(No Model.)

H. S. THORNBERRY.

TELEPHONE TRANSMITTER.

No. 336,268. Patented Feb. 16, 1886.

Fig. 1.

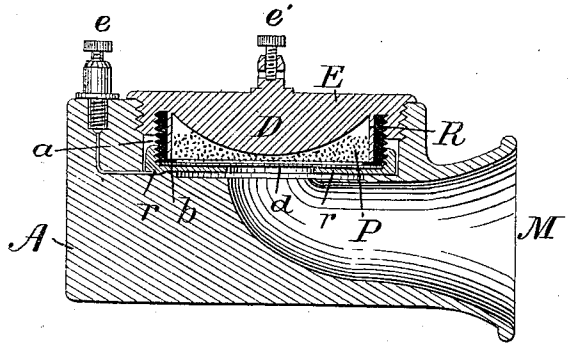


Fig. 2.

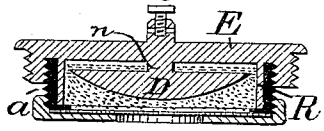


Fig. 3.

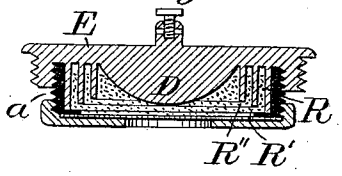
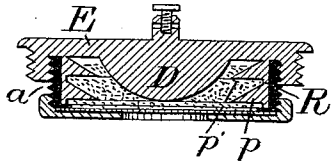


Fig. 4.



Witnesses.

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Wm. B. Vansize.

Inventor.

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UNITED STATES PATENT OFFICE.

HENRY S. THORNBERRY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF SAME PLACE.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 336,268, dated February 16, 1886.

Application filed August 12, 1885. Serial No. 174,204. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. THORNBERRY, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Telephone-Transmitters, of which the following is a specification.

My invention is an improvement in telephone-transmitters of that class in which finely-divided conducting material forms the current-varying medium. The first transmitter of this class was the invention of Henry Hunnings, United States Patent 246,512, August 30, 1881, and since the time of its introduction many attempts have been made to obviate certain inherent difficulties incident to its use.

My invention is the result of an extended series of experiments, and by its use I obtain clear, well-defined, natural articulation, and prevent the packing of the conducting particles, which desirable results have been hitherto unattained, so far as I am able to learn.

In general, my improvements consist in providing a containing-cell for the conducting particles, the interior of which cell is of such form that the electrical resistance is a minimum, while a slight vibration of the movable electrode produces an effective variation in resistance and a general displacement or movement of the confined conducting particles, whereby packing is prevented.

The construction more specifically consists of a containing-cell having its walls divided into two sections. One section is composed of a flexible conducting-diaphragm fixed in a horizontal position and forming one electrode, upon which the finely-divided conducting material normally rests by its gravity. The second section is of conducting material, forms the complementary electrode, and is of such form as to expose as much surface as possible to the conducting particles, while at the same time it contributes to and augments the general disturbance of the conducting particles due to the vibration of the diaphragm. The form of this complementary electrode may be varied within certain limits. I prefer to give to that portion immediately opposite the diaphragm a convex surface. This increases the surface-contact, and is found to contribute to the extended disturbance of the conducting particles when the diaphragm is vibrated, as when the said particles strike the convex surface they are deflected toward the sides, and when returning to rest take a new or a different position from that which they would assume if projected against a plane surface, in which case they would fall back in a nearly straight line. If it be desirable to still further reduce the resistance, one or more points, rings, or projections are provided, extending either from the sides or top of the cell or inclosure. Another meritorious feature of this construction is that it is impossible to produce "breaks"—that is, entirely sever electrical continuity between the electrodes—by shouting or loud speaking.

I will now describe my invention by reference to the accompanying drawings.

Figure 1 is a cross-section of the transmitter complete. Figs. 2, 3, and 4 are modifications.

In Fig. 1, A is a recessed block of insulating material, as wood or hard rubber.

a is a ring of insulating material—as hard rubber—having a flange, *b*, turned inward. Upon the under side of this flange is fixed a flexible conducting-diaphragm, *d*. I prefer to use platinum-foil.

r is a threaded ring of conducting material, which screws down upon rubber ring *a* and holds the diaphragm *d* firmly in position, making conducting contact between ring *r* and diaphragm *d*. This ring *r* is connected to screw-post *e*, so that the diaphragm forms one electrode of the circuit. Upon the diaphragm I place a quantity of finely-divided conducting material, P. I prefer to use granulated or powdered carbon.

