

(No Model.)

T. GRISSINGER.
TELEPHONE TRANSMITTER.

No. 551,674.

Patented Dec. 17, 1895.

Fig. 1.

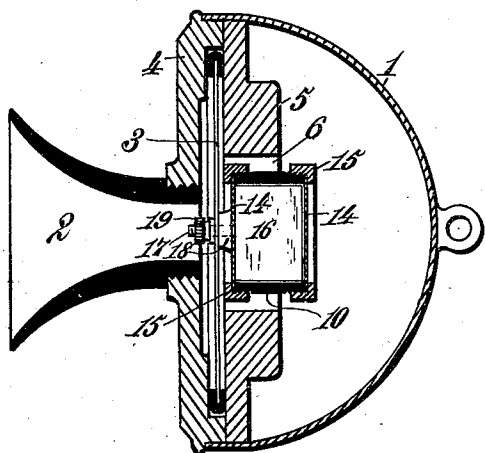


Fig. 2.

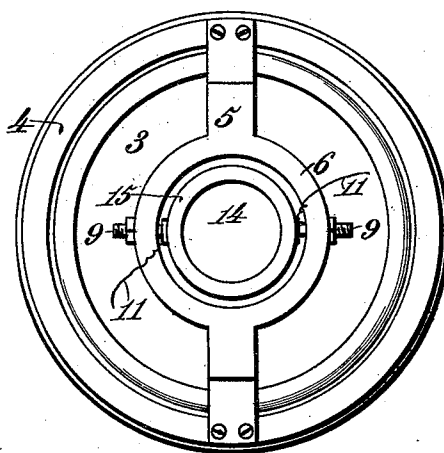


Fig. 3.

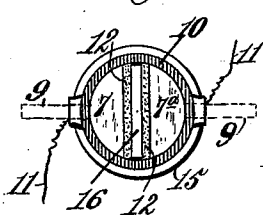


Fig. 4.

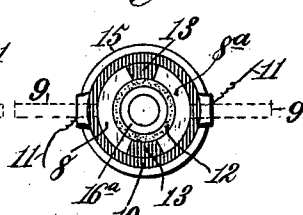


Fig. 5.

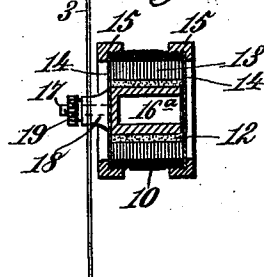
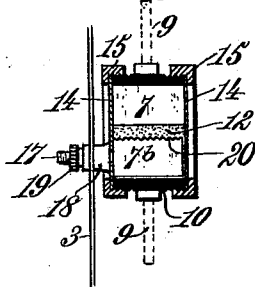


Fig. 6.



Witnesses.
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TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 551,674, dated December 17, 1895.

Application filed October 18, 1894. Serial No. 526,293. (No model.)

To all whom it may concern:

Be it known that I, THEODORE GRISSINGER, a citizen of the United States, residing at Mechanicsburg, in the county of Cumberland and State of Pennsylvania, have invented new and useful Improvements in Telephone-Transmitters, of which the following is a specification.

This invention relates more particularly to telephone-transmitters of that class in which the required variations or undulations of current for reproducing the sound-waves are effected through a change in the position of the particles of a granulated conducting material confined in contact with the electrodes and set in motion by the vibrations of a diaphragm not in contact with said granulated conducting medium.

It is the purpose of my invention to effect variations of the transmitting-current through change of position among the particles of granulated conducting material caused by an agitation or vibration thereof in a direction parallel with the electrodes and across the path of the current within the body of such conducting medium, whereby the required undulations or vibrations of current will be effected in such manner as to make the transmitter extremely sensitive and reproduce the sound-waves with a great degree of flexibility and distinctness. This object may be accomplished by arranging a vibrator or plunger so that it will extend between two fixed electrodes and through the granulated conducting material confined in contact therewith, whereby the movements of the diaphragm, communicated to the vibrator or plunger, will cause a movement of the said vibrator in a direction parallel with the electrodes and thereby agitate the granulated material and thus effect the required variations or undulations in a current passed laterally through the instrument at a right angle to the direction of movement imparted to the vibrator. In another mode of accomplishing the same result one electrode may be fixed and the other be carried by the vibratory diaphragm, so as to have a movement parallel with the fixed electrode and in contact with the interposed granulated material. The vibrator or the movable electrode, as the case may be, is to be connected to and carried by a vibratory diaphragm that is not in contact with the

granulated conducting material and the said vibrator or the movable electrode will be arranged at a right angle to the diaphragm and have a forward and back movement alongside the fixed electrode or electrodes and parallel therewith, instead of toward and from the electrode; and the electric current will be passed in a direction parallel with the diaphragm and at a right angle to the direction of movement imparted to the conducting medium, thus permitting a clear and distinct reproduction of sound-waves.

