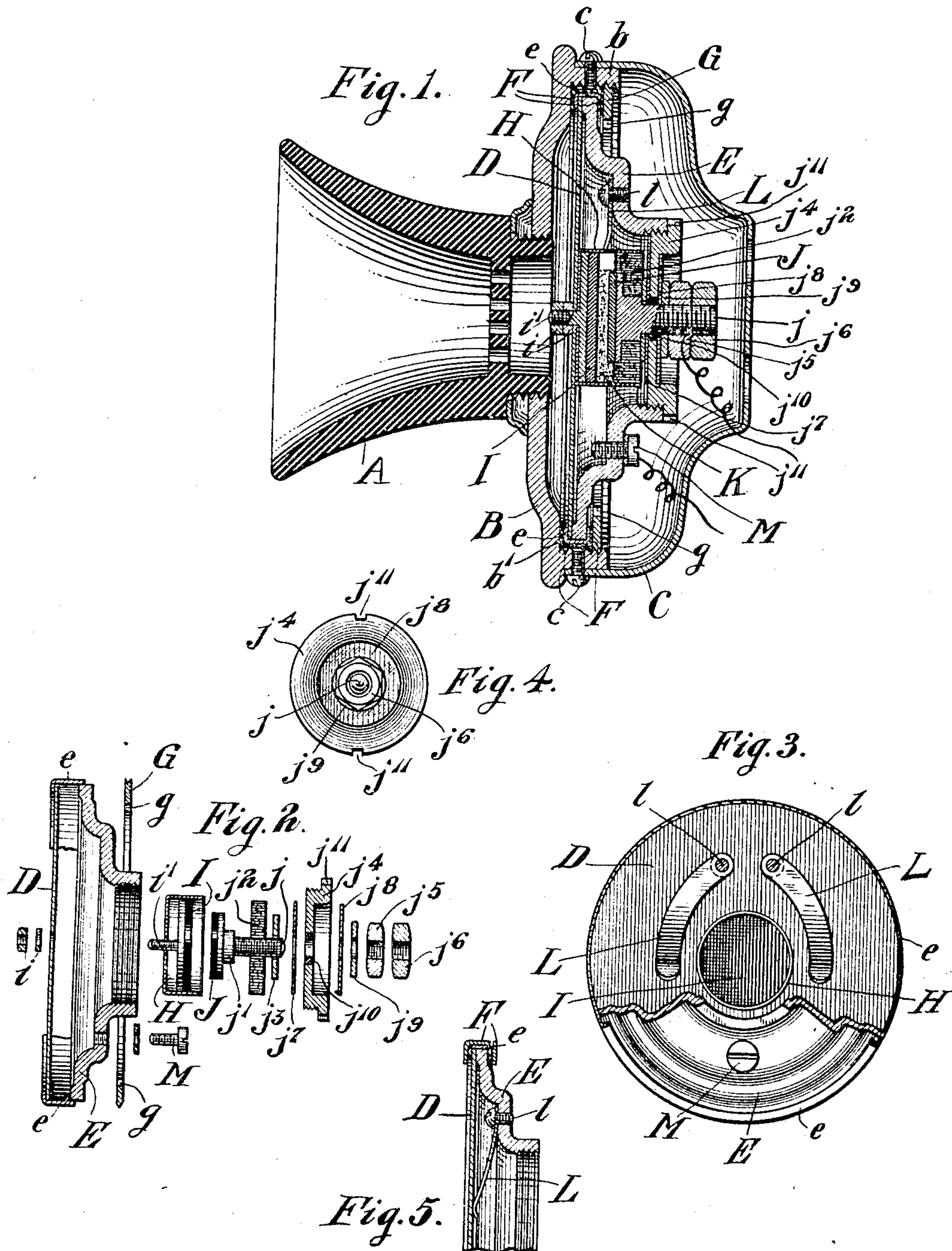


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PATENTED MAY 1, 1906.

M. SETTER.
TELEPHONE TRANSMITTER.
APPLICATION FILED OCT. 31, 1904.



Witnesses.

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TELEPHONE-TRANSMITTER.

No. 819,084.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, MICHAEL SETTER, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a specification.

My invention relates to telephone-transmitters of that type in which the necessary variations in resistance of the talking-circuit are produced by the action of a vibratory diaphragm upon a mass of granular carbon interposed between a stationary back electrode and the vibratory front electrode.

