May 2, 1933. L. H. SMITH 1,906,725

MICROPHONE

Filed Jan. 11, 1932

Fig. 1.

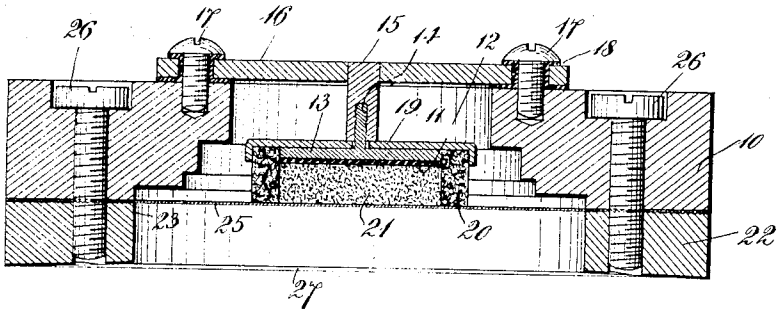


Fig. 2.

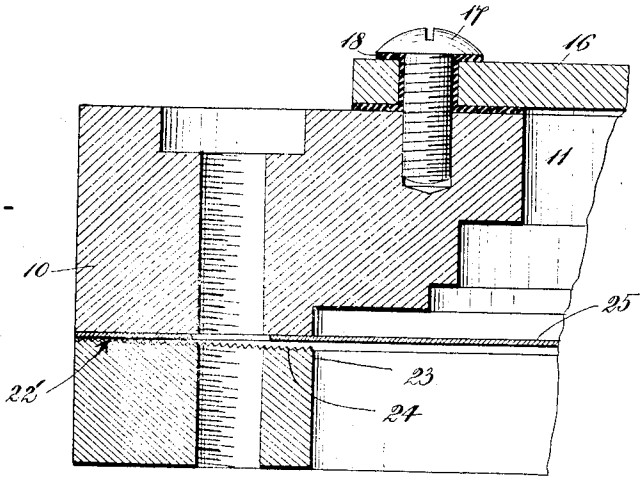
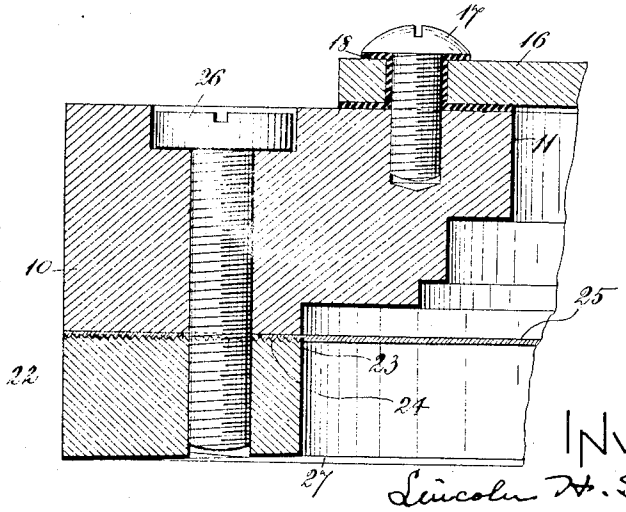


Fig. 3.



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UNITED STATES PATENT OFFICE

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MICROPHONE

Application filed January 11, 1932. Serial No. 585,929.

This invention relates to microphones especially applicable for radio broadcasting which imposes the requirement that the natural frequency of the diaphragm used in such microphones shall be higher than that of the highest audible note transmitted in order to avoid distortion.

The object of my invention is to provide a simple and effective means for automatically stretching a microphone diaphragm by the act of clamping the microphone parts together, in order to give the same the desired natural frequency.

With this object in view my invention comprises the usual disc enclosing the carbon button, said disc being superimposed upon a co-operating annulus with a diaphragm interposed therebetween. The inner face of the annulus is provided with a bevelled surface which may be roughened or serrated and extends preferably from a point near the outer periphery thereof to its inner periphery. Spaced screws pass transversely through the disc and annulus and through holes near the periphery of the disc which are slightly larger in diameter than said screws, and upon the tightening of said screws, preferably pair by pair, to clamp the three microphone members together, the outer peripheral portion of the diaphragm will be pressed into contact with the bevelled surface of the annulus and the central portion thereof will be stretched until it has the desired natural period.

In the drawing which accompanies and forms a part of this specification I have shown for illustrative purposes only a microphone which has given good results in practice.

Figure 1 is a central vertical section of a broadcasting microphone embodying my invention;

Fig. 2 is a fragmentary central vertical section on an enlarged scale, the relative proportion of certain parts being greatly exaggerated to facilitate disclosure, and said figure showing the relation of the parts before they have been clamped together;

Fig. 3 is a similar section showing the relation of the parts after the clamping operation, the relative proportion of certain parts being, as before greatly exaggerated.

In the particular drawing selected for more fully disclosing the principle of my invention and which is to be considered merely as illustrative of a certain specific embodiment thereof, 10 is a disc having a centrally-disposed button chamber 11 in which is placed a carbon button 12 of any suitable type, said button in the present instance being shown as secured to the under side of the metal disc 13 attached by the threaded stud 14 integral therewith to the rod 15 depending from and pressed into the cover-plate 16 which in turn is secured to the disc by screws 17, said screws being suitably insulated from said disc by bushings 18. The stud 14 passes through an aperture in the cup 19 to which the cylindrical felt washer 20 is secured and granular carbon 21 is placed within said cup.

