

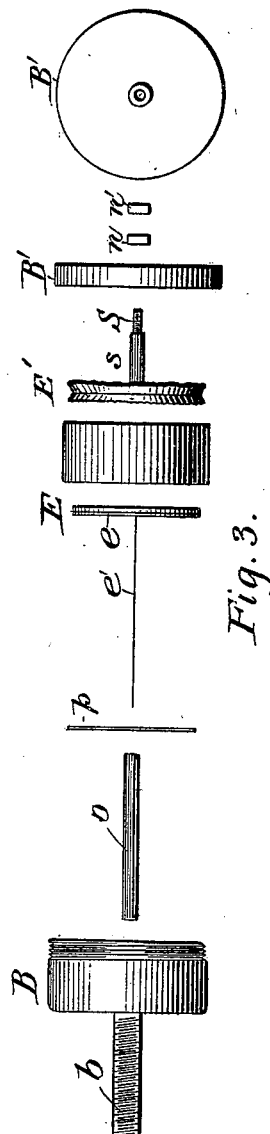
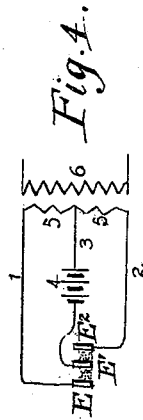
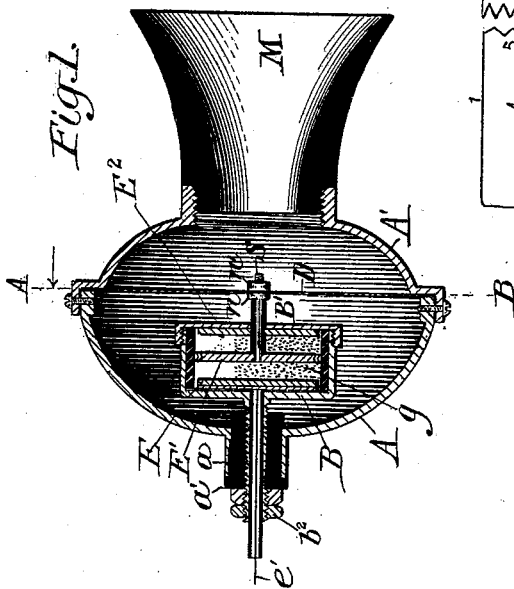
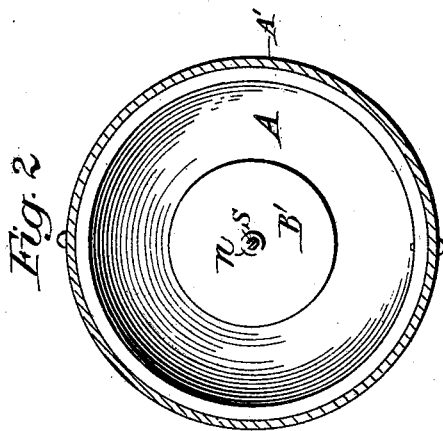
No. 646,678.

Patented Apr. 3, 1900.

**E. E. CLEMENT.**  
**TELEPHONE TRANSMITTER.**

(Application filed Aug. 20, 1898.)

(No Model.)



Witnesses:  
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E. W. Cady

Inventor:  
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# UNITED STATES PATENT OFFICE.

EDWARD E. CLEMENT, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR  
TO THE SUN ELECTRIC MANUFACTURING COMPANY, OF NEW JERSEY.

## TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 646,678, dated April 3, 1900.

Application filed August 20, 1898. Serial No. 689,130. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD E. CLEMENT, a citizen of the United States, and a resident of Washington, in the District of Columbia, have  
5 invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a specification.

My invention relates to the class of telephone-transmitters in which granular carbon is used as the resistance-varying means, and has special reference to what are known as  
10 "differential" transmitters. In these instruments more than one resistance-varying pair is provided, the arrangement being such as  
15 to permit a double-branched circuit to be used, the resistance at any given moment being decreased in one branch and simultaneously increased in the other.

The main trouble heretofore experienced  
20 with differential or pole-changing transmitters, apart from the complication of the circuits, has been the irregularity of their performance and their difficulty of adjustment. I provide a containing-box for the electrodes,  
25 accurately centered within the transmitter-shell and having all the operative parts in line, thus avoiding all torsional strains and making the action very true and direct, while the adjustment, once made, is not easily lost.

30 My invention is fully illustrated in the accompanying drawings, wherein the same letters refer to the same parts throughout.

Referring to the drawings, Figure 1 is a sectional view of the transmitter complete. Fig.  
35 2 is a sectional view on the line A B of Fig. 1, looking in the direction of the arrow. Fig. 3 is a detail view showing all the parts of the electrode box or "button" separated or opened out on the line of their common axis. Fig. 4 is a  
40 diagram of the circuits.

In the drawings, A is a shell adapted to contain all the parts of the transmitter and to support the diaphragm D. Secured to the shell by side screws, as shown, or in any other  
45 suitable manner, is a cap A', carrying a mouth-piece M. In practice this cap is made much flatter than shown in the drawings, where the shape is exaggerated for ease of illustration.

The shell A has a rearwardly-extending per-  
50 forated nipple a, provided with an insulating-

bushing a'. Screwed into and through this bushing is the hollow screw-threaded stem b of a box B, which contains and forms a part of the operative resistance-varying means.

