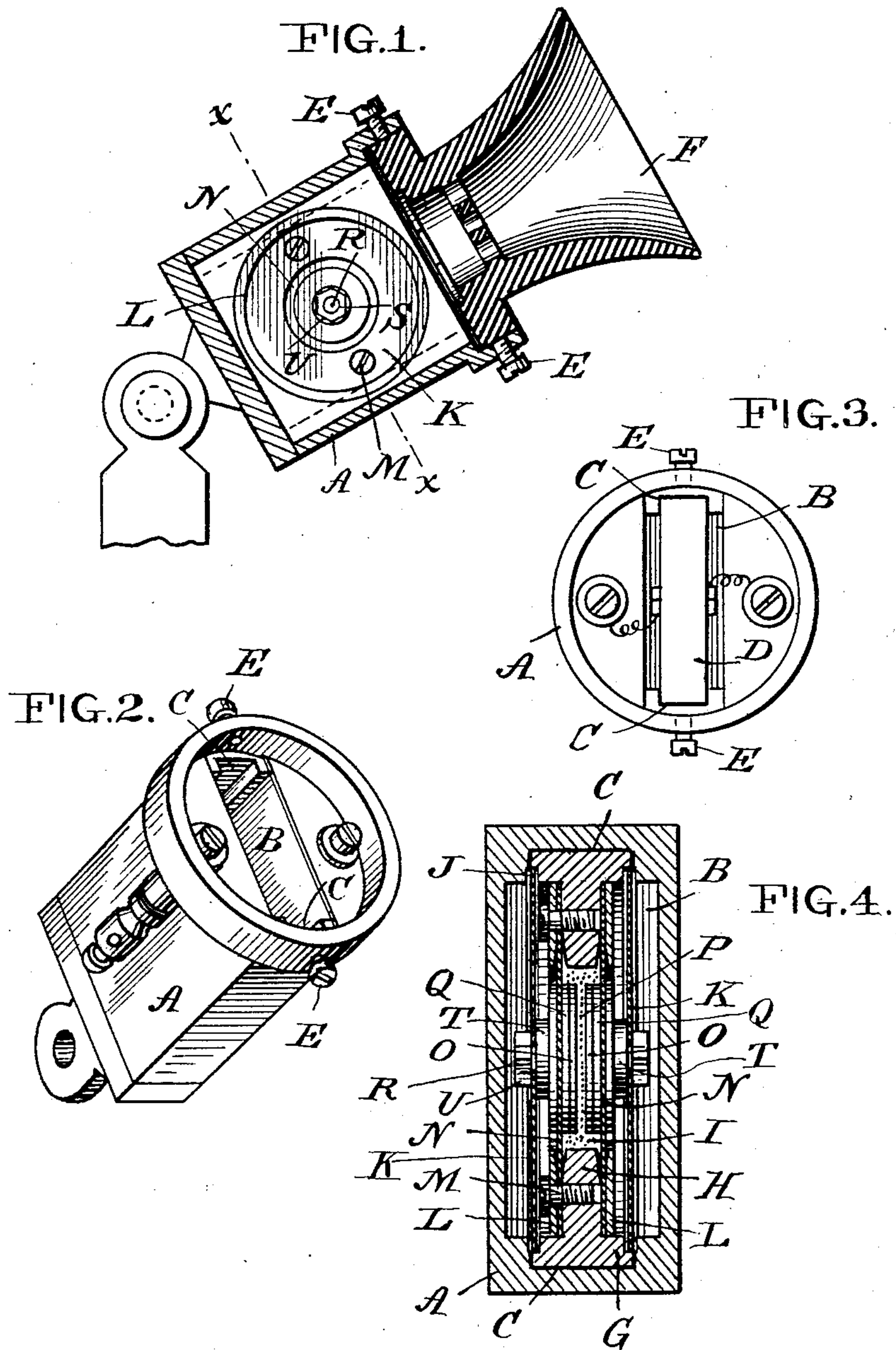


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E. B. FAHNESTOCK.  
TELEPHONE TRANSMITTER.  
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NO MODEL.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 750,835, dated February 2, 1904.

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*To all whom it may concern:*

Be it known that I, ERNEST B. FAHNESTOCK, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Telephone-Transmitters, of which the following is a specification.