The disc 10 is superimposed upon the co-operating annulus 22, the inner face of which is bevelled preferably from a point 22′ near the outer periphery thereof to its inner periphery 23, and preferably the bevelled face of said annulus is roughened or serrated as indicated at 24. It has been found sufficient to give the bevelled surface of said annulus a rough cut in a lathe, although of course the serrations may be formed by means of a pointed tool which moves inwardly toward the axis of the ring as the same is rotated in the lathe, thereby cutting thereinto a spiral groove, as indicated in Fig. 2.

The diaphragm 25 which may have the same diameter as the annulus is interposed between the latter and the disc 10.

In one embodiment of my invention, the diaphragm is one thousandth of an inch in thickness, and in that case I have found that sufficient stretching is imparted thereto by bevelling the inner face of the annulus at such an angle that the vertical height between the planes of the outer and inner peripheries thereof is one hundredth of an inch. Obviously the degree of bevel will depend somewhat upon the thickness of the diaphragm and the radial length of the bevelled portion of the annulus.

The three members of the microphone are

provided with a plurality of spaced registering holes for receiving the clamping screws 26. In one embodiment of my invention I have employed three pairs of clamping screws, the members of each pair being arranged diametrically opposite each other.

The microphone is assembled by placing the diaphragm on the annulus, as shown in Fig. 2 and then superimposing the disc thereon and progressively tightening the screws 26. Preferably the screws are tightened slowly, pair by pair, a few turns being given to one screw and then a few to the diametrically oppositely-disposed screw, and then the next pair of screws are turned slightly, and finally the third pair, after which the first pair of screws are further tightened, and so on until all three pairs have been tightened to substantially the same degree.

The result of such progressive tightening of the oppositely-disposed pairs of screws is as follows: First, the outer peripheral portion of the diaphragm from the point 22′ to the outer periphery thereof is firmly gripped by the serrations of the outer rim of the inner face of the annulus from said point to the outer periphery thereof, said rim being level and not bevelled as aforesaid. Second, the successive portions of the inclined or bevelled serrated or roughened inner surface of the annulus are progressively forced upwardly into contact with the outer peripheral portion of the diaphragm, i. e., the portion thereof between the point 22′ and the inner periphery of the annulus 23, as shown in Fig. 3.

The result of the tightening operation is that as successive portions of said inner surface are forced into contact with the diaphragm, the material thereof is moved by minute increments outwardly from the center thereof, so that when the clamping screws have been turned home, the central portion of the diaphragm, that is to say, the portion thereof bounded by the inner periphery of the annulus, has been stretched to the degree necessary to give said diaphragm a natural frequency higher than the highest audible note used in broadcasting.

The preliminary grip of the annulus on the diaphragm from the point 22′ to the outer periphery thereof is greatly facilitated by roughening or serrating the inner surface of the annulus, and it will be noted by reference to Fig. 3 that the ribs or teeth formed by roughening or serrating the inner surface of the annulus are impressed into the material of the diaphragm, this not only causing or assisting in causing the stretching of said diaphragm, but also facilitating the holding of the same in fixed position after the stretching operation has been completed. Preferably the holes for the clamping screws are so disposed that the center of each is much nearer the inner than the outer periphery of the annulus. In the present instance the distance from said outer periphery to the center of said screw is slightly more than twice the distance from the center of the screw to the inner periphery of the annulus. By virtue of this arrangement a substantial leverage about the point 22′ as a fulcrum is obtained when the screws are tightened to lift the bevelled portion of the annulus up into contact with the diaphragm.

As indicated at 27 in Figs. 1 and 3, the outer face of the annulus after the parts of the microphone have been clamped together, will be slightly deformed and cupped to a degree conforming substantially to the amount of inclination or bevel given to the inner face of said annulus, that is to say, in the specific instance above referred to, the vertical height between the planes of the outer and inner peripheries of said lower face will be about one-hundredth of an inch.

Having thus described an illustrative embodiment of my invention without having limited the same thereto, what I claim and desire to secure by Letters Patent is:

1. A microphone comprising an annulus, the inner face of said annulus having its surface bevelled from a point near its outer periphery to its inner periphery, a co-operating disc superimposed upon said annulus, the inner face of said disc opposed to and co-operating with the inner face of said annulus being parallel to the outer peripheral portion of the face of said annulus and angularly related to the inner peripheral portion thereof, a diaphragm interposed between said disc and annulus, and means for clamping said disc and annulus together and deforming said annulus to bring the entire inner face thereof into parallelism with the inner face of said disc whereby the bevelled surface of said annulus is pressed into contact with the outer peripheral portion of said diaphragm without bending the same out of the plane of the central portion thereof and said central portion is stretched.

2. A microphone comprising two opposed annular members, the juxtaposed surfaces of said members being angularly related, a diaphragm interposed between said members, and means for clamping said members together and at the same time deforming one of said members and bringing said surfaces into parallelism.

In testimony whereof, I have hereunto subscribed my name this 12th day of December, 1931.

LINCOLN H. SMITH.