

May 24, 1932.

N. H. RICKER

1,859,892

ACOUSTIC DEVICE

Filed Oct. 6, 1922

Fig. 1.

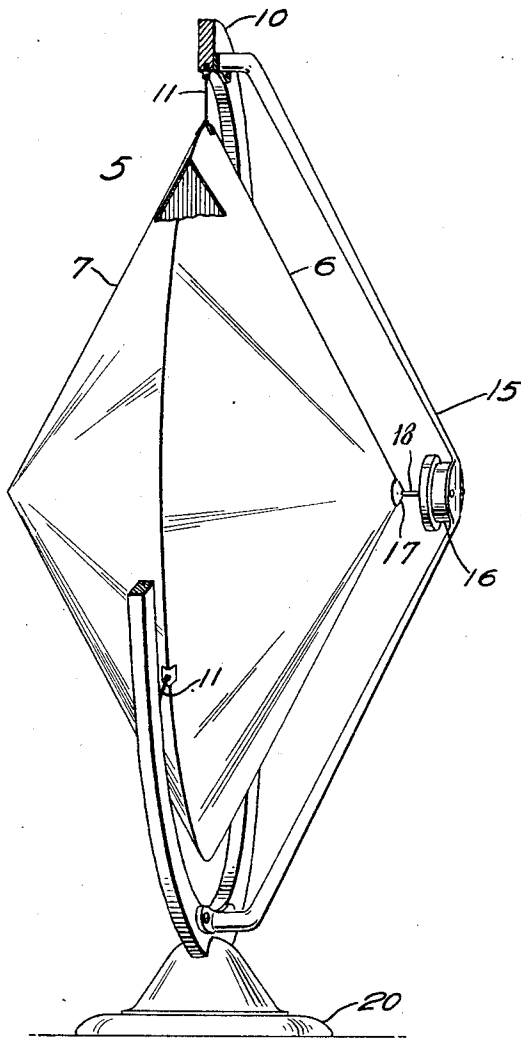
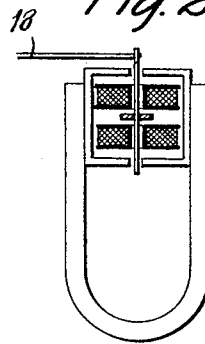


Fig. 2.



Inventor:
Norman H. Ricker
by *Jul C. Palmer* Att'y.

UNITED STATES PATENT OFFICE

NORMAN H. RICKER, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

ACOUSTIC DEVICE

Application filed October 6, 1922. Serial No. 592,675.

This invention relates to acoustic devices and its object is to produce an acoustic device capable of accurately responding to and reproducing vibrations within the audible range.

The present invention in its broadest aspects contemplates a peripherally substantially unrestrained direct-acting loud speaker comprising two dish-shaped members of thin material joined at their peripheries for mutual reinforcement. Other things being equal the natural frequencies of diaphragms peripherally unrestrained are much lower than the natural frequencies of the heretofore large direct-acting diaphragms having restrained or rigidly clamped peripheries.

A diaphragm which will meet these conditions is one having a diameter somewhere in the neighborhood of one-quarter of the wave length of the lowest sound to be reproduced, and composed of such material and of such thickness that the velocity of propagation through the device is sufficient to transmit up to five thousand cycles. Such a diaphragm may be produced by uniting at their bases in such a manner that they will reinforce each other against collapse, two conical surfaces having a diameter in the neighborhood of three feet and formed of fibrous material such, for example, as paper.

A diaphragm of the above construction freely suspended and connected with a vibrating means such as a receiver magnet system, is capable of producing and magnifying all tones within the audible range and particularly those tones of the lower frequencies which the ordinary diaphragm and amplifying horn fail to project accurately.

In the drawings:

Fig. 1 is a view in perspective of one form of the invention, and

Fig. 2 is an elevational view of an electromagnetic vibrating system which may be used.

As shown in the drawings, 5 designates an acoustical device having characteristics of a diaphragm.

The device 5 is composed of two conical surfaces 6 and 7 secured together at their bases to reinforce each other. The conical

surfaces are formed of light material of fibrous character, which will be stiff and light enough to respond accurately to the vibrations within an audible range. Drawing paper of ordinary quality has been used successfully for this purpose. The double conical body has been chosen because of the reinforcing or stiffening effect that each of the sections has upon the other. The device shown is only illustrative, however, it being understood that the invention contemplates the use of any material and any form which will produce a large direct acting diaphragm which may be freely suspended in position to transmit vibrations of from thirty up to five thousand cycles.

