Examiner.

No. 824,159. PATENTED JUNE 26, 1906.

F. TREYER.

MICROPHONE.

APPLICATION FILED OCT. 3, 1905.

German Pat. 186,052
Austrian " 24761

Fig. 1.

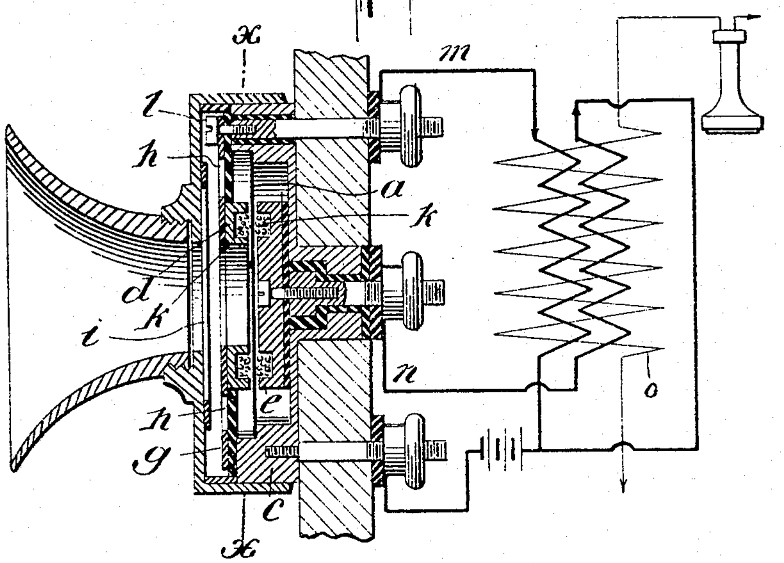


Fig. 2.

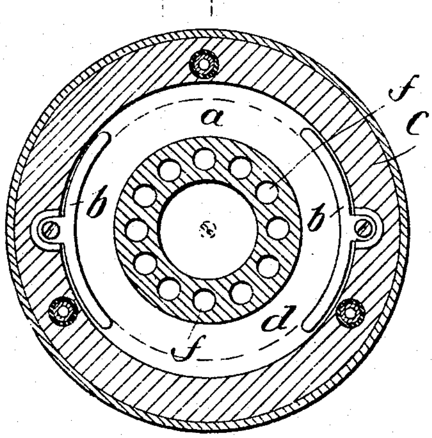
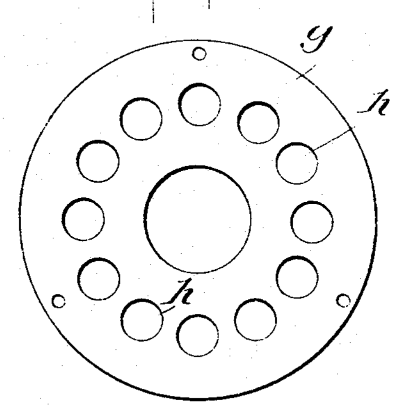


Fig. 3.



Lwata, 665,637, Teleph, Subf. 124.
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Acheson, 472,243, " "

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UNITED STATES PATENT OFFICE.

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MICROPHONE.

No. 824,159. Specification of Letters Patent. Patented June 26, 1906.

Application filed October 3, 1905. Serial No. 281,115.

To all whom it may concern:

Be it known that I, Franz Treÿer, a citizen of Austria-Hungary, and a resident of the Canton of Zurich, Switzerland, have invented certain new and useful Improvements in Microphones, of which the following is a specification.

The microphone of my invention is adapted for the purpose of equalizing, or rather of harmonizing, the variations on the two sides of the membrane or diaphragm for the purpose of producing more exact results in the transmission of sound. This result is accomplished mainly by utilizing the vibrations on both sides of the diaphragm and transmuting the two varying vibrations into a single compromised result, substantially uniform with the actual vibrations of the diaphragm. The particular feature by means of which these results are accomplished consists of the diaphragm supported between a carbon ring and a carbon disk, both provided with recesses adapted to be filled with granulated carbon to form the contact between the ring and the diaphragm on one side and between the disk and the diaphragm on the other side.

The drawings illustrate one form of my invention, and therein—

Figure 1 is a sectional view of the microphone, and Fig. 2 is a front sectional view on line *x x* of Fig. 1. Fig. 3 illustrates a detailed plan view of the support for the ring.

In the drawings, *a* is a diaphragm circular in shape, supported upon an interior shoulder of the recessed box *c* and retained in place by means of the circumferential springs *b*, Fig. 2, which clamp the diaphragm upon the recesses of the box *c* without interfering with its ability to vibrate freely. In the spaces between the edges of the box *c* and centrally located with regard to the diaphragm *a* a carbon disk *e* is fastened. This disk *e* is provided with cavities *f*, which are adapted to be filled with granulated carbon *k* in such a manner that the diaphragm *a* contacts with the carbon-grains. On the opposite or front side of the diaphragm *a* a carbon ring *d* is supported by the plate *g*, which is fastened to the box by means of the screws *l*. The inner surface of this ring *d* is also provided with recesses *f*, which are adapted to be filled with granulated carbon *k*, so as to contact with the front face of the diaphragm through the carbon-grains. The recesses of the ring *d* and the disk *e* and the disposition of the granulated carbon therein are alike on both sides of the diaphragm—that is, the recesses of the ring register with those of the disk. The plate *g* is perforated at *h*, Fig. 3, and these perforations prevent the plate *g* from vibrating. The plate *g*, although fastened to the box *c*, is insulated from it.