My invention relates to telephone-transmitters of the type which make use of a microphone; and it consists, first, in providing the transmitter-case with a sound-chamber and locating in said sound-chamber a microphone so arranged as to be readily removed for inspection and repair; second, so locating the microphone relative to the sound-chamber that the diaphragms of the microphone shall be correspondingly acted upon by sound-waves; third, so arranging the diaphragms relative to the supporting-body of the microphone that they will be free to vibrate at their periphery and the sound-waves impinge only upon the outer surface of the diaphragms; fourth, in providing the microphone with two sound-diaphragms of relatively much greater diameter than the chamber which contains the granular carbon of the microphone; fifth, so arranging the sound-diaphragms that they shall be supported by the microphone independent of the transmitter-case and in such manner that they will transmit their motion to secondary diaphragms of much smaller size which form the covers of the chamber containing the electrodes and carbon of the microphone.

The general object of my invention is to improve the construction of telephone-transmitters.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a longitudinal section through the mouthpiece and transmitter-case, showing the microphone and support for the case in elevation. Fig. 2 is a perspective view of the transmitter-case, showing the sound-chamber. Fig. 3 is an end view of the transmitter-case and microphone, showing the microphone in position in the case. Fig. 4 is a transverse section taken on the line X X of Fig. 1 and illustrates the construction of the microphone and its relation to the sound-chamber.

In the drawings, A represents the transmitter-case, which may be given any convenient shape. The interior of the case has formed within it a sound-chamber B, which is shown as oblong in shape and provided with slotted ends C for receiving and defining the position of the microphone. I do not limit myself in any wise to the particular shape shown for the sound-chamber, as very many shapes may be given to such chamber.

D represents the microphone; E, screws for securing the microphone in position; F, mouthpiece of the usual type. The microphone consists of the metallic annulus G, provided with the inwardly-projecting flange H, the inner periphery of which forms the sides of the carbon-chamber I. Located in recesses J on each side of the annulus G are the sound-diaphragms K, made of mica or other suitable material and preferably so arranged relative to the annulus G that the inner surface of the periphery of such diaphragms will be in contact with or situated slightly in front of the bottom of the recesses J, the object of which arrangement is to permit free vibration of the diaphragms at their periphery and to practically prevent the ingress of the sound-waves behind the diaphragms. In practice I have found if the sound-waves are allowed to impinge only upon the external surface of the diaphragms and the diaphragms arranged to vibrate freely, owing to their not being secured at their periphery, that the microphonic effects will be largely increased.

Secured on each side of the flange H by means of the rings L and screws M are the secondary diaphragms N, made of mica or other suitable material and which form the covers of the carbon-chamber I.

Situated within the carbon-chamber I are the carbon electrodes O O and between them, as is usual in microphone constructions, a body of granular carbon P. The carbon electrodes O O are secured to metallic plates Q.

Secured to the metallic plates Q and passing through the secondary diaphragms N are the bolts R, screw-threaded on their outer ends S. These bolts also pass through the center of the sound-diaphragms K.

Situated between the sound-diaphragms and



the secondary diaphragms and over the bolts R are metallic washers T, and outside of the sound-diaphragms K and over the bolts R are the nuts U. By adjusting the nuts U upon the bolts R the distance between the sound-diaphragms and the flexible covers may be altered, as also the characteristic note of the diaphragms. It will be understood that when the nuts U are screwed down tight the distance between the sound-diaphragms and the flexible covers will be decreased and the pitch of the characteristic note of the diaphragms increased. By releasing the nuts U the area of contact between the washers T and the sound-diaphragms will be decreased, and as the characteristic note of the diaphragms depends upon such area of contact such note will be decreased. Further, by increasing the pressure exerted by the nuts U upon the sound-diaphragms they are brought nearer to their seats and into a position where the sound-waves from without the instrument will only impinge upon the outer face of the diaphragms—a condition which in practice has been found to materially increase the amplitude of the vibrations, or, in other words, the loudness of the sounds transmitted.

By reason of the construction described large sound-diaphragms are obtained with relatively a very small carbon-chamber. In practice this construction has been found to be of advantage, as by reason of the large size of the sound-diaphragms the required vocal note is obtained and by reason of the small size of the carbon-chamber packing and settling of the carbon within the chamber is avoided.

In operation the sound-waves enter the sound-chamber and impinge upon the outer face of the sound-diaphragms on each side of the microphone. The to-and-fro motion of these diaphragms is transmitted through the bolts R to the secondary diaphragms and the electrodes secured within the carbon-chamber. As the pressure of the electrodes upon the granular carbon is varied the resistance of the instrument is altered, thereby producing the well-known telephonic results common to microphones.

Having thus described my invention, I claim—

1. A telephone-transmitter comprising a case having an open sound-chamber, and a self-contained removable microphone therein capable of acting as a sound-transmitter independently of the case, said microphone embodying in its construction a supporting-body, and a sound-diaphragm which is free to vibrate at its periphery uninfluenced by tension or pressure and having its periphery located in such near relation to the supporting-body that sound-waves will only impinge upon the exterior surface of the diaphragm.

