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Oct. 23, 1928. 1,688,730

J. A. MEARS

SOUND REPRODUCER

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Fig. 1.

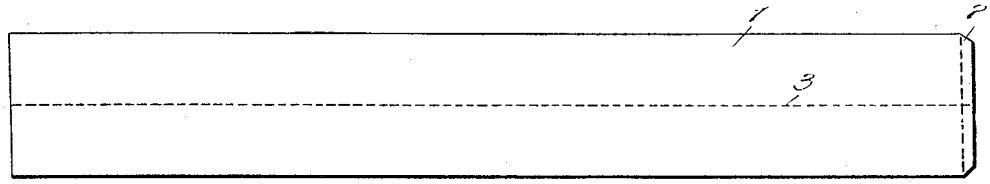


Fig. 2.

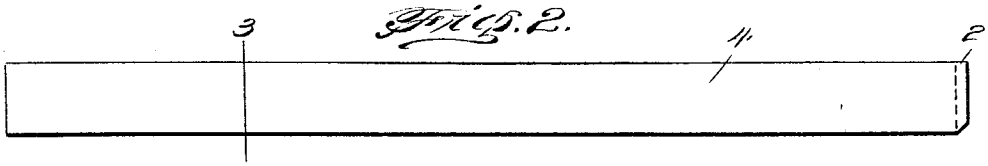


Fig. 3.

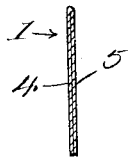


Fig. 4.

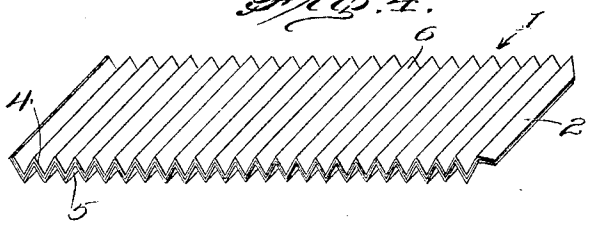


Fig. 5.

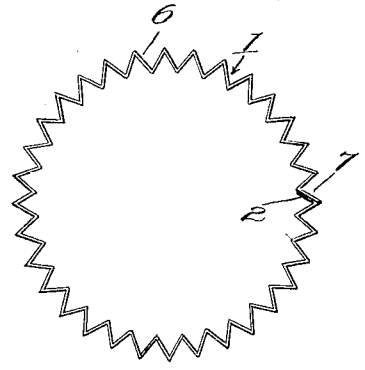
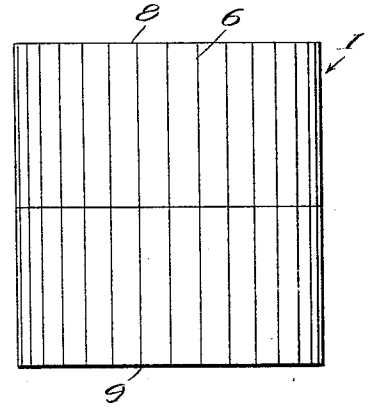


Fig. 6.



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Fig. 7

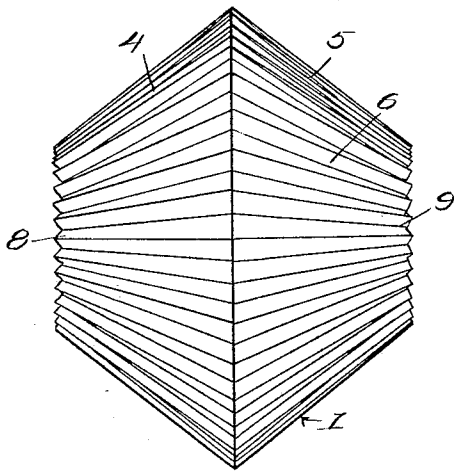


Fig. 8.

