

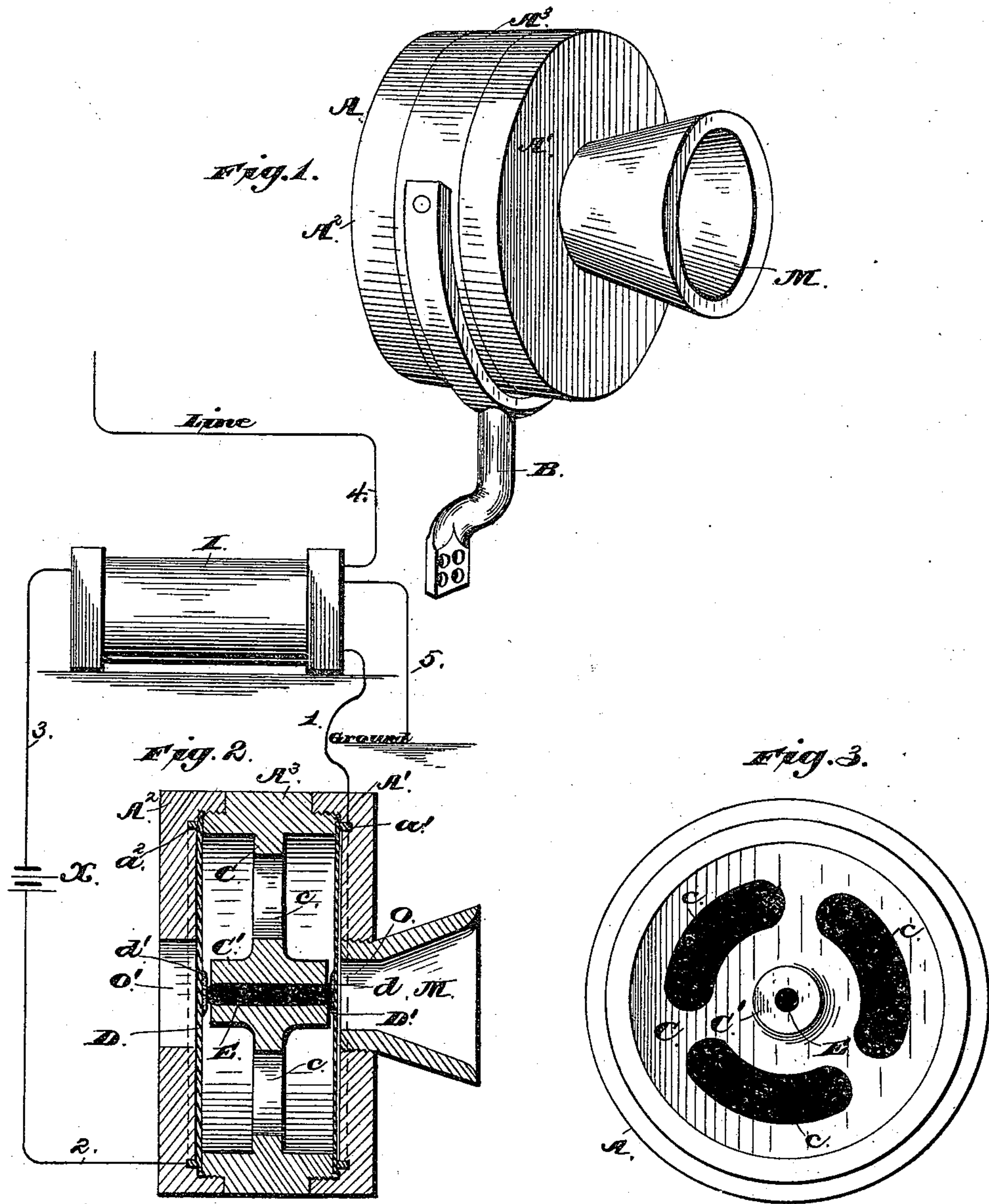
(No Model.)

2 Sheets—Sheet 1.

J. P. FREEMAN.
TELEPHONE TRANSMITTER.

No. 356,034.

Patented Jan. 11, 1887.



Witnesses:

L. Seward Bacon

Inventor:
James P. Freeman.

By *Emmatt*
Atty.