The box B is preferably of metal and has a  
55 cover B', centrally perforated and adjustably secured to the box. On the inside face of the cover is secured an electrode E<sup>2</sup>, with a central perforation registering with the perforation in the cover. Within the stem of the box  
60 (shown at b) is an insulating-tube b'. Resting upon the bottom of the box, inside, is a disk of paper coated with shellac, (shown at p.) Resting on the paper disk is a metallic disk or cup e, carrying the electrode E and pro-  
65 vided with a conducting-stem e', which passes through the insulating-tube b' in the stem b. Within the box B a cylindrical shell b<sup>2</sup>, of rubber or paper, is disposed, and fitted to reciprocate easily within this shell is an electrode  
70 E', having on its periphery a washer of yielding material e<sup>2</sup>, which permits free motion of the electrode, but prevents the granulated carbon g from creeping under the edges thereof. I have made this washer, as shown, of a  
75 ring of plush or velvet, secured by a wrapping of thread in a peripheral groove on the electrode; but any other form is contemplated by my invention.

Rigidly secured to the electrode E' is a stem  
80 S, of conducting material, screw-threaded on its extremity and jacketed for the greater part of its length by an insulating-tube s. The stem so protected passes through the perforation in the front electrode E<sup>2</sup> and in the cover  
85 B' and through a central perforation in the diaphragm D, to which it is firmly secured by means of the nuts n and n', which screw upon its extremity, one on each side of the diaphragm.

Referring to Fig. 4, it will be seen that the electrodes E and E<sup>2</sup> are connected to the extremities of the primary 5 of the induction-coil, the secondary 6 of which is to line. The middle or movable electrode E' is connected,  
95 through the local battery 4 by wire 3, to the middle point of the primary. The operation with such connection is obvious. As the normal current-flow is in opposite directions through the primary, the core remains neu- 100

tral—a very favorable condition for delicacy of transmission. A change due to one oscillation of the diaphragm and its connected electrode E' causes current to rise in one half of the primary and simultaneously to fall in the other half, and as these effects are opposite the resultant action on the secondary produces a strong rise in one direction through the whole length of the secondary equal to the sum of the individual effects. On the reverse oscillation the current in the secondary first sinks to zero and then reverses to an equal degree, clean-cut reversals thus being produced.

Many advantages inhere in the arrangement of the electrodes shown. All of the three circuits issue at the back of the shell, where in a proper socket (not shown) suitable coöperative connections are provided. One circuit is by way of the nipple *a* and shell A to the diaphragm, and thence through the stem S to the central electrode E'. The second circuit is by way of the lock-nuts *b*<sup>2</sup> on stem *b* to box B, lid B', and electrode E<sup>2</sup>. The third circuit is by the central stem or wire *e*' within tube *b*' to disk *c* and electrode E. All the parts have a common axis, upon which they are centered once for all, and the box B, with all the operative parts, may be manufactured and handled as a unit self-contained, being attached to the instrument only by the screw-stem *b* and the nuts *n* and *n*'.

I do not wish to be limited to the specific details of construction shown and described, as many of them may obviously be changed without affecting the character of the invention as a whole.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a telephone-transmitter, a shell or casing in two parts, a diaphragm clamped between the parts, an orifice in the rear part and an insulating-bushing therein, a conducting-stem adjustably supported in said bushing and having one end accessible as a contact from the outside of the shell, an electrode-box carried upon the stem inside of the shell or casing and independently of the bushing, fixed and movable electrodes, in the box, and a connection between the diaphragm and the movable electrode, substantially as described.

2. In a telephone-transmitter a shell or casing and a diaphragm, a front and rear electrode supported rigidly but adjustably in said casing, a movable electrode between the fixed

electrodes, and a rigid connection from said movable electrode through the front fixed electrode to the diaphragm, substantially as described.

3. In a telephone-transmitter a diaphragm, a metallic shell or casing, an orifice therein, an insulating-bushing in said orifice, a hollow screw-threaded stem adjustable in said bushing, a closed metallic box carried by said stem, two rigid electrodes in said box, one carried directly thereby, and one insulated therefrom, a movable electrode between the rigid electrodes, insulated from the box but both electrically and mechanically connected to the diaphragm, and an insulated circuit connection passing from the insulated rigid electrode through the hollow stem, substantially as described.

4. In a telephone-transmitter a diaphragm, two rigid electrodes, and a movable electrode between them, a rigid connection from the movable electrode through one of the rigid electrodes to the diaphragm, and granular conducting material between the electrodes, substantially as described.

5. In a telephonic transmitter a self-contained resistance-varying button or capsule, consisting of a metallic box with a perforated cover and a hollow stem, an insulated electrode seated in the box, and having its electrical connection led through the stem, another electrode perforated and fixed to the inside of the cover, a movable electrode between the fixed electrodes and having an insulated stem extending through the perforation in the cover and its attached electrode, and granular carbon in the box between the electrodes, substantially as described.

6. In a telephone-transmitter, the combination of two relatively-central and two relatively-lateral electrode-faces, one pair being movable and one rigid in the supporting-frame, granular conducting material situated between the adjacent central and lateral electrode-faces, a diaphragm and a positive connection between the two movable electrode-faces whereby they are moved in absolute synchronism with the diaphragm and so as to simultaneously relax the pressure on one mass of granular material and increase it on the other mass.

In witness whereof I have hereunto set my hand this 15th day of August, A. D. 1898.

EDWARD E. CLEMENT.

In presence of—

WM. D. GHARKY,

ROBERT OSBORNE, Jr.