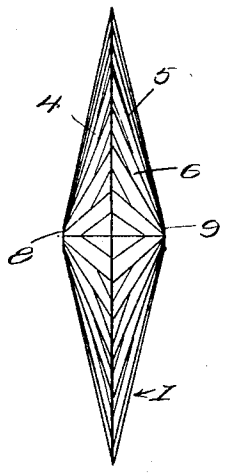
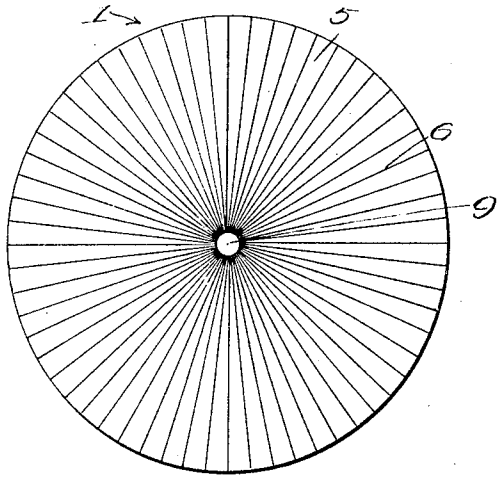


Fig. 9.



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SOUND REPRODUCER

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Fig. 11.

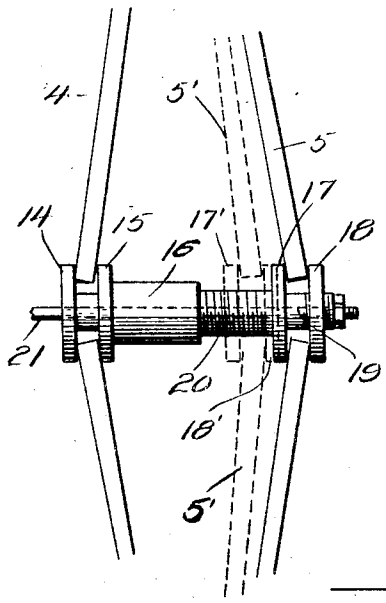


Fig. 10.

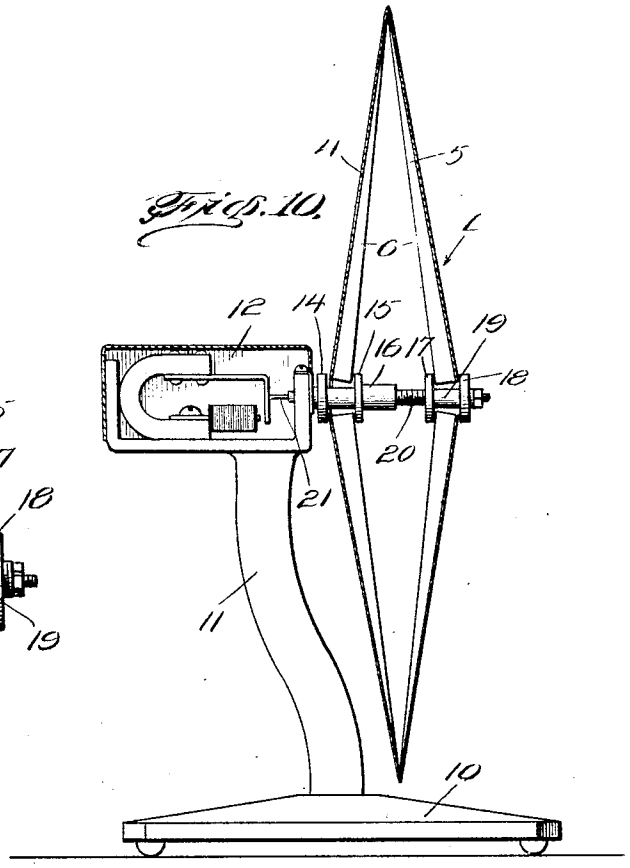
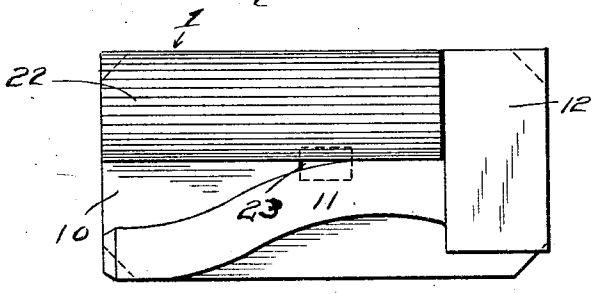


Fig. 12.



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Attorney

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Patented Oct. 23, 1928. 1,688,730

UNITED STATES PATENT OFFICE.

JOSEPH ARCHIBALD MEARS, OF NEW YORK, N. Y., ASSIGNOR TO WIRED RADIO, INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

SOUND REPRODUCER.

Application filed September 16, 1925 Serial No. 56,671.