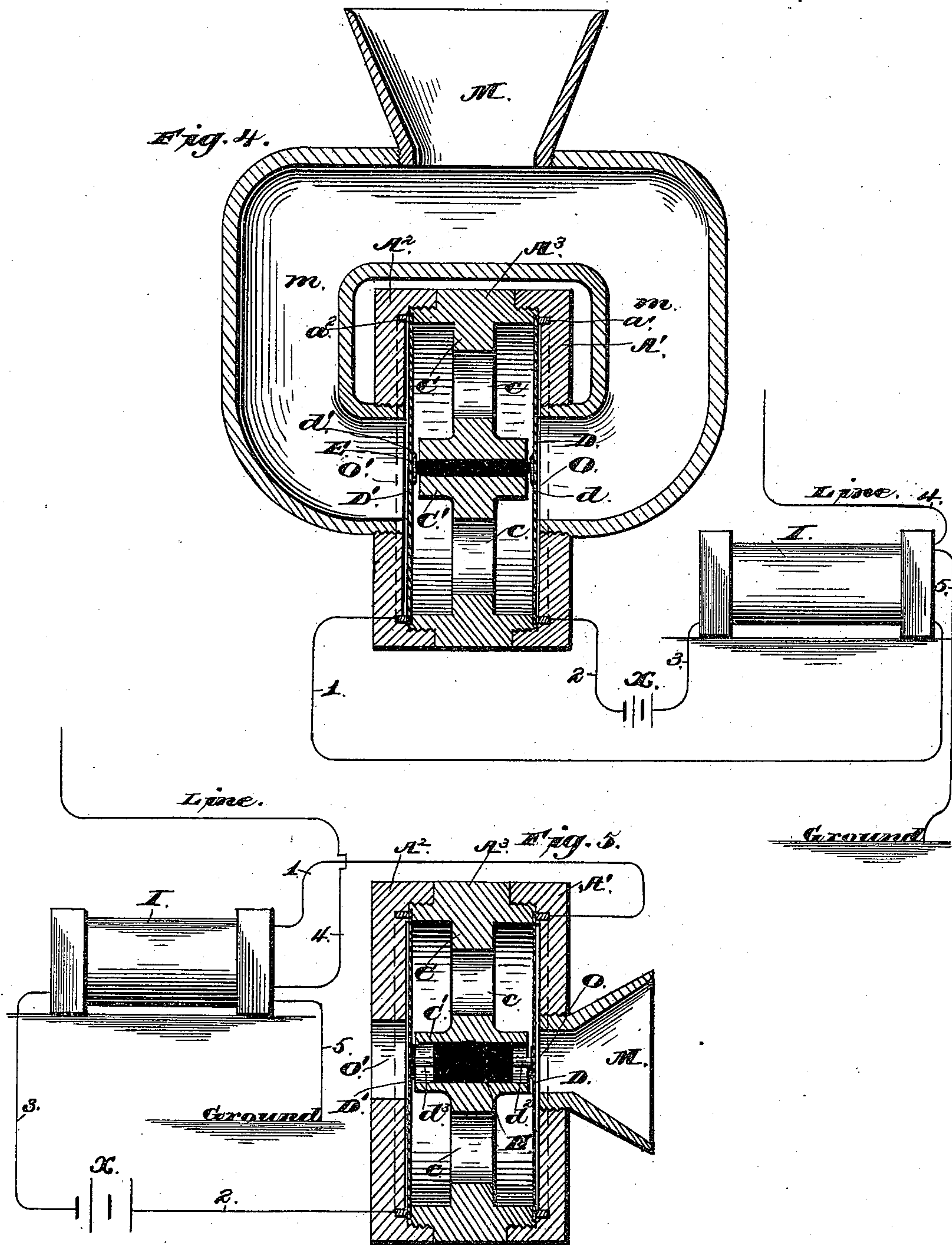
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UNITED STATES PATENT OFFICE.

JAMES P. FREEMAN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO
SAMUEL M. BRYAN, OF WASHINGTON, DISTRICT OF COLUMBIA.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 356,034, dated January 11, 1887.

Application filed August 21, 1886. Serial No. 211,517. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. FREEMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Telephone-Transmitters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to telephone-transmitters; and it consists in the construction and arrangement of the parts, which will be more fully hereinafter described, and pointed out in the claims.

