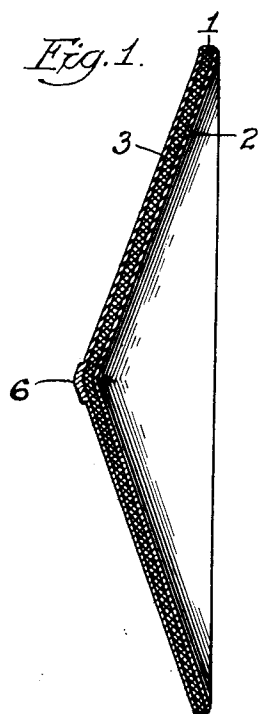
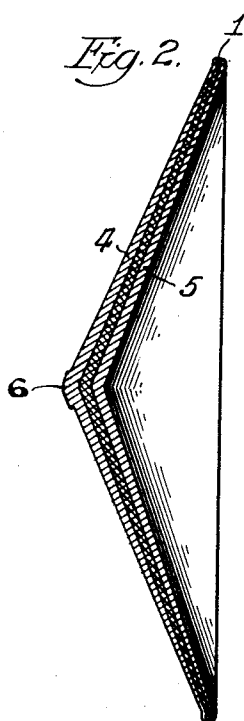
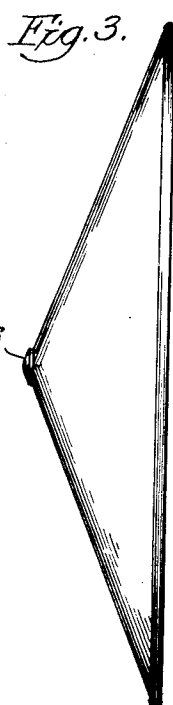
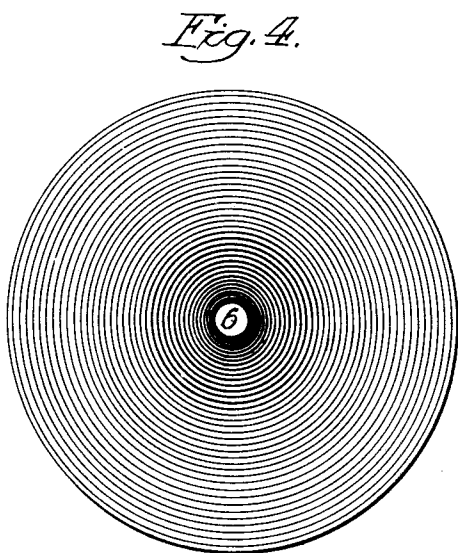
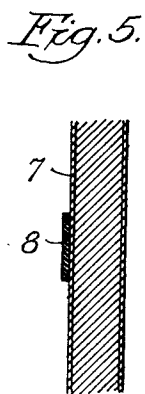
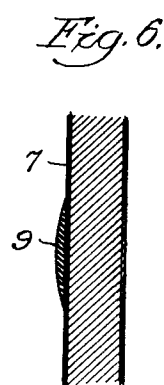


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J. B. HAWLEY ET AL
METAL COATED DIAPHRAGM

1,715,598

Filed March 13, 1926



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UNITED STATES PATENT OFFICE.

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METAL-COATED DIAPHRAGM.

Application filed March 13, 1928. Serial No. 94,388.

The present invention relates to sound producing or reproducing diaphragms, such as those used in radio reception and the like.

Among the objects of the invention is to produce a novel vibratable sound producing or reproducing diaphragm with a metal or metallized surface, such a coated diaphragm having the advantage of increased rigidity as well as being rendered nonhygroscopic whereby the vibrations of the diaphragm will not change with the variation in humidity of the surrounding atmosphere.

Another object of the invention is to provide a novel diaphragm which will have the advantage of increasing the conductivity of the sound producing energy, such as to and toward the rim or edge of the diaphragm. This may be effected in one way by varying the thickness of the metal in a diminishing manner from the center of the diaphragm toward the edge thereof.

The invention also comprehends the provision of the metal coating on the diaphragm in such thicknesses and variations of thicknesses as to produce resonances of different periods depending upon the proportion of the metal to the material of the diaphragm body. Likewise, the thickness and variations of thickness of the metal coating may also be such as to introduce any desired degree of rigidity at any given point or points in the diaphragm, also to localize nodal points at desired places.

Another object of the invention is to provide a coating of non-magnetic metal with or without any localized mass of magnetic metal or material high in magnetic permeability such that the armature effect may be concentrated in a given point of the diaphragm whereby the diaphragm may be efficiently actuated by the magnetic system of the sound reproducing device at that point. Ferrous material having magnetic permeability may be massed at such point.

