M. S. CONNER.

TELEPHONE TRANSMITTER.

APPLICATION FILED DEC. 18, 1906

**901,687.** Patented Oct. 20, 1908.

Fig. 1.

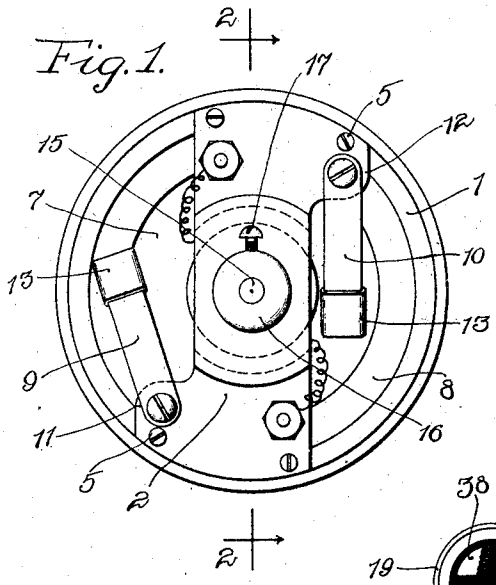
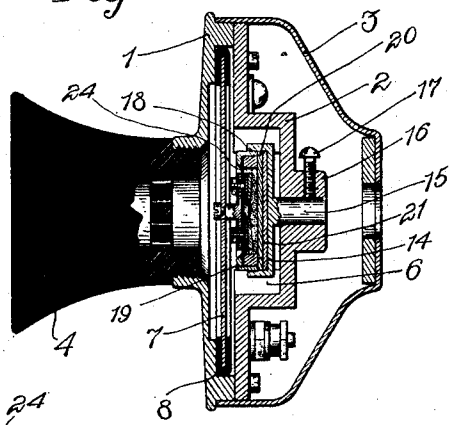



Fig. 2.



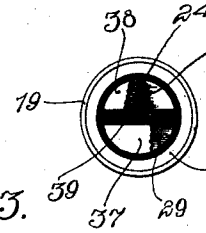




Fig. 5.

Fig. 3.

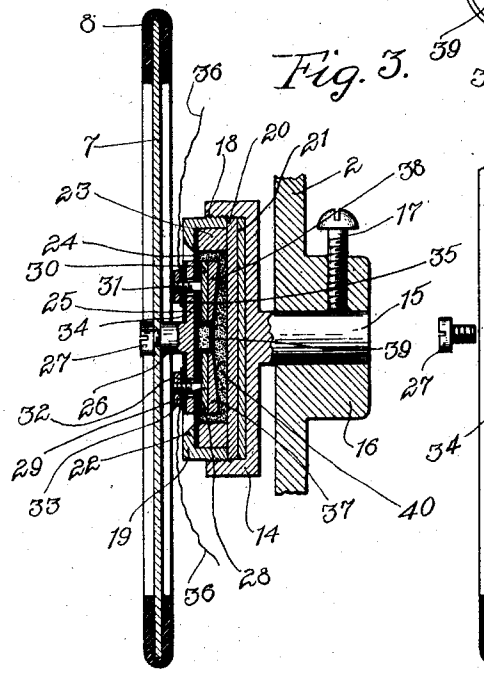
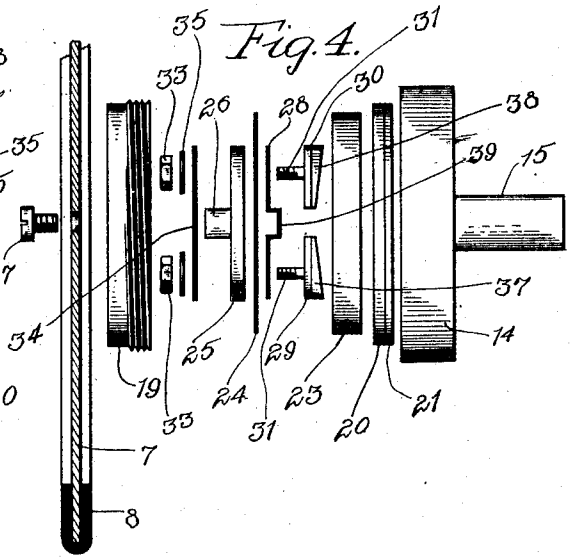



Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-TRANSMITTER.

No. 901,687. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed December 18, 1906. Serial No. 348,454.