It has long been known that sounds of all kinds are produced by vibration, and that when these vibrations are communicated to an elastic medium—such as the atmosphere—they alternately cause expansions and contractions of its particles, which may be in turn communicated to other elastic bodies upon which the vibrations impinge.

The essential feature of my invention, which is based on these well-known facts, is the construction of a novel apparatus for transmitting articulate speech, sounds, or signals through an electric circuit embracing a carbon rod in constant contact with two diaphragms to both diaphragms at one and the same time by an equal diffusion of the said waves of sound produced by the human voice or otherwise from one point between the said diaphragms, or one of said diaphragms receiving the sound-waves direct and the other diaphragm receiving said sound-waves by the elastic transmission of the atmosphere on the opposite side of the instrument to that to which is spoken directly.

My invention has for one of its objects the more perfect transmission of articulate sounds or speech over telegraphic circuits by means of an improved transmitting apparatus, the two diaphragms of which are acted upon by the sonorous vibrations traversing the atmosphere in such manner as to produce the necessary corresponding vibrations in strength in the electric circuit, which vibrations are reproduced at the receiving-station by means well known in the art.

A further object of my invention is to provide a transmitting-instrument which is so mechanically constructed as to remain in continual contact, needing no further adjustment other than that attained when the instrument is first put together, and, further, to provide a closed air-chamber between the two diaphragms, so as to render their operation more positive and effective, and whereby the adjustment of the instrument is unaffected by transportation and is ready for use.

A still further object of my invention is to provide a telephonic transmitting-instrument in which the use of metal is entirely dispensed with, thus avoiding the musical and other metallic sounds so commonly prevalent in transmitters having a metallic construction.

A still further object of my invention is to provide a telephonic transmitter with two removable heads, the inner peripheries of which impinge against the outer edges of the diaphragms, retaining them rigidly at these points, and only allowing the central portions thereof to vibrate, whereby more perfect reproduction of sound is produced in the receiving-instrument than has heretofore been attained.

A still further object of my invention is to secure an apparatus for the telephonic transmission of speech of extreme simplicity and efficiency, well adapted for use in connection with any of the well-known forms of receiving-telephones, and has been practically demonstrated to be specially useful on lines which are subject to inductive interference from adjacent telegraphic conductors upon the same supports or in the same cable.

I attain these objects by the construction of transmitters illustrated in the accompanying drawings, wherein like letters of reference indicate similar parts in the several views, and in which—

Figure 1 is a perspective view of my improved telephone-transmitter, showing the means for setting it up. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a front elevation with one of the heads removed. Fig. 4 is a transverse vertical section illustrating a modified form of speaking orifice or tube. Fig. 5 is a transverse vertical section of a modified form of my invention.

A indicates the casing, formed of hard rubber or other suitable material, which is supported by a suitable arm, B, which may be secured in any well-known manner. The casing A is formed with two heads, A' A², and a central main body portion, A³. This central body portion, A³, has a web, C, in the central portion thereof, formed of the same material as the said body portion and integral therewith. A rigid sleeve, C', is formed with the central portion of the web C, which extends outwardly from each side of said web, in which a carbon rod or pencil, E, is removably mounted. The caps A' and A² are screwed down on the screw-threaded portions of A³. The web C is formed with a series of openings, *c c c*, which act to preserve the air-chamber between the two diaphragms D and D' by uniting the two apartments on each side of the said web C. The induction-coil I may be situated in any suitable, convenient, and accessible manner, and the battery X is set up by the usual well-known means.

In Fig. 4 I have illustrated a modified form of mouth-piece or speaking-tube, M, and in this instance the mouth-piece M has two branches, *m m*, which extend down and around the casing A, and inclose each of the orifices O and O', leading to the two diaphragms D and D', respectively. By this means the sound-waves are divided and strike or impinge against the said diaphragms with equal intensity.

In Fig. 5 a further modification is illustrated, wherein the carbon rod E is made of larger diameter than heretofore described, but of less longitudinal extent. The contact-points *d d'* on the diaphragms D D' are replaced by small platinum-tipped rods or wires *d²* and *d³*, which engage with the enlarged carbon rod E in a manner similar to the form heretofore described. In this instance the aperture in the collar C' of the web C is made of greater diameter to receive the enlarged carbon rod E.