Generally stated, the object of my invention is the provision of an improved and highly efficient telephone-transmitter of the foregoing general character; and a special object is to provide an improved construction of the means for inclosing the electrodes and granular carbon and of the means for adjustably supporting the stationary or back electrode; and another object is to provide an improved construction and arrangement whereby the diaphragm, the box or inclosure containing the electrodes and granular carbon, and the means for supporting the stationary back electrode may all be organized into a compact structure which is removable as a unit from the casing of the transmitter; and it is also an object, of course, to provide certain details and features of improvement tending to increase the general efficiency and serviceability of a telephone-transmitter of this particular character.

To the foregoing and other useful ends my invention consists in the matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a longitudinal section of a telephone-transmitter embodying the principles of my invention. Fig. 2 shows the different parts in a separate condition of the microphone device which is removable as a unit from the interior of the transmitter-casing. Fig. 3 is a broken detail view showing the arrangement of the damping-springs which bear against the inner surface of the diaphragm. Fig. 4 is a detail view of the adjustable member to which the rear or stationary electrode is secured. Fig. 5 is a detail sectional view of the edge or marginal portion of the diaphragm and cover-plate to which the same is secured.

As thus illustrated my improved transmitter comprises the usual mouthpiece A, a front plate B, having a threaded opening into which said mouthpiece is screwed, and a shell C, the said front plate and shell constituting the casing of the transmitter. The diaphragm D has its edge or marginal portions secured to the perimeter of a concave cover-plate E. This may be accomplished in any suitable manner, but preferably by means of a sheet-metal ring *e*, the same having its edge portions spun over, so as to clamp the diaphragm and cover-plate tightly together. As illustrated, the diaphragm and cover-plate, thus organized into a unitary structure, are insulated from the transmitter-casing by means of one or more layers of insulation F, the same being applied to the peripheral portions of the said structure.

The front plate B has its flange *b* internally threaded and adapted to be engaged by the threaded periphery of a clamping-ring G. It will be seen that this clamping-ring is so applied that it clamps the peripheral portions of the diaphragm and cover-plate tightly against the shoulder *b'*, formed on the interior of the front plate. Screws *c*, extending through the flange *b*, can be employed for securing the shell C to the front plate B. With the arrangement shown a sheet-metal cup H is provided for inclosing the front and back electrodes I and J. The said cup can be clamped tightly to the rear surface of the diaphragm by means of the nuts *i*, applied to the stem *i'* of said front electrode. In this connection it will be seen that the said front electrode may consist of a carbon disk secured to a disk of metal and that the said stem may be integral with the said metallic disk. In this way the said nuts or other fastening devices serve as the means for securing both the front electrode and the metal cup or inclosure to the back of the diaphragm. The rear or stationary electrode J is preferably of less diameter than the front electrode and may consist of a disk of carbon secured to a disk of metal. Thus constructed the said back electrode may be provided with a relatively large threaded stem *j*, which is integral with the said metallic disk. Preferably the said stem is provided with a shoulder *j'*. A ring of felt *j''* encircles the said stem *j* and is adapted to be clamped firmly against the back of the stationary electrode by means of

a washer or clamping-ring j^3 , it being observed that the front face of the said ring of felt or other suitable material is preferably flush with the joint between the carbon and metallic disks. Preferably the back electrode and its ring of felt or other suitable material are clamped to a rotary adjustable member j^4 . This can be accomplished by extending the stem j through the central opening of the said adjustable member j^4 and by then applying clamping and lock nuts j^5 and j^6 .

In order that the back electrode may be thoroughly insulated from the metal of the transmitter structure, mica washers j^7 and j^8 are interposed between the member j^4 and the metal washers j^3 and j^9 , while a ring of insulation j^{10} is provided in the central opening of the adjustable member j^4 . Thus constructed the back electrode is clamped firmly to and insulated from the rotary externally-threaded adjustable member j^4 , and the felt or other similar ring is clamped tightly to the back of said electrode. It will be understood, of course, that the said felt ring is of a diameter to fit snugly within the bore or interior of the cup H, so as to effectually seal or inclose the granular carbon and electrodes. It will be seen that the washer j^3 is of a size to bear against the shoulder j' . The threaded portion of the member j^4 is adapted to engage and screw into the internally-threaded central opening, with which the cover-plate E is provided. In other words, the member j^4 is not only an adjustable support for the rear electrode, whereby the distance between the two electrodes may be varied if such is necessary, but also serves as a closure for sealing the chamber provided between the opposing surfaces of the diaphragm and the concave cover-plate. The granular carbon K or other suitable comminuted material is interposed between the opposite faces or surfaces of the two electrodes. Damping-springs L, secured to the cover-plate by means of screws l , are adapted to bear upon the back of the diaphragm. In order that it may be readily adjusted, the rotary member j^4 can be provided with peripheral notches j^{11} . As the back electrode is insulated from the metal structure, while the front electrode is in electrical connection with the diaphragm and cover-plate, it is obvious that one circuit-wire can be attached to the binding-post M, while the other wire can be secured to the stem j . In order that it may be turned readily, the clamping-ring G can be provided with internal notches g . As a matter of compactness of structure the rotary member j^4 can be made with a concave or hollow outer surface adapted to partially, at least, contain the nuts of the threaded stem j .