My invention relates broadly to sound reproducers and more particularly to a self-supporting diaphragm of relatively large size which may be inexpensively manufactured and which is capable of reproduction of sound with pleasing tone quality.

One of the objects of my invention is to provide a collapsible dipahragm of double cone construction which is assembled from plaited sheet material which may be folded upon itself to form a completed diaphragm.

Another object of my invention is to provide a loud speaker or electromagnetic sound reproducer having its parts constructed in such manner that they may be shipped in knocked down position within a small compass and assembled by a customer into a completed instrument for reproduction of electrical vibrations.

Still another object of my invention is to provide a loud speaker having a double cone plaited sound reproducing diaphragm enclosing a sound chamber, the volume of which may be readily changed and the tension upon both cone areas of the diaphragm correspondingly changing to select values which will give the most pleasing sound reproduction.

My invention will be more fully understood by reference to the accompanying drawings, wherein:

Figure 1 shows a strip of sheet material which is employed in the construction of the diaphragm; Fig. 2 shows the sheet material of Fig. 1 folded into a double strip for the purpose of constructing the double plaited cone; Fig. 3 is a cross-sectional view of the folded strip taken on line 3—3 of Fig. 2; Fig. 4 is a perspective view of the double folded strip from which the double cone diaphragm is folded; Fig. 5 is an end view of the plaited material of the diaphragm where it has been opened out flat and the ends of the strip brought together to form a cylinder; Fig. 6 is a plan view looking down upon the cylindrical construction of the diaphragm; Fig. 7 indicates the diaphragm with its ends gathered in the process of folding into a completed diaphragm which has been represented more clearly in Fig. 8; Fig. 9 represents a front view of the completed diaphragm; Fig. 10 shows a cross-sectional view of the diaphragm assembled with the electromagnetic actuating mechanism; Fig. 11 is a fragmentary view illustrating the adjustable feature of the diaphragm construction by which the volume within the sound chamber is varied; and Fig. 12 is a diagrammatic view showing the parts of the electromagnetic sound reproducer folded into a small compass for the process of shipment.

Referring to the drawings in detail, reference character 1 indicates a strip of flat sheet material from which the sound reproducing diaphragm is formed. The flat sheet material contains an end portion 2 for the purpose of forming a lap joint as will be more fully described hereinafter. The strip 1 is arranged to be folded longitudinally along dotted line 3 to a double thickness consisting of surfaces 4 and 5 in Fig. 2. In the double folded position of Fig. 3 the strip 1 has one surface 4 folded directly in contact with its opposite surface 5. The double folded strip 1 is then folded in alternate directions forming plaits 6 along the strip as represented in Fig. 4. The double folded plaited strip of Fig. 4 is then opened out flat and the ends brought together utilizing the portion 2 for forming a lap joint with the opposite end of the strip at 7. The strip now forms substantially a cylinder which is more clearly represented in plan view in Fig. 6. The ends 8 and 9 of the cylindrical plaited strip are next gathered as represented in Fig. 7 and pushed inwardly to complete the double folded cone as represented in Fig. 8 in such manner that the diaphragm has the appearance in front elevation as represented in Fig. 9.

In order to support the sound reproducing diaphragm a stand which may be readily assembled or disassembled is provided as shown in Fig. 10. The stand includes a base portion 10, an angularly disposed upright 11 and an electromagnetic driver which is contained within a housing 12. The diaphragm 1 is shown as having the plait 6 in each side of the folds 4 and 5. The inner edges of the cone portions of the diaphragm are supported by guide washers. The inner edges of the cone portion 4 fit between guide washers 14 and 15 on cylindrical member 16, while the inner edges of the cone portion 5 represented in Figures 8 and 9 at reference character 9 fit between washers 17 and 18 which are carried by the sleeve 19 threaded at 20 into the cylindrical member 16. The cylindrical member 16 has internal threads within its body portion with which the threads 20 on the member 19 cooperate in such manner that the

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sides of the double cone can be moved toward or away from each other to vary the volume enclosed by the cones. Where it is desired to reduce the volume of the sound chamber enclosed by the double cone the member 19 is threaded into cylindrical member 16, the cone portion 5 assuming dotted line position 5′ at the same time that washer members 17 and 18 assume dotted line positions 17′ and 18′ respectively. Sound vibrations are imparted to the entire diaphragm through link 21 which carries the adjustable member 16 and 19 on one end thereof. The construction of the sound reproducer is such that the parts may be disassembled and packed within a small area as represented in Figure 12 where the upright 11 has been removed from the aperture 23 in the base 10 and laid along the base 10 in contact therewith, while the diaphragm is shown folded into a compact rectangular area indicated at 22. The process of assembly of the diaphragm is extremely simple as the folded diaphragm 22 is readily unfolded and mounted upon the adjusting devices 16 and 19.

