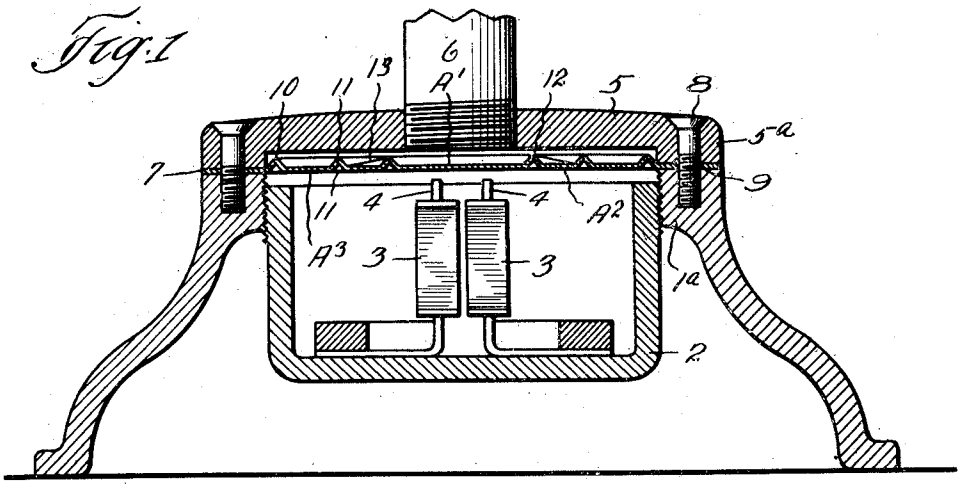
Sept. 28, 1926. 1,601,656

A. S. THAYER

DIAPHRAGM FOR TRANSMITTERS AND RECEIVERS

Filed April 13, 1925

Fig. 1



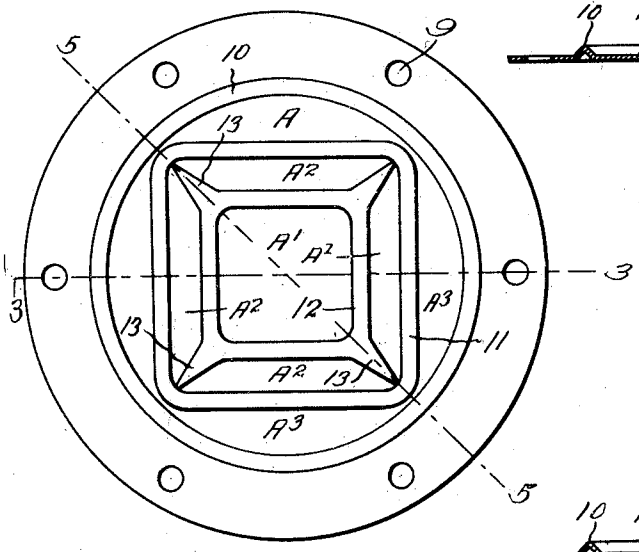


Fig. 2

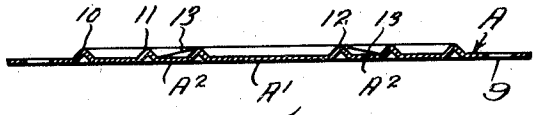


Fig. 3

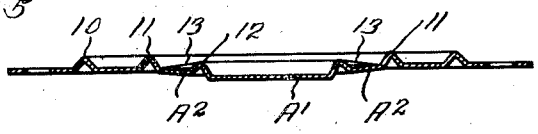


Fig. 4

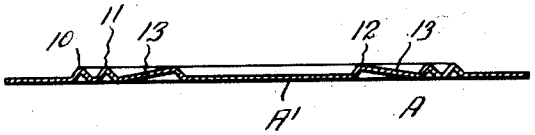


Fig. 5

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Patented Sept. 28, 1926. 1,601,656

UNITED STATES PATENT OFFICE.

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DIAPHRAGM FOR TRANSMITTERS AND RECEIVERS.

Application filed April 13, 1925. Serial No. 22,718.

This invention relates to the construction of diaphragms such as are employed with the transmitters and receivers of telephones and radio apparatus, and has for its general object to improve the efficiency of such diaphragms, particularly in the matter of preventing such distortions in the said diaphragms as will result in distortions in the sounds produced through the operation thereof. A further object of the invention is to provide a diaphragm of this character which will prevent vibrations of the central portion thereof from reaching the peripheral clamping portion of the same, thereby eliminating rattling noises. The advantages referred to hereinbefore, as well as others, to be discussed hereinafter, will be realized in and through the construction and arrangement of parts shown in the drawings, wherein Fig. 1 represents a central vertical sectional view through a receiver such as is used with a radio loud-speaker, the said receiver being provided with my diaphragm; Fig. 2 a plan view of the diaphragm; Fig. 3 a sectional view of the diaphragm corresponding to the line 3—3 of Fig. 2; Fig. 4 a similar view showing the manner in which the diaphragm responds to sound waves when used with transmitters and to electrical impulses of the pole pieces when used with receivers; and Fig. 5 a sectional view corresponding to the line 5—5 of Fig. 2.

Describing the various parts by reference characters, 1 denotes the base of a support, the one shown herein being of the type employed with the loud-speakers of radio sets. The base is in the form of a downwardly and outwardly flaring casing having a cylindrical top provided with an internal thread 1^a for the reception of a receptacle 2 containing the coils 3 and pole pieces 4. 5 denotes a cover for the base 1, having a central opening into which is threaded the neck 6 of a horn or other sound-amplifying device.