*To all whom it may concern:*

Be it known that I, MERRITT S. CONNER, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone transmitters and has for its object the provision of a transmitter in which the range of variation of resistance is greatly increased without a multiplicity of parts or intricate construction.

The transmitter of my invention is of that class in which the active electrodes are disposed side by side instead of in opposition, the current flow through the transmitter depending upon the pressure exerted by a plunger member against the comminuted material disposed between the plunger and the active electrode members which are included in the transmitter circuit. In transmitters of this class of the prior art there has been difficulty in securing efficient operation, because of the tendency of the major portion of the current to pass through a comparatively small portion of the comminuted material disposed between the proximate ends of the active electrodes. This, of course, greatly decreases the range of variation and consequently impairs the operation of the transmitter.

It is one of the primary objects of my invention to so construct and dispose the various parts in the electrode chamber that the current passes directly through a very large portion of the comminuted material whereby the range of variation of resistance is greatly increased.

To carry out this principle, the electrode members connected with the circuit are mounted upon a flexible wall or diaphragm independent of the main diaphragm in such manner that upon voice currents being impinged upon the diaphragm, there will be relative motion between the electrode members and other associated parts in the electrode chamber.

In order that the tendency for the current to pass through only a small portion of the comminuted material between the proximate ends of the electrodes may be entirely eliminated, I provide means whereby the resistance may be equalized through the comminuted material so that the current passing therethrough will be distributed over the entire amount of resistance medium. To this end I construct the electrodes in the form of a wedge and dispose them in the electrode chamber so that their small ends respectively will be proximate to each other. Thus the respective outer ends of the electrodes will be nearer the common electrode disposed in opposition thereto than the respective inner ends, and the amount of resistance material disposed between the active electrodes and the common electrode will, therefore, gradually decrease toward the respective outer ends of the active electrodes. This construction will cause the current to have a tendency to traverse the resistance material disposed between an active electrode and the common electrode in practically equal distribution, the same, of course, being true of the current passing from the common electrode to the other active electrode. Thus, it is apparent that the current is made to traverse directly a very large portion of the comminuted material whereby the range of variation of resistance is greatly increased.

This description will be more readily understood by referring to the accompanying drawings in which

Figure 1 is a rear view of the transmitter with the inclosing shell removed; Fig. 2 is a sectional view on the line 2—2 of Fig. 1, the inclosing shell, however, being in position; Fig. 3 is an enlarged sectional view similar to Fig. 2 of the diaphragm, showing a part of the supporting frame and the intervening operative mechanism; Fig. 4 is a view showing the parts of Fig. 3 disassembled, and Fig. 5 is a face view of the electrode members and the supporting diaphragm.

The supporting framework of the transmitter consists of the front wall 1, the bridge member 2, and the inclosing shell 3, the mouth piece 4 being secured to the front wall 1 in the ordinary manner. The bridge member 2 extends diagonally across the rear of the wall 1, as best shown in Figs. 1 and 2, being secured thereto by means of the screws 5, 5. The center of the bridge is offset, as shown, to form the electrode pocket or com-

partment 6. The diaphragm 7 surrounded by the rim or washer 8 of insulating material in the ordinary manner is clamped to the front wall 1 by means of the spring clamps 9 and 10 secured at one end to extensions 11 and 12 from the bridge member 2 and terminating at their other ends in shoes 13 of insulating and cushioning material such as rubber or felt.

The electrode chamber comprises the cup member 14 from which extends the stud 15 for engagement in the hub part 16 extending from the bridge member, the set screw 17 serving to secure the stud in any desired position. The cup member 14 is threaded at the inside at 18 and is adapted to be engaged by the threaded clamping ring 19. The clamping ring 19 serves to securely clamp in the cup member 14 a plate or disk 20 which may be secured to the supporting disk 21. This disk 20 may be of carbon and is adapted to form the common electrode, as will be hereinafter described. The clamping ring 19 is provided with an inwardly extending flange 22 between which and a separating ring 23 is clamped the flexible diaphragm 24 of insulating material such as mica. It is apparent now that the clamping ring 19 when in threaded engagement with the cup member 14, securely clamps the common electrode and the flexible diaphragm which forms an auxiliary diaphragm, as will be hereinafter described. At one side of this diaphragm and preferably concentric therewith is arranged a disk member 25 which is provided with the stud 26 which is adapted to be engaged by the screw 27 whereby the diaphragm 7 may be clamped thereto, as clearly shown in the various figures. Against the other face of this auxiliary diaphragm and opposite the supporting disk 25 is arranged first an insulating member 28. Disposed against this insulating member are the supporting sectors 29 and 30 which may be of substantially semi-circular form, as shown in Fig. 5. From each of the sectors extends a threaded stud 31 which passes through an enlarged opening 32 in the supporting disk 25 and is engaged by a nut 33 which is insulated from the supporting disk 25 by means of the washer of mica or similar material 34. A washer 35 may be provided between which and the nut 33 a conducting strand 36 may be secured, thereby forming one of the terminals of the transmitter. The supporting sectors 29 and 30 are provided with the electrode members of carbon or other suitable material 37 and 38 respectively, the electrodes being insulated from each other by means of a ridge 39 formed from the insulating member 28. The electrode member may be either soldered or glued to the supporting members or secured in any other suitable manner. Comminuted material, such as granular carbon indicated at 40, is disposed in the electrode chamber.