As is well known, variations in electrical resistance caused by the loose contacts of the microphone produce a change of intensity of current by reason of which sound is reproduced in telephones. My present invention involves the employment of such lose contacts on both sides of the diaphragm in the transmitter. The effect of such a construction, wherein the diaphragm makes contact both at its front face and at its rear face, as represented in the drawings just described, is that each vibration of the diaphragm results in an increased electrical resistance on the one side and with a simultaneous equivalent reduction of the electrical resistance on the other side. In the diaphragm the current is divided, one branch of the current passing through the loose carbon contacts in front of the diaphragm and the other branch passing through the loose contacts in the rear of the diaphragm. Consequently if the diaphragm exercises an increased pressure on the granulated carbon at the rear of the diaphragm there will be a resultant reduction of electrical resistance at that point, but at the same time there will be a corresponding increase in the electrical resistance at the front of the diaphragm, where there naturally is a decreased pressure on the carbon contacts. The reverse is true when the front contacts are under greater pressure, because then the rear contacts are relieved. It follows that the induction-coil, forming part of the microphone-circuit must have two sets of primary windings, the current in which flows in opposite directions. Upon these two primary windings is placed a secondary winding, upon which act the inducing actions of the two branches of the primary circuit. In this way a more exact and clearer result is obtained, due to the double action of the two branches of the current. These currents are clearly illustrated in the drawings, Fig. 1 showing that the current through the carbon-grains *k* in the ring *d* passes through the circuit *m*, the arrows in said circuit indicating the direction. The current on the opposite side of the diaphragm passes through the carbon-grains *k* and through the circuit and windings *n*. The secondary winding and the resultant current are indicated by the circuit *o*.

Of course in the construction of microphones of this invention it is important and essential that the loose contacts placed in front of the diaphragm should be made in such a manner that they shall not interfere with the free vibration of the diaphragm. Granulated carbon is therefore preferably placed in the ring or similar body having a central opening to permit sound-waves to reach the membrane without interference. In various constructions the form of opening or of the ring may be varied, the arrangement of openings and of recesses therein being the subject of choice by the particular manufacturer, nor is it essential that the ring and disk be made of carbon or that the loose parts of the contacts be made of granular carbon. Other material may be used; but the construction I have shown and described apparently produces the best results. The diaphragm may be either metallic or non-metallic, (though I prefer carbon,) and the contacts may be metallic or otherwise; but in any event the vibrations on both sides of the diaphragm are utilized to produce a clear and more accurate result and a louder reproduction of sound.

The microphone of this invention is readily distinguishable from those now in use by the extraordinary clearness of the reproduction of sound.

The disk *i*, (shown in Fig. 1 of the drawings,) consisting, for instance, of varnished linen or the like, prevents the moisture produced by speaking from reaching or affecting the granulated carbon in the contacts.

I claim as my invention—

1. A microphone comprising a vibratory diaphragm, a ring and a disk between which said diaphragm is arranged, an insulated support for said ring provided with antivibratory perforations; and loose contact material interposed between the diaphragm and said ring and disk.

2. A microphone comprising a vibratory diaphragm, two conducting members between which said diaphragm is mounted, loose contact material between the diaphragm and said conducting members, and a support on which the conducting member nearest to the speaking end of the microphone is mounted, said support being provided with antivibratory perforations.

3. A microphone comprising a vibratory diaphragm, two conducting members between which said diaphragm is arranged, said members being provided with recesses on their opposing faces, loose contact material located within said recesses and engaging the diaphragm, and a support for that conducting member which is nearest the speaking end of the microphone, said support being provided with antivibratory perforations.

4. A microphone comprising a vibratory diaphragm, a disk-like conducting member on one side of said diaphragm, a centrally-apertured conducting member on the other side of the diaphragm so that the sound-waves may reach the central portion of the diaphragm through said opening of the conducting member, and loose contact material between the diaphragm and said conducting members.

5. A microphone comprising a vibratory diaphragm, a ring-like conducting member located on the sound-receiving side of the diaphragm and so arranged that the sound-waves passing through the aperture of the said conducting member will reach the central portion of the diaphragm directly, another conducting member located on the other side of the diaphragm, and loose contact material located between the diaphragm and the conducting members at a greater distance from the center of the diaphragm than the outer portion of said opening in one of the conducting members.

6. A microphone comprising a vibratory diaphragm, a conducting member located on the sound-receiving side of the diaphragm and provided with a central aperture through which the sound-waves may reach the adjacent central portion of the diaphragm directly, and loose contact material located between the diaphragm and said conducting member at a greater distance from the center of the diaphragm than the outer portion of said opening.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANZ TREYER.

Witnesses:
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CARL SIGG.