A represents the diaphragm generally, the marginal portion 7 of the diaphragm being clamped between the marginal flange 5^a on said cover 5 and the top of the base 1, screws 8 being shown as extending through apertures 9 in such marginal portion of the diaphragm and securing the cover to the base.

Within and adjacent to the clamping flange 5^a, the diaphragm is provided with an upwardly extending annular V-shaped rib 10 which is pressed therefrom and within and enclosed by the rib 10 is an upwardly projecting V-shaped rib 11, the last mentioned rib being polygonal in outline and shown herein as having four sides, although the particular number of sides may be varied in accordance with the uses to which the diaphragm is applied, it being preferred to use more sides with a transmitter diaphragm than with a receiver diaphragm.

Within the rib 11, the diaphragm is provided with an upwardly projecting rib 12, which is also polygonal and has its sides parallel with the sides of the ribs 11. Extending outwardly from each outer corner of the rib 12 toward and preferably as far as the corresponding inner corner of the rib 11 is a rib 13, each of the ribs 13 gradually diminishing in width and depth from the rib 12 toward the rib 11, with like variation in the width and depth of the grooves formed therebeneath.

In the construction of the diaphragm just described, I employ high silicon steel, as this steel has no residual magnetism and is therefore immediately reponsive to changes in polarity; and I prefer to use metal of approximately 36 gauge for my diaphragms.

A diaphragm constructed as described is provided with a relatively large central polygonal space A′, said space being defined by the rib 12 and the groove therebeneath, with a space surrounding such central space and included between the ribs 11 and 12 and the grooves therebeneath, the surrounding space in turn consisting of a number of polygonal spaces A^2 defined by the ribs 11, 12, and ribs 13, and by the grooves beneath said ribs.

In operation, when the diaphragm is subjected to an impulse (either an electrical impulse due to the pole pieces 4 or an impulse due to the impact of a sound wave thereagainst), the extended central portion A′ moves bodily inwardly, such central portion remaining in the same plane, during such movement, as shown in Fig. 4, this action being due to the provision of the rib 12 and the groove therebeneath, which allows the central portion to flex bodily downwardly, drawing at its periphery upon the surplus metal in the rib and rocking at such periphery upon such rib. The metal surrounding such central portion and within the rib 11 flexes downwardly from such rib toward the rib 12. Each segment A^2, defined by

and between the ribs 11, 12 and 13, moves as a plane, rocking about the central portion of the groove 11 as a pivot or fulcrum, this action being permitted by the ability of each segment A^2 to draw upon the surplus metal in the ribs 11, 12 and 13.

Ordinarily the metal in the part A^3 of the diaphragm between the ribs or beads 10 and 11 will not be deflected, the rib 10 serving to dissipate any vibrations of the diaphragm which may reach it and prevent such vibrations from reaching the clamping seat, thereby preventing any rattling noises in the receiver or transmitter.

With the parts constructed, arranged, and operating as described, the only vibrations which will be produced in the enlarged central section of the diaphragm are the bodily vibrations of such central portion toward and from the actuating means, while the vibrations in the parts A^2 will be the vibrations of said parts as planes hinged or pivoted to the rib or bead 11; and no cross vibrations will be set up in the parts A′ and A^2, which cross vibrations would result in distortion in the sounds received or transmitted by the diaphragm.

As pointed out hereinbefore, it is desirable to have the central part A′ polygonal, rather than circular, as it is believed that the use of a circular central portion, with a circular surrounding rib, would result in too great flexibility of such central portion.

The ribs 13 serve to stiffen the rib 12 and to prevent unnecessarily great movement or deflection of the central part A′. Furthermore, these ribs constitute fulcra for the short sides or corners of the segments A^2, which fulcra can open up under deflection of the parts A^2.

When my diaphragm is to be used as a transmitter, more ribs 13 will be employed than when it is used as a receiving diaphragm.

A diaphragm constructed from the material and in the manner shown and described herein has been found to be of marked efficiency when used with the receiver of a radio set, the diaphragm giving perfect reproduction of whatever may be transmitted from a radio microphone and showing no natural frequency period of its own.

Having thus described my invention, what I claim is:—

1. A metal diaphragm for receivers or transmitters, the said diaphragm having a rib pressed therefrom and enclosing an extended flat central portion, said diaphragm also having a second rib pressed therefrom and surrounding and spaced from the first rib, there being radial ribs extending from the first rib toward, but not across, the second rib, the said radial ribs diminishing uniformly in depth and width from the first rib toward the second rib, the said diaphragm also having a rib pressed therefrom and surrounding and spaced from the second rib and the diaphragm also having a marginal clamping portion located outside the last-mentioned rib.

2. A metal diaphragm for receivers or transmitters, the said diaphragm having pressed therefrom a rib V-shaped in section and enclosing an extended flat central portion, the diaphragm also having pressed therefrom a rib V-shaped in section and surrounding and spaced from the first rib, there being radial ribs extending from the first rib toward the second rib, the said radial ribs also being of V-shaped in cross-section and diminishing uniformly in depth and width from the first rib toward the second rib, the diaphragm also having a rib pressed therefrom and surrounding the second rib and the diaphragm having a marginal clamping portion outside the last-mentioned rib.

3. A metal diaphragm for receivers or transmitters, the said diaphragm having a polygonal rib V-shaped in section pressed therefrom and enclosing an extended flat central portion, the said diaphragm also having a polygonal rib