The operation is as follows: The voice-vibrations are conducted through the mouth-piece and allowed to impinge upon the face

of the diaphragm. These vibrations are of course communicated to the front electrode and the metal cup, with the result that the well-understood effect is produced upon the granular carbon interposed between the two electrodes. This relative movement between the two electrodes is perfectly free in character, because the felt ring, although it fits the interior of the said cup, permits the latter to have the necessary slight but perfectly free sliding movement upon its periphery. Furthermore, the said felt ring is of course more or less flexible and can vibrate with the cup at its periphery. In use the action of the electrodes in this manner serves to vary the resistance of the circuit in which the transmitter is included and to thus effect an electrical transmission of the voice-vibrations in the well-known manner.

It will be seen that the granular carbon and electrodes are effectively inclosed without interfering with the necessary relative vibration of the two electrodes and that the arrangement for adjustably supporting the back electrode is of an effective and efficient character. The back electrode and the rotary member by which it is supported can be removed at will without removing any other portion of the transmitter than the shell C. Also by removing the said shell and the clamping-ring G the diaphragm and cover-plate and electrodes and granular carbon can be removed as a unit from the casing of the transmitter. This arrangement obviously facilitates the substitution and repair of the different parts and renders the transmitter serviceable and reliable in use. Again, the cost of manufacturing a transmitter of the foregoing character is comparatively small.

With the construction shown the cover-plate E serves as the bridge or support for the back electrode and also as the means for effectually sealing or inclosing the box containing the granular carbon.

Obviously the sheet-metal binding e constitutes a means for binding or securing together the peripheral portions of the diaphragm and cover-plate, and the two when fastened together cannot be separated—that is, except by ripping off the said sheet-metal binding. With this arrangement it is desirable that the central opening in the cover-plate be large enough to permit the ready removal of the carbon-holder H. In other words, the opening in the back of the unit composed of the diaphragm and cover-plate is large enough to permit the ready removal of the two electrodes and granular carbon and vibratory cup or carbon-holder.

What I claim as my invention is—

1. A telephone-transmitter comprising a casing, a diaphragm, a support secured to the diaphragm, a vibratory front electrode secured to the diaphragm, a stationary back electrode secured to the said support, granu-

lar carbon between said electrodes, and means for holding or inclosing the granular carbon, the said diaphragm, support, electrodes, carbon-holding means and granular carbon being inclosed within said casing, and the same being organized into a structure which is removable as a unit from the interior of said casing the means for holding or inclosing the granular carbon being vibratory with the diaphragm and removable with the electrodes through an opening in the back of said unit.

2. A telephone-transmitter comprising a casing, a diaphragm, a vibratory front electrode, a stationary back electrode, granular carbon between the two electrodes, means for holding or inclosing the granular carbon, together with a cover-plate upon which said back electrode is mounted, the said diaphragm, electrodes, cover-plate, carbon-holding means and granular carbon being organized into a structure which is removable as a unit from the interior of said casing the means for holding or inclosing the granular carbon being vibratory with the diaphragm and removable with the electrodes through an opening in the back of said unit.

3. A telephone-transmitter comprising a casing, a diaphragm, a cover-plate having its perimeter secured to the edge of said diaphragm, a vibratory front electrode secured to the diaphragm, a stationary back electrode mounted in and removable through an opening in the center of said cover-plate, and granular carbon between the two electrodes, said operative elements being removable as a unit from the interior of said casing together with a vibratory carbon-holder adapted for removal through the said opening.

4. A telephone-transmitter comprising a diaphragm, a concave cover-plate having its perimeter secured to the marginal portions of said diaphragm, said cover-plate being provided with a central opening, a vibratory front electrode secured to the diaphragm, a stationary back electrode mounted in and removable through the said opening in the cover-plate, and granular carbon between the two electrodes together with a vibratory carbon-holder adapted for removal through the said opening.