With this arrangement, upon impingement of voice currents against the main diaphragm the comminuted material will be more or less compressed between the electrode members and the plate 20, the current flow being from one electrode member to the other, partly through the comminuted material and partly through the carbon plate 20, and the current flowing through the transmitter circuit conductors will depend upon the degree of compression of the comminuted material between the electrode members and the plate 20, or in other words, will depend upon the variation of resistance through the comminuted material. With the arrangement herein shown and described, the tendency for the current to pass through only the small portion of resistance material between the proximate ends of the electrodes is entirely eliminated. The current flows from one electrode through the comminuted material and to the other electrode by way of the comminuted material and the common electrode. The current tends to distribute itself equally throughout the comminuted material whereby the range of variation is greatly increased, this desirable feature being made possible by the employment of such wedge-shaped electrodes as have been described. With the electrodes shaped as they are shown in the drawings, the current will tend to distribute itself equally, because the electrode surface gradually becomes closer to the common electrode toward the outside thereof whereby the tendency for the current to pass through a small portion of the comminuted material to the other electrode is entirely overcome. These desirable features are obtained without the employment of intricate and complex mechanism, and the various parts are such that they can be easily manufactured and easily assembled.

I am aware that transmitters have heretofore been described with the electrodes disposed side by side and in opposition to a common electrode, but I wish to have my invention construed broadly in that a construction is provided whereby the current is equally distributed throughout the comminuted material by means of the peculiar construction and disposition of the electrodes with reference to the common electrode in opposition thereto whereby that portion of the current leaving that part of the electrode farthest away from the other electrode proximate thereto will encounter less resistance than that portion of the current leaving the electrode at a point nearest the other electrode proximate thereto.

While I have herein shown and described but one embodiment of my invention, it is evident that changes and modifications could be made therein by those skilled in the art

without departing from the spirit and scope thereof, and I do not wish to be limited, therefore, to the precise construction herein shown.

I claim as new and desire to secure by Letters Patent:

1. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, a positive and a negative electrode disposed side by side in said chamber and adapted to vibrate with said diaphragm, a common electrode disposed in opposition to said electrodes, comminuted resistance material disposed in said chamber whereby the current may pass from one electrode to the other therethrough and through said common electrode, and means for equally distributing the current throughout the resistance material.

2. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, a positive and a negative electrode disposed side by side in said chamber and adapted to vibrate with said diaphragm, a common electrode disposed in opposition to said electrodes, comminuted resistance material disposed in said chamber whereby the current may pass from one electrode to the other therethrough and through said common electrode, and means for decreasing the resistance toward that portion of one electrode furthest from the other electrode.

3. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, a positive and a negative electrode disposed side by side in said chamber and adapted to vibrate with said diaphragm, a common electrode disposed in opposition to said electrodes, and comminuted resistance material disposed in said chamber whereby the current may pass from one electrode to the other therethrough and through said common electrode, the contact surfaces of said positive and negative electrodes being so disposed that the amount of resistance material between said surfaces and said common electrode will decrease toward that portion of one electrode furthermost from the other electrode.

4. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, positive and negative electrodes disposed in said chamber and adapted to vibrate with said diaphragm, comminuted material forming a resistance medium between said electrodes, and means for adjusting the resistance inversely proportional to the distance between a point on the negative and a point on the positive electrode respectively.

5. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, positive and negative electrodes disposed in said chamber and adapted to vibrate with said diaphragm, comminuted material forming a resistance medium between said electrodes, and means for increasing the resistance toward the adjacent ends of said electrodes.

6. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber having a flexible auxiliary diaphragm forming one wall thereof, comminuted conducting material in said chamber, positive and negative electrodes attached to said auxiliary diaphragm and making contact with the comminuted material in said chamber, means for mechanically transmitting the vibrations of said main diaphragm to said auxiliary diaphragm, and means for increasing the resistance of the conducting medium between said electrodes toward the adjacent ends of said electrodes.

7. In a telephone transmitter, the combination with a main diaphragm, of an electrode chamber having a flexible auxiliary diaphragm forming one wall thereof, means for mechanically transmitting the vibrations of said main diaphragm to said auxiliary diaphragm, insulated electrodes disposed side by side within said chamber, a common electrode disposed in opposition thereto, and comminuted material interposed between said electrodes and said common electrode, said insulated electrodes being so disposed within said chamber that the amount of resistance material between said electrodes and said common electrode is increased toward the adjacent ends of said electrodes.

8. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, insulated positive and negative electrodes disposed side by side in said chamber, means for transmitting the vibrations of said diaphragm to said electrodes, a common electrode disposed in opposition to said electrodes, and comminuted material interposed between said negative and positive electrodes and said common electrode, the contact surfaces of said positive and negative electrodes being flared outwardly toward the common electrode from the adjacent ends of said electrodes whereby the amount of resistance material is decreased toward the outer ends of said positive and negative electrodes.

9. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, positive and negative electrodes disposed side by side within said chamber and mechanically connected with said main diaphragm whereby the vibrations thereof are transmitted thereto, a common electrode disposed in said chamber in opposition to said electrodes, and comminuted material interposed between said positive and negative electrodes and said common electrode, said positive and negative electrodes being wedge-shaped and having their smaller edges adjacent whereby the amount of resistance material between said surfaces and said com-

mon electrode is increased toward the adjacent edges of said positive and negative electrodes.

10. In a telephone transmitter, the combination with a diaphragm, of an electrode chamber, a positive and a negative electrode, means for mechanically transmitting the vibrations of said diaphragm to said electrodes, a common electrode disposed in opposition to said positive and negative electrodes, resistance material disposed in said chamber, and means for decreasing the resistance toward that part of one electrode farthest from the other.

11. In a telephone transmitter, the combination with a main diaphragm, of an electrode chamber having a flexible auxiliary diaphragm forming one wall thereof, positive and negative electrodes disposed side by side on said diaphragm, a common electrode disposed in opposition to said electrodes, and comminuted material interposed between said positive and negative electrodes and said common electrode, said positive and negative electrodes being wedge-shaped and having their smaller edges adjacent whereby the amount of resistance material is increased toward the adjacent edges of said electrodes.

12. In a telephone transmitter, the combination with a main diaphragm, of an electrode chamber having a flexible auxiliary diaphragm forming one wall thereof, comminuted conducting material in said chamber, positive and negative electrodes attached to said auxiliary diaphragm insulated from each other and making contact with the comminuted material in said chamber, a common electrode disposed in opposition to said positive and negative electrodes, the contact surfaces of said positive and negative electrodes flaring outwardly from the adjacent edges thereof toward a common electrode whereby the amount of resistance material is decreased toward the outer ends of said electrodes.

13. In a telephone transmitter, the combination with a front wall in which a mouth piece is disposed, of a flexible main diaphragm clamped to said wall, a bridge member secured to said wall, an electrode chamber supported by said bridge member and disposed in an offset portion thereof, said chamber consisting of a cup portion secured to the bridge, a clamping ring threaded in said cup, a common electrode clamped in said cup by means of said clamping ring, a separating ring, and a flexible diaphragm clamped between said separating ring and a flange on said clamping ring, positive and negative electrodes mounted side by side on the auxiliary diaphragm and insulated from each other, comminuted material in said chamber interposed between said positive and negative electrodes and said common electrode, and means for mechanically connecting said main and said auxiliary diaphragms, said positive and negative electrodes being wedge-shaped with their smaller edges adjacent whereby the amount of resistance material interposed between said electrodes and said common electrode will decrease toward the outer edges of said electrodes.

In witness whereof, I hereunto subscribe my name this 2nd day of Nov. A. D., 1906.

MERRITT S. CONNER.

Witnesses:

H. C. SLEMIN,

F. W. KING.