2. A telephone-transmitter comprising a

transmitter-case having a sound-chamber, and a removable microphone, which in construction is entirely independent of the case, provided with a carbon-chamber and two sound-diaphragms, located in said case.

3. A telephone-transmitter comprising a transmitter-case having a sound-chamber, a removable microphone provided with a carbon-chamber, two oppositely-disposed electrodes within the carbon-chamber, carbon between said electrodes, flexible covers for said carbon-chamber, two sound-diaphragms of relatively larger size than the flexible covers located on opposite sides of the carbon-chamber, and means interposed between the electrodes and sound-diaphragms, whereby the vibrations of the sound-diaphragms will be communicated to the electrodes.

4. A telephone-transmitter, comprising a transmitter-case having a substantially oblong sound-chamber with its forward end open toward the mouthpiece of the instrument, and a microphone carrying two sound-diaphragms located in but independent of said chamber and in such manner that sound-waves may impinge on each side of the microphone.

5. A telephone-transmitter comprising a transmitter-case having a sound-chamber with parallel sides and parallel top and bottom, and said top and bottom slotted, a removable microphone carrying its sound-diaphragms adapted to be received in said slots, whereby a space is provided between the sides of the sound-chamber and the sound-diaphragms of the microphone.

6. In a telephone-transmitter, a microphone, comprising an annulus with an inwardly-projecting flange, a pair of flexible disk covers secured at their outer edges to said flange, a pair of sound-diaphragms secured at their center to said flexible disk covers, electrodes mounted on the inner side of said flexible disk covers, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the electrodes.

7. A telephone-transmitter comprising a case having a sound-chamber open at one end, and a microphone, which in construction is entirely self-contained and capable of acting as a sound-transmitter independently of the case, provided with two sound-diaphragms, said microphone arranged centrally of said sound-chamber and in such manner that one end of the microphone will be presented to the opening in the sound-chamber.

8. A telephone-transmitter comprising a transmitter-case having a sound-chamber, a microphone consisting of a supporting-body, a carbon-chamber within said body, flexible covers for said carbon-chamber, oppositely-disposed electrodes within the carbon-chamber, carbon between the electrodes, and oppositely-disposed diaphragms mounted at their



centers upon the flexible covers, free to vibrate at their periphery and bearing at their periphery upon the supporting-body.

9. In a telephone-transmitter, a microphone, 5 comprising an annulus having a recess on each face, a pair of sound-diaphragms located in said recesses, said annulus also provided with an inwardly-projecting flange, a pair of flexible disk covers secured at their outer edges to said 10 flange, a pair of electrodes mounted on the inner side of said flexible disks, and means introduced between said sound-diaphragms and electrodes, whereby the motion of the sound-diaphragms will be communicated to the elec- 15 trodes.

10. In a telephone-transmitter, a microphone wholly self-contained and capable of acting as a sound-transmitter, said microphone comprising in its construction a supporting- 20 body, and a sound-diaphragm supported upon a flexible base, said diaphragm free to vibrate at its periphery uninfluenced by tension or pressure and having its periphery in such near relation to the supporting-body that sound- 25 waves will only impinge upon the exterior surface of the diaphragm.

11. In a telephone-transmitter, a microphone wholly self-contained and capable of acting as a sound-transmitter, said microphone 30 comprising in its construction a supporting-body, and a sound-diaphragm supported at its center upon a flexible base, said diaphragm free to vibrate at its periphery uninfluenced by tension or pressure and having its periph- 35 ery in such near relation to the supporting-body that sound-waves will only impinge upon the exterior surface of the diaphragm.

12. In a telephone-transmitter, a self-contained microphone, comprising a supporting- 40 body, a carbon-chamber, flexible covers for said carbon-chamber, electrodes connected to said covers, carbon between said electrodes, diaphragms located on opposite sides of the carbon-chamber, connected at their centers to 45 said flexible covers, free to vibrate at their periphery and bearing such near relation to the support that sound-waves will only impinge upon their outer surface.

13. In a telephone-transmitter, the combination with a support provided with a sound- 50 chamber and having grooves in the top and bottom of said chamber, of an independent and removable microphone adapted to be inserted into said grooves in said sound-chamber and 55 have its position therein defined thereby.

14. In a telephone-transmitter, a transmitter-case with its sides and ends substantially parallel and provided with a sound-chamber, a mouthpiece connected to one end of said 60 sound-chamber, and a self-contained removable microphone carrying its own sound-diaphragms, located within the sound-chamber.