E is the complementary electrode, of conducting material, preferably metal, as iron or brass. It is screw-threaded to fit rubber ring *a*. A ring projection, R, fits the interior of rubber ring *a*, and constitutes the side wall of the cell. The top of the cell D is arc-shaped, or like an inverted dome. This construction is chosen, as experiment shows that when the diaphragm vibrates the conducting material P is forced toward the space next the side wall of the cell-producing a general displacement,

and such displacement prevents packing. To still further reduce the resistance of the transmitter, the surface of the complementary electrode constituting the walls of the cell is still further increased, as shown in Figs. 2, 3, and 4.

In Fig. 2 the convex portion of the electrode D is separated from the main portion and connected thereto by neck *n*. This affords an opportunity for the particles to surround it. In Fig. 3 there are three ring-projections, R R′ R″, and in Fig. 4 the ring R has interiorly-projecting rings *p p′*. It is intended that the transmitter shall be fixed in position substantially as shown in Fig. 1. The circuit-terminals are connected to screw-posts *e* and *e′*, respectively, and speech is directed upon the diaphragm through mouth-piece M.

The use and operation of the instrument is otherwise similar to instruments of the same class.

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

1. The combination, in a telephone-transmitter, of a flexible diaphragm, a mass of finely-divided conducting material in a loose and free state in contact with the diaphragm, and a rigid back plate having a pendant projecting into said conducting material, substantially as described.

2. The combination, in a telephone-transmitter, of a horizontal diaphragm forming one electrode, a mass of finely-divided conducting particles resting thereon, and a cell or chamber of conducting material confining said particles and constituting the complementary electrode.

3. The combination, in a telephone-transmitter, of a horizontal diaphragm controlling one electrode, a mass of finely-divided conducting material resting thereon, and a rigidly-supported complementary electrode having a convex surface in contact with said particles.

4. In a telephone-transmitter, the combination of a horizontal diaphragm forming one electrode of the circuit, a mass of finely-divided conducting material confined and resting thereon, and a convex complementary electrode.

5. In a telephone-transmitter, the combination of a horizontal diaphragm forming one electrode, and a mass of finely-divided conducting material resting thereon and confined by an insulated cell of conducting material, the interior surface of which is extended by one or more projections forming the complementary electrode.

6. In a transmitter, the combination of a fixed horizontal diaphragm forming one electrode of a circuit, and a mass of finely-divided conducting particles resting thereon and confined by an inclosing-cell the interior of which is furnished with one or more curved or pointed projections forming the complementary electrode.

7. In a telephone-transmitter, the combination of a fixed horizontal diaphragm forming one electrode of a circuit, and a mass of finely-divided conducting material resting thereon and confined by an insulated cell or inclosure of conducting material, having a convex projection forming the second electrode of said circuit.

8. In a telephone-transmitter, the combination of a horizontal diaphragm forming one electrode, a mass of finely-divided conducting materal resting thereon, and an inclosing-cell therefor forming the complementary electrode having walls of conducting material, that portion opposite the diaphragm being in the form of a convex arc.

9. The combination, in a telephone, of a horizontal diaphragm forming one electrode, a quantity of finely-divided conducting material resting thereon, an inclosing-cell therefor having a convex projection, and one or more supplementary rings or projections forming the complementary electrode.

10. The combination, in a telephone, of a fixed horizontal diaphragm, a quantity of finely-divided carbon particles resting thereon, and a metal inclosing-cell therefor, the interior surface of which is extended by one or more projections.

11. The combination, in a telephone-transmitter, of a horizontal diaphragm, a mass of finely-divided conducting material resting thereon, and a rigid back plate having a projection therefrom immersed in the said divided conducting material.

12. The combination, in a telephone-transmitter, of a flexible metallic diaphragm forming one electrode, and a complementary electrode consisting of a fixed plate of metal having one or more pendants projecting into the mass of finely-divided carbon, which forms the current varying medium, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 7th day of August, 1885.

HENRY S. THORNBERRY.

Witnesses:
WM. B. VANSIZE,
GEO. WILLIS PIERCE.