The device 5 may be suitably supported inside a ring 10 by means of a plurality of supporting members 11, 11 of light, flexible material, which will not transmit vibrations to or from the diaphragm. The diaphragm is preferably supported at three equi-distant points on its periphery. The position and manner of suspension of the diaphragm, however, is immaterial, that chosen in the drawings being merely illustrative.

Secured at its opposite ends to the ring 10 is a bracket 15, which supports at its center a receiver magnet system 16, which may be of a standard well-known type, such as shown, for example, in Fig. 2.

Upon the apex of the conical member 6 is secured a metallic cap 17 to which is soldered a connection 18 from the receiver magnet system.

The ring supporting member 10 may be supported upon a suitable base 20.

The invention claimed is:

1. An acoustic device comprising a large direct-acting double conical diaphragm having a high degree of stiffness relative to mass, means attached to the outer edge of the diaphragm for substantially freely supporting said diaphragm, and means for transmitting vibrations to said diaphragm.

2. An acoustic device comprising a large direct acting diaphragm of light material in the shape of two conical surfaces secured together at their bases, means at the periphery of the diaphragm for substantially free-

ly supporting the diaphragm whereby the vibrations applied at an apex are uniformly distributed thereover, and means for transmitting vibrations to an apex of the diaphragm.

3. An acoustic device comprising a large direct acting diaphragm of light material in the shape of two conical surfaces secured together at their bases to reinforce each other, a supporting means from which the diaphragm is freely suspended at peripheral points, and a vibrating means carried by the supporting means and operatively connected to the diaphragm at an apex.

4. An acoustic device comprising a large direct acting diaphragm of light material in the shape of two conical surfaces secured together at their bases to reinforce each other, means flexibly supporting said diaphragm at a plurality of points so that said diaphragm is substantially free to vibrate around its periphery and means for transmitting vibrations to one apex of the diaphragm.

5. In an acoustic device, a large direct-acting diaphragm comprising two members one of which is dish-shaped, joined at their peripheries, and separate means for supporting and vibrating said members, their entire peripheries being free to vibrate with substantially equal amplitude.

6. In an acoustic device, a large direct-acting diaphragm comprising two elastic members mutually reinforcing each other, one of said members being dish-shaped, and means for supporting and vibrating said members, their entire peripheries being free to vibrate with substantially equal amplitude, said supporting means including flexible material extending outwardly from the periphery of the diaphragm.

7. In an acoustic device, a large direct-acting loud speaker comprising two dish-shaped vibratory members joined at their peripheries to form a chamber and reinforce each other, a frame surrounding the peripheries of said members, means flexibly connecting the peripheries of said members to said frame, and means for vibrating one of said members, the other member being actuated solely by said first member.

8. In an acoustic device a large direct-acting diaphragm having front and rear walls of light material converging toward each other and secured together at their peripheries, means connected to one of said walls for actuating it, the second wall being driven solely at its periphery by the first said wall and a frame for mounting said diaphragm and actuating means, said diaphragm being supported from said frame at points remote from the place of connection of said actuating means to said diaphragm.

9. In an acoustic device, a large direct-acting loud speaker comprising two conical

members of light material joined together at their bases, means associated with the apex of one of said members for vibrating said member in accordance with sound waves, the second member being driven by the first conical member solely through its connection with the said first member at its base and a frame having an annular portion and inwardly extending arms, said diaphragm being flexibly supported from said annular portion and said vibrating member being supported from said arms.

10. Sound reproducing means comprising a diaphragm having the form of a hollow cone made rigid by a conical member secured to its base, said cone being flexibly supported from the periphery of its base, and actuating means for said diaphragm located outside said cone and secured to said cone at its apex.

11. In an acoustic device, a hollow diaphragm exposed on opposite sides to the free air, means for supporting said diaphragm so that its periphery is substantially free to vibrate, and means coupled to said diaphragm remote from the supporting means for driving said diaphragm.

12. An acoustic device comprising two large conical members rigidly joined together and symmetrically arranged about a common axis, said members having their presented faces acting upon a body of confined air and their opposite faces acting upon free air, means flexibly supporting said members at points remote from the common axis, and driving means acting along the common axis of said conical members and tending to drive said members equally and simultaneously in the same direction.

In witness whereof, I hereunto subscribe my name this 4th day of October A. D. 1932.

NORMAN H. RICKER.