15. In a telephone-transmitter, a transmitter-case with its sides and ends substantially 65 parallel and provided with a sound-chamber,

and a removable microphone which corresponds in shape with that of the sound-chamber and carrying its own diaphragms and located in such sound-chamber in such manner that the sound-waves will impinge on the outer 70 side of each diaphragm only.

16. A telephone-transmitter comprising a transmitter-case having a sound-chamber, a microphone consisting of a supporting-body, a carbon-chamber within said body, flexible 75 covers for said carbon-chamber, oppositely-disposed electrodes within the carbon-chamber, carbon between the electrodes, oppositely-disposed diaphragms mounted at their center and adjustable toward or from said support- 80 ing-body, free to vibrate at their periphery and bearing such near relation to the supporting-body that the sound-waves will impinge only on the outer side of such diaphragms.

17. In a telephone-transmitter, a micro- 85 phone wholly self-contained and capable of acting as a sound-transmitter, said microphone comprising in its construction a supporting-body, a carbon-chamber, electrodes in said carbon-chamber, granular carbon between the 90 electrodes, a flexible cover for said carbon-chamber, a diaphragm mounted at its center upon said flexible cover, said diaphragm free to vibrate at its periphery uninfluenced by tension or pressure and having its periphery 95 in such near relation to the supporting-body that sound-waves will only impinge upon the outer surface of the diaphragm.

18. In a telephone-transmitter, a microphone wholly self-contained and capable of act- 100 ing as a sound-transmitter, said microphone comprising in its construction a supporting-body, a carbon-chamber, electrodes in said carbon-chamber, granular carbon between the electrodes, a flexible cover for said carbon- 105 chamber, a sound-diaphragm mounted at its center upon said flexible cover, adjustable relative to the supporting-body, free to vibrate at its periphery uninfluenced by tension or pressure, and bearing such near relation to 110 the supporting-body that such diaphragm will in any position receive the impact of the sound-waves only upon its exterior surface.

19. In a telephone-transmitter, the combination with a support provided with a sound- 115 chamber open at one end, a detachable mouthpiece, and a microphone which is wholly self-contained and which will act as a sound-transmitter when removed from said case and which is provided with a diaphragm having such re- 120 lation to the body of the microphone that when the microphone is out of the case sound-waves cannot pass around behind the diaphragm.

20. In a telephone-transmitter, the combination of a support having a sound-chamber open 125 at one end, a microphone capable of acting as a sound-transmitter independently of the support, and having two oppositely-disposed sound-diaphragms, said microphone located centrally of said sound-chamber and with its 130



diaphragms so disposed as to leave sound-spaces between the faces of said diaphragms and the sides of the sound-chamber.

21. In a telephone-transmitter, the combination with a support provided with a sound-chamber open at one end, of an independent self-contained and removable microphone having two sound-faces.

22. A telephone-transmitter comprising a supporting-case, and a structurally-independent microphone embodying in its construction a supporting-body, a sound-diaphragm carried thereby, electrodes, and granular carbon between the electrodes, which form the operative parts of the microphone, said microphone having its diaphragm arranged to be capable of free vibration at its periphery uninfluenced by tension or pressure and only to be influenced by air-waves impinging upon its outer surface.

23. A telephone-transmitter comprising a supporting-case, having a sound-chamber open at one end, and a structurally-independent microphone comprising a supporting-body, a diaphragm, and a variable-resistance medium, said diaphragm mounted at its center and carried by the supporting-body and with its periphery so disposed relative to the supporting-body and the sound-chamber that it is free to vibrate uninfluenced by tension or pressure and will only be acted upon by air-waves impinging upon its outer surface.

24. As a new article of manufacture, a wholly self-contained and reversible micro-

phone, said microphone comprising a supporting-body, a pair of sound-diaphragms, a variable-resistance medium interposed between the diaphragms, said diaphragms so mounted upon and disposed relative to the body that they will be free to vibrate at their periphery uninfluenced by tension or pressure and having such relation to the supporting-body that they will be acted upon by air-waves impinging upon their outer surface only.

25. A telephone-transmitter comprising a wholly self-contained microphone device, which of itself is capable of transmitting sound, and a support therefor having such construction that a sound-receiving chamber will exist between it and the microphone structure.

26. In a telephone-transmitter, the combination with a support provided with a sound-chamber, of a structurally-independent microphone device removable from said support and capable when so removed of serving as an efficient sound-transmitting device.

27. A telephone-transmitter formed of two members structurally independent, one a support having a sound-chamber, and the other an independent self-contained and functionally-operative sound-transmitting microphone.

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

ERNEST B. FAHNESTOCK.

Witnesses:

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C. E. STECHER.