Another object of the invention is to provide a sound producing or reproducing diaphragm that is seamless, thus doing away with the disadvantage of localizing a false arrangement of nodes or nodal points resulting from a seam.

Other objects, features, advantages and

capabilities are comprehended by the invention as will later appear and are inherently possessed thereby.

Referring to the drawings, Fig. 1 is a transverse sectional view of a sound producing or reproducing diaphragm constructed in accordance with the invention and shown with the parts in exaggerated thickness for the sake of clarity;

Fig. 2 is a similar transverse sectional view of another form of metallized diaphragm.

Fig. 3 is a view in side elevation of forms shown in Figs. 1 and 2 and showing the use of a localized mass of magnetic material, such as at the apex thereof.

Fig. 4 is a front view thereof.

Fig. 5 is a fragmentary sectional view taken through a diaphragm and showing a localized mass of magnetic material upon a coating of non-magnetic material.

And, Fig. 6 is a similar view showing a different form of the localized magnetic mass.

Referring now more in detail to the drawings, the embodiments selected to illustrate the invention are shown as comprising a diaphragm of cone shape having a body portion 1 of material preferably non-metallic in its properties, such as fibrous or the like material, with coverings of metal 2 and 3, such covering being preferably of non-magnetic material, although in some cases might be wholly of magnetic material. As a specific example, this metal may be of aluminum and may be made to engage with the material 1 by the projection of the same in molten form upon the fibrous body portion whereby the metal will adhere to and coat such portion, the metal thus being metallized upon the body portion of the diaphragm. The term "metallized" is used in this sense as distinguished from mere painting with a liquid metal holding solution.

When this metal is being metallized upon the body portion 1 of the diaphragm, it may be effected thereon in various thicknesses such as diminishing in thickness from the central portion of the diaphragm toward the edge thereof as shown by the metal portions 4 and 5 of Fig. 2 of the drawings. Also, the invention comprehends or covers the idea of

varying the thicknesses in any direction so that there may be thicknesses in points so as to set up nodes or nodal points at given locations or points as desired so as to obtain
 5 the correct periods and resonances from the diaphragm.

When the diaphragm is covered with non-magnetic metal, it is often advantageous to have a magnetic mass concentrated at some
 10 point on the diaphragm where the mechanical actuation is effected thereon by the electro-magnetic system of the reproducing device. As for example, such a magnetic mass of ferrous material or iron or other material
 15 permeable to magnetic lines of force may be located in the form of a button 6 or the like at the apex of the cone as clearly shown in Fig. 3 of the drawings.

The invention is comprehensive enough to include the idea of diaphragms which are of flat form and as shown in Figs. 5 and 6. The non-magnetic material or coating 7 on one side of such a diaphragm may have located thereon a localized mass of magnetic material
 25 8 at a point where it may cooperate with the armature of an electro-magnet in the reproducing system. Similarly the magnetic mass may be made in the form of a rounded portion 9 instead of as shown in Fig. 5, as clearly shown in Fig. 6 of the drawings. Any other
 30 form of the mass may be used.

While we have herein described and upon the drawings shown illustrative forms of the invention, it is to be understood that the invention is not limited thereto but comprehends other constructions, features, details,
 35 and arrangements of parts without departing from the spirit thereof.

Having thus disclosed the invention, we
 40 claim:

1. A sound diaphragm having a metallized surface.
 2. A sound diaphragm having a non-metallic body, and a metallized surface.
 3. A sound diaphragm having a metallized surface of varying thickness.
 4. A sound diaphragm having a metallized surface of non-magnetic metal.
 5. A sound diaphragm having a metallized surface of non-magnetic metal, and a local mass of magnetic metal.
 6. A sound diaphragm having a fibrous body, a metallized non-magnetic metal surface, and a localized mass of magnetic material.
 7. A sound diaphragm comprising a body portion, and a metallic surface portion diminishing in thickness from the central part to the edge of the diaphragm.
 8. A sound diaphragm comprising a body portion, and a metallic surface portion of non-magnetic material and diminishing in thickness from the central part to the edge of the diaphragm.
 9. A sound diaphragm comprising a body portion, and a metallic surface portion of non-magnetic material and diminishing in thickness from the central part to the edge of the diaphragm, and a mass of magnetically permeable material at the central part of said diaphragm.
 10. A sound diaphragm comprising a non-metallic body portion, and a metallic surface varying in thickness at different points for producing resonances of different periods.
- In witness whereof, we hereunto subscribe our names to this specification.

JESSE B. HAWLEY.
 PAUL G. ANDRES.