My invention consists in the features of construction and novel combination of devices in a telephone-transmitter, as herein-after more fully described and claimed.

In the annexed drawings, Figure 1 is a vertical longitudinal section of a telephone-transmitter, illustrating one form of my invention. Fig. 2 is a rear view of the same. Fig. 3 is an end elevation of the electrodes, shown as half-disks or semicylinders with an interposed rectangular plunger or vibrator, granular conducting material, and an inclosing inner casing. Fig. 4 is a similar view showing a modification in the form of the electrodes and plunger. Fig. 5 is a vertical longitudinal section of the same with diaphragm attached. Fig. 6 is a horizontal section showing a modification in which one electrode is fixed and the other attached to the diaphragm and having a longitudinal movement parallel with the fixed electrode and interposed granular conducting material.

Referring to Figs. 1 and 2, the numeral 1 designates the outer casing of a telephone-transmitter in which the mouthpiece 2 and diaphragm 3 may be supported by a circular frame 4 having the rear bridge-piece 5 and its ring 6 of any suitable or preferred construction. If relatively immovable electrodes are employed they may be in the form of semicylinders or half-disks, as 7 and 7^a, Fig. 3, or in the form of arcs 8 and 8^a, Fig. 4. In either form of construction, where each electrode is fixed or immovable with relation to the other, the said electrodes may be rigidly supported at lateral points in the outer casing 1 or in the ring 6 of the bridge-piece, in any suitable manner. If preferred, the electrodes may be provided with arms 9, each of which has one end screwed into or otherwise secured to the

edge or periphery of an electrode and the other end connected with the ring 6 or with the outer casing of the instrument. As shown in Figs. 1, 3 and 4, the fixed and relatively immovable electrodes may be inclosed in an insulating or non-conducting casing 10 through which the inner ends of the arms 9 will be passed. The conducting-wires 11 may be fastened to an edge of each electrode and the current will thus be passed through the instrument in a lateral direction, or from side to side, and not axially.

To provide electrical connection between the electrodes there is interposed a granulated conducting material 12, Figs. 3, 4 and 5, of any suitable character. Aside from the electrical connection afforded by the interposed granulated material the electrodes are insulated from each other, either by being placed a proper distance apart in the insulating casing 10 or by inserting between the ends of the arc-shaped electrodes 8 and 8^a some suitable insulating substance 13, Fig. 4. The granulated material is held between the electrodes by one or more flexible mica disks 14 fastened in place by clamping-rings 15 screwed onto the inner casing 10, or one of the flexible disks may be omitted and the casing 10 be closed at that end by a solid back.

The agitation of the granulated conducting material to effect the required variations or undulations of current for reproducing the sound-waves representing articulate speech may be obtained through the action of a longitudinally-movable vibrator or plunger 16, Figs. 1 and 3, or 16^a, Figs. 4 and 5, clamped to one or both flexible disks 14 and to the diaphragm 3 and extended from end to end of the casing 10 through the entire body of granulated material 12 contained therein. In the construction shown in Figs. 1 and 3, the plunger or vibrator 16 is of rectangular form, corresponding with the parallel straight inner faces of the half-disk or semicylindrical electrodes 7 and 7^a, between which the said vibrator is arranged. When the electrodes are of arc shape, as in Figs. 4 and 5, a cylindrical vibrator or plunger 16^a, either solid or tubular, may be employed. Whatever may be its form, the vibrator or plunger is extended in contact with the granulated material 12 and is connected to the diaphragm 3 so as to vibrate in consonance therewith and at an angle to the direction of the electric current. By this agitating action of the vibrator the required variations or changes in the position of the particles of granular material is accomplished in such manner as to render the transmitter extremely sensitive. With a vibrator thus extended into the granular conducting medium the changes of current strength are very great and the efficiency of the instrument is correspondingly improved. The vibrator or plunger can be made of either conducting or non-conducting material, but if constructed from a non-conducting substance it should be provided with suitable openings

or perforations for passage of the current to the granulated conducting medium.

Any suitable clamping device may be employed to connect the vibrator with the diaphragm—as, for instance, a screw-threaded stem 17, Figs. 1 and 5, on one end of the vibrator, a washer 18 between the diaphragm and adjacent flexible disk 14 and a nut 19 on the outer portion of the screw-stem.