5. A telephone-transmitter comprising a diaphragm, a concave cover-plate having its perimeter held in engagement with the marginal portions of said diaphragm, said cover-plate having a central opening through which access may be had to the fully-inclosed space provided between the diaphragm and cover-plate, a closure for said opening, a vibratory front electrode secured to the diaphragm, a stationary back electrode removably secured to said closure, and granular carbon between the two electrodes together with a vibratory carbon-holder adapted for removal through the said opening.

6. A telephone-transmitter comprising a diaphragm, a sheet-metal binding, a concave cover-plate having its perimeter held in engagement with the marginal portions of the diaphragm by the sheet-metal binding, a vibratory front electrode carried by the diaphragm, a stationary back electrode carried by the said cover-plate, granular carbon between the two electrodes, a casing provided with a shoulder, and a clamping-ring for clamping the marginal portions of the cover-plate and diaphragm against the said shoulder.

7. A telephone-transmitter comprising a diaphragm, a support bridging the back of the diaphragm, a vibratory front electrode secured to the diaphragm, a stationary back electrode mounted in and removable from the transmitter through an opening in the center of said support, and granular carbon between the two electrodes together with a vibratory carbon-holder adapted for removal through the said opening.

8. A telephone-transmitter comprising a diaphragm, a sheet-metal binding, a concave cover-plate having its perimeter secured to the marginal portions of said diaphragm by the sheet-metal binding, a casing providing a chamber from which the said diaphragm and cover-plate are removable as a unit, and a resistance-bearing device within the fully-inclosed space provided between the diaphragm and cover-plate.

9. A telephone-transmitter comprising a diaphragm, a support bridging the back of the diaphragm, a sheet-metal cup, a vibratory front electrode clamping the bottom wall of said cup to the back of said diaphragm, a stationary back electrode provided with a shoulder, a ring of soft fibrous material encircling the rear portion of said back electrode and closing the mouth of said cup, granular carbon between the two electrodes, screw-threaded means for clamping the said ring against the shoulder on the said back electrode, and means for removably mounting said back electrode in the said support.

10. A telephone-transmitter comprising a front plate, a diaphragm, a vibratory metal cup, a vibratory front electrode secured to the back of said diaphragm, a concave cover-plate having its perimeter held in engagement with the marginal portions of said diaphragm, and with said front plate, the said front electrode being electrically connected with said cover-plate through the medium of said diaphragm, a stationary back electrode removably mounted in the central portion of said cover-plate but insulated therefrom, said cover-plate being provided at its center with an opening through which the cup and both electrodes are removable from the chamber provided between the diaphragm and cover-plate, whereby the cup and elec-

trodes can be removed without separating the front and cover plates.

11. A telephone-transmitter comprising a front plate, a mouthpiece removably secured to the center of said front plate, a shell removably secured to the periphery of said front plate, a diaphragm, a support secured to and bridging the back of the diaphragm, a vibratory front electrode secured to the diaphragm, a stationary back electrode carried by the said support, and granular carbon between the two electrodes, said diaphragm, support, electrodes, and granular carbon being organized into a structure which is removable as a unit from the chamber provided by the said front plate and shell together with a vibratory carbon-holder adapted for removal through the said opening.

12. A telephone-transmitter comprising a diaphragm, a concave cover-plate having its perimeter secured to the marginal portions of said diaphragm, a casing, means for insulating the diaphragm and cover-plate from the casing, a vibratory front electrode secured to the diaphragm, a stationary back electrode removably mounted in said cover-plate, granular carbon interposed between the two electrodes, damping-springs secured to the cover-plate and bearing against the back of the diaphragm, and a clamping-ring for holding the unit-like structure comprising the

diaphragm and cover-plate against the said casing.

13. A telephone-transmitter comprising a diaphragm, a sheet-metal binding, a concave cover-plate having its perimeter held against the marginal portions of said diaphragm by the sheet-metal binding, a resistance-bearing device connected between the diaphragm and cover-plate and inclosed within the chamber between the same, and one or more damping-springs secured to the inner surface of the cover-plate and bearing against the said diaphragm.

14. A telephone-transmitter comprising a diaphragm, a concave cover-plate covering the back of said diaphragm, said plate having an internally-threaded central opening, a vibratory front electrode carried by the diaphragm, a peripherally-threaded closure screwed into said opening and cover-plate, a stationary back electrode removably secured to said closure, and granular carbon between the two electrodes together with a vibratory carbon-holder adapted for removal through the said opening.

Signed by me at Chicago, Cook county, Illinois, this 25th day of October, 1904.

MICHAEL SETTER.

Witnesses:

A. E. KEITH,
R. C. GIFFORD.