It will be observed that the sound reproduction of the diaphragm may be governed by selecting a particular volume for the sound chamber which volume may be readily changed by means of the adjusting device heretofore described.

While I have described my invention in certain particular embodiments, I desire that it be understood that modifications may be made and that I intend no limitations upon the invention other than those imposed by the scope of the appended claims.

What I claim and desire to secure by Letters Patent of the United States is as follows:—

1. A sound reproducing diaphragm comprising a single sheet of plaited material folded into a double cone with the peripheral edges of the bases thereof formed integral with each other for enclosing a sound chamber between the surfaces of the double cone and means for adjusting the distance between the apexes of the cones for selecting a desired volume of sound chamber between said cones.

2. A sound reproducing diaphragm comprising a pair of plaited cone surfaces with their bases adjacent each other and their apexes opposite each other for enclosing a sound chamber between said plaited cone surfaces and means for adjusting the distance between the apexes of said cone surfaces.

3. A sound reproducing diaphragm comprising a pair of plaited surfaces diverging in opposite directions from each other, for enclosing a sound chamber between said plaited surfaces, and means for varying the angular degree of divergence of said surfaces for selecting the volume of the sound chamber enclosed by said surfaces.

4. A sound reproducing diaphragm comprising a pair of plaited cone surfaces with their bases adjacent each other and their apexes opposite each other, a pair of screw threaded members each provided with closely adjacent flanges for guiding the centrally disposed inner peripheral edges of each of said cone surfaces toward or away from each other for adjusting the volume of the sound chamber between said cone surfaces.

5. A sound reproducing diaphragm comprising a pair of plaited surfaces diverging in opposite directions from each other and providing an enclosed sound chamber between the plaited surfaces, a pair of screw threaded members cooperating one with the other and each having guiding flanges thereon with the centrally disposed inner peripheral edges of each of said plaited surfaces disposed between said flanges whereby the angular degree of divergence of said surfaces may be varied for selecting the volume of the sound chamber enclosed by said surfaces.

6. A diaphragm comprising a pair of hollow cones, having plaited surfaces formed from a single sheet of material with the plaited surfaces disposed at acute angles to each other, said cones being attached to each other around the periphery of their bases and with their apexes separated and variable in position relative to each other to form an air chamber adjustable in volume for the reproduction of tones over a broad range of musical notes.

7. A sound reproducing diaphragm comprising a pair of hollow cones, at least one of said cones having a fluted surface with the bases thereof adjacent to each other and their apexes separated to form a sound chamber, and means for variably selecting and fixing the distance between said apexes.

8. A sound reproducer comprising a pair of diaphragms arranged substantially in the form of cones with the bases thereof integrally connected and the surfaces of at least one of said cones being plaited, the apexes of said cones being joined together by means arranged to impart sound vibrations to said diaphragms, said means operating to selectively fix the special relation of said diaphragms at the apexes thereof.

9. A sound reproducer comprising a pair of screw threaded members arranged to be adjusted one with respect to the other along the same axis, each of said members carrying a set of annular flanges, a pair of coextensive plaited surfaces diverging from a common periphery and having their inner edges secured between each of said sets of annular flanges whereby said screw threaded members may be adjusted one with respect to the other for varying the angular relationship of said plaited surfaces.

10. A loud speaker reproducer comprising a pair of cone shaped surfaces having radial plaits extending throughout their area, from

a position adjacent a central axis, said cone shaped surfaces having the radial plaits thereof joined at the outer periphery of said surfaces, a double screw member located centrally of said surfaces, said double screw member consisting of a pair of screw threaded devices, one entering the other, a pair of flanges carried by each of said screw threaded devices for egaging the inner ends of each of the plaits formed on said conical surfaces at a position adjacent said central axis, and means for imparting sound vibrations to said screw threaded devices.

In testimony whereof I affix my signature.

JOSEPH ARCHIBALD MEARS.