Instead of employing a longitudinally-movable vibrator extended between two fixed electrodes and through an interposed granular conducting material I may secure only one electrode in a fixed position and attach the other to the diaphragm so that it will vibrate therewith and become, in effect, a vibrator or plunger. A construction of this character is illustrated in Fig. 6, and may be in all respects essentially the same as already described with reference to Figs. 1 and 3, except that the intermediate plunger 16 is omitted, one electrode, as 7, remains immovable in the insulating-casing 10 and the other electrode, as 7^b, Fig. 6, has one end secured to the diaphragm 3 so as to vibrate therewith in contact with the granulated conducting medium 12 between the two electrodes. This arrangement of electrodes prevents a movement of one toward the other, and yet permits a longitudinal vibration of the movable electrode 7^b alongside the fixed electrode 7 and in agitating contact with the interposed granular material. The change in position among the particles of granular conducting material is effected in all these forms of construction through agitation or vibration, induced by the movements of the diaphragm and attached electrode or plunger, as the case may be.

It will be observed that in each form of construction the vibratory diaphragm and the granular conducting material are not in contact, neither do the electrodes have any movement toward each other. The vibrator or the movable electrode is preferably extended through the casing 10 in which the electrodes and granular material are contained and the vibrations are effected at a right angle to the direction in which the current is passed. In order to facilitate the change in position of the granules, the vibrator or movable electrode may have a roughened side 20, Fig. 6, in contact with the granular material.

By causing the electric current to traverse a conducting medium in a state of agitation or vibration at a right angle to the line of current the required variations, undulations, or vibrations of current are obtained in such manner as to give a great flexibility and distinctness in the reproduction of sound-waves representing articulate speech.

It will be obvious that the form of the electrodes and plunger or vibrator, as well as other parts of the transmitter, may be varied within proper limits without affecting the principle of the invention.

What I claim as my invention is—

1. In a telephone transmitter, the combina-

tion of a diaphragm, a granulated conducting medium not in contact with the diaphragm, a vibrator in contact with said conducting medium, a casing for the conducting medium and vibrator, and means for passing an electric current laterally through the conducting medium, at a right angle to the vibrator and parallel with the diaphragm, substantially as described.

2. In a telephone transmitter, the combination of a granulated conducting medium, a vibrator adapted to agitate said conducting medium in accordance with sound vibrations, a casing for the conducting medium and vibrator, and means for conducting an electric current laterally through the granulated conducting medium and at a right angle to the movements of the vibrator, substantially as described.

3. In a telephone transmitter, the combination of a granulated conducting medium, a diaphragm not in contact with said granulated conducting medium, a vibrator connected with the diaphragm and extended into the said granulated conducting medium, and means for passing an electric current laterally through the granulated conducting medium, at a right angle to the vibrator and parallel with the diaphragm, substantially as described.

4. In a telephone transmitter, the combination of an electrode, a granulated conducting medium in contact with the electrode, a diaphragm not in contact with said granulated conducting medium, a vibrator connected with the diaphragm and extended into the said granulated conducting medium, and wires for conducting an electric current laterally through the granulated conducting medium and at a right angle to the movements of the vibrator, substantially as described.

5. In a telephone transmitter, the combination with electrodes and a granulated conduct-

ing medium confined between and in contact with the electrodes, of a diaphragm, and a vibrator connected with the diaphragm and extended into the said granulated conducting medium to cause an agitation of or change in the position of its particles and thereby effect variations or undulations in an electric current passed laterally through the conducting medium and at a right angle to the movements of the vibrator, substantially as described.

6. In a telephone transmitter, the combination with fixed electrodes and a granulated conducting medium confined in contact with the electrodes, of a diaphragm not in contact with said granulated conducting medium, a vibrator connected with the diaphragm and extended through the said granulated conducting medium, and wires for passing an electric current laterally through the electrodes and interposed granulated conducting medium, substantially as described.

7. In a telephone transmitter, the combination of a fixed laterally supported electrode, a granulated conducting medium confined in contact with the electrode, a diaphragm not in contact with said granulated conducting medium, a vibrator connected with the diaphragm and extended through the granulated conducting medium in a direction parallel to the fixed electrode and at a right angle to the direction of the electric current, and means for passing a current laterally through the granulated conducting medium and at a right angle to the movement of the vibrator, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

THEODORE GRISSINGER. [L. S.]

Witnesses:

R. R. GENSEMAN,
AGNES Q. BOBB.