In connecting up my transmitter one of the primary wires, 1, runs from the diaphragm D' to the induction-coil I, while the other primary wire, 2, runs from the diaphragm D to one pole of the battery X, the circuit being continued by wire 3, connecting with the opposite pole of said battery, and running to the induction-coil. This circuit forms the primary circuit, the wire 3 being merely a continuation of the wire 2. The secondary circuit is formed by the two secondary wires 4 and 5, which run to line and ground, respectively, which will be readily understood by those skilled in the art.

When speaking to my transmitter, as shown in Fig. 1, the diaphragm D receives the sound-waves directly through the mouth-piece M, which connects with the orifice O. That portion of the sound-waves which passes into the air is conducted by the elastic transmission to the diaphragm D' through the orifice O', as the transmitter is so suspended as to allow the

said sound-waves to impinge against both diaphragms. The diaphragms then buckle inward, increasing the contact between the same and the carbon rod E, causing a variation in the primary circuit by the central vibrations of the diaphragms passing out to line and to the receiving-stations, as heretofore described. The degree of vibration is controlled by the intensity of impingement of the sound-waves against either one or both of the diaphragms, and when the transmitter is constructed as shown in Fig. 4 the sound-waves will impinge the said diaphragms with equal intensity, and consequently the diaphragms act conjointly and reproduce double the volume of loudness at the receiving-station than would be accomplished by the use of a single diaphragm.

The wires 1 and 2 of the primary circuit connect with the metallic rings *a'* and *a²* in the cap-pieces A' and A², and, the diaphragms D and D' resting in continual contact with the said rings, the current is equally diffused over the surface of the said diaphragms, and the vibrations or pulsatory movement thereof in a re-enforced condition by the action of both diaphragms more or less conjointly reproduces an increased variation in the primary circuit which passes out to line and to the receiving-station.

The advantage obtained by the confinement of the edges of the diaphragms, is that the said diaphragms are caused to vibrate in their central portions only and cause a concentration of said vibrations, and preventing their injury by the movement of the peripheries of the diaphragms. By this means the instrument is rendered more sensitive and delicate, resulting in an increased degree of clearness of the transmitted sound.

It is obvious that many details in the construction and arrangement of the parts could be made and substituted for those shown and described without in the least departing from the nature and principle of my invention.

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

1. In a telephone-transmitter, the combination of a three-part casing rigidly suspended, two diaphragms securely held at their peripheral edges in said casing, and a carbon rod in continual contact with said diaphragms, substantially as described.

2. In a telephone-transmitter, the combination of a rigidly-suspended casing having two opposite sides free to receive the sound-waves, two diaphragms situated opposite to each other and rigidly confined at their peripheral edges, and a carbon rod in continual contact with said diaphragms, substantially as described.

3. In a telephone-transmitter, the combination of a three-part casing, a divisional perforated web formed integral with the inner central portion, a sleeve formed with the cen-

tral portion of said web, and a carbon rod in continual contact with two diaphragms mounted therein, substantially as described.

4. In a telephone-transmitter, the combination of a three-part casing rigidly confining two diaphragms at their peripheral edges, a carbon rod in continual contact with the diaphragms, metallic rings upon which the diaphragms rest, and the electrical connections, substantially as described.

5. In a telephone-transmitter, the combination, with a three-part rigidly-suspended casing having double orifices, of two diaphragms adjacent to said orifices rigidly held at their peripheral edges, a carbon rod in continual contact with said diaphragms, and the electrical connections, substantially as described.

6. In a telephone-transmitter, the combination, with a three-part casing rigidly suspended, of one or more mouth-pieces or tubes connecting with the orifices, two diaphragms mounted adjacent to said orifices, a carbon

engaging with the said diaphragms by continual contact, and the electrical connections, substantially as described.

7. In a telephone-transmitter, the combination of the casing A, having three parts, A', A², and A³, two diaphragms, D and D', mounted in the parts A' and A², a web, C, formed integral with the inner central portion of the part A³, a sleeve, C', formed at the central part of the said web C, a carbon rod, E, mounted in said sleeve, platinum contacts d and d', mounted in the central portions of the diaphragms in continual contact with both ends of the carbon rod, and electrical connections, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES P. FREEMAN.

Witnesses:

CHARLES S. HYER,
TOM R. STUART.