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PALLE-FINN BEER

2,790,032

CONTACT MICROPHONE

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Fig. 1.

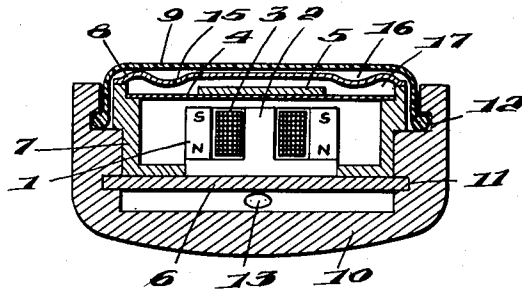
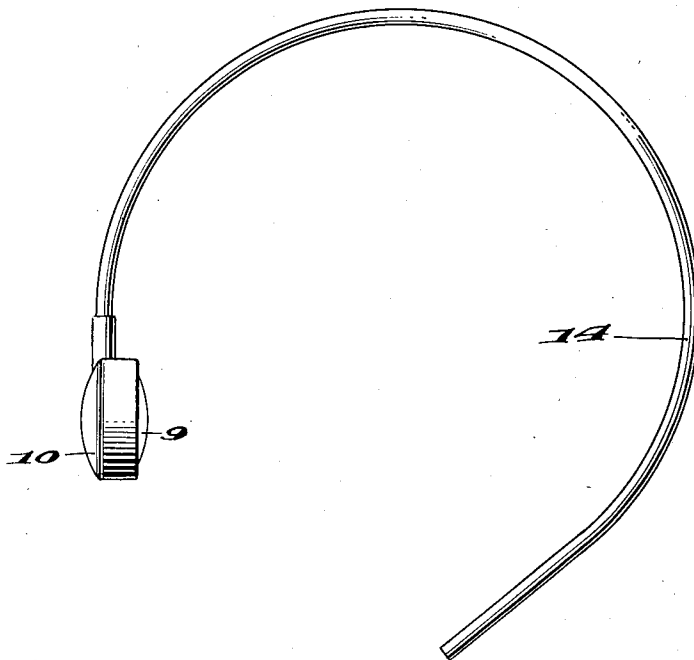


Fig. 2.



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2 Claims. (Cl. 179-116)

In the construction of contact microphones adapted for use, for instance, as neck microphones, it has been found very difficult to obtain a suitable frequency characteristic. In particular, the reproduction of medium and high speech frequencies has been unsatisfactory and resulted in distorted and unintelligible speech.

In the contact microphone forming the subject matter of the present invention, an essential improvement of the frequency response has been obtained. The microphone comprises an outer membrane which is adapted to contact a vibrating member, such as a part of the neck, and an inner diaphragm which forms a part of an electro-acoustic system and which is coupled to the outer membrane by means of an acoustic network. According to the invention the inner diaphragm is made resonant in the upper part of the recorded frequency band, whereas the acoustic network comprises two air chambers connected by means of apertures which are so proportioned with respect to the volume of the air chambers that the low frequencies of the reproduced frequency band are suppressed.

By using a neck microphone constructed in accordance with these principles, very good reproduction is obtained not only of vowels, but of all the consonants, whereby the intelligibility is increased and the special character of the voice is retained.

In the annexed drawing, Fig. 1 shows a section through a contact microphone in accordance with the invention, and Fig. 2 shows an exterior view of a microphone with a resilient holder to be placed around the neck.

In the embodiment illustrated, the microphone comprises an electromagnetic system having an annular permanent magnet 1, which is magnetized so as to have its south pole upwards and its north pole downwards, a central core 2, a coil 3 and a diaphragm 4, on which there is fastened a thin disk 5 of magnetic material. The magnet assembly is mounted on a disk 6, to which there is also secured an outer ring 7. The diaphragm 4, which rests on a shoulder of the ring 7, is dimensioned to have its resonant frequency at about 2500 C./S.

A partition or lid 8 of thin plate rests on the upper rim of the ring 7 and has been pressed to form thereon a central projection as well as an annular ridge. The lid 8 is held in position by a thin membrane 9, for instance of rubber or a soft plastic, and the whole assembly is surrounded by a casing 10, for instance of a somewhat harder plastic, the elements being held in their correct positions by means of a groove 11 provided in the casing 10 for accommodating the plate 6 as well as a groove 12, into which extends a flange formed on the membrane 9. The casing 10 has an aperture 13, through which the leads from the coil 3 are brought out to connect with the input circuit of an amplifier, not shown in the drawing.

The microphone is placed at the end of a microphone

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cable 14, whose end portion is bent circularly as indicated in Fig. 2 and is kept in this shape by a resilient insert. When putting on the microphone it is therefore only necessary to adapt the resilient part around the neck in such a way that the microphone contacts the soft tissue of the neck. The membrane 9 is then supported on part of its surface by the projection and the ridge on the lid 8, whereby the microphone can sustain a comparatively great mechanical pressure without damage.

Between the remaining part of the lid 8 and the membrane 9 there is formed an air chamber 16, which communicates through one or more small apertures 15 with a second air chamber 17 bounded by the lid 8 and the diaphragm 4 of the magnet assembly.

When the person carrying the microphone on his neck speaks, vibrations are set up and are impressed on the free parts of the membrane 9. These vibrations cause pressure variations in the chamber 16, which via the apertures 15 set up corresponding pressure variations in the chamber 17, whereby the vibrations are imparted to the diaphragm 4. This induces in the coil 3 electric currents in accordance with the vibrations.

The frequency characteristic of the microphone is determined by the size and number of apertures 15, the resonant frequency of the diaphragm 4, and the thickness and pliability of the membrane 9. For instance, an increase in thickness or stiffness of the membrane causes a weakening of the lower frequencies. The arrangement can readily be dimensioned so as to suppress the lower frequencies of speech and simultaneously stress the higher ones, all of which makes for better intelligibility of the speech.

In the embodiment of the invention just described an electromagnetic vibratile diaphragm arrangement was used, but it is apparent that any other type of electro-acoustic arrangement may be used, such as an electrodynamic, or a carbon one. Also, the invention is not limited to the form of air chamber 16 between the membrane 9 and the lid, shown in the drawing as an annular chamber, but may also be circular and bounded only by one outward projection.

What I claim is:

1. A contact microphone to reproduce the upper part of the voice frequency band provided with an outer impermeable membrane of soft and pliable material, and an inner diaphragm forming a part of an electroacoustic system and made resonant in the upper part of the voice frequency band, said inner diaphragm connected to said outer membrane by means of an acoustic network consisting of two air chambers separated by a rigid partition and bounded by said diaphragm and said membrane; said partition being provided with apertures which are small compared to the volume of said air chambers and which form an acoustic connection between said two air chambers which suppresses the low frequencies of the frequency band.

2. A contact microphone according to claim 1 in which the partition is provided with a central projection and an annular ridge, said outer membrane resting on the projection and on the ridge, thereby forming an annular air chamber between said membrane and said lid.

References Cited in the file of this patent

UNITED STATES PATENTS

2,205,670	Pye	June 25, 1940
2,325,688	Landis	Aug. 3, 1943
2,345,996	Anderson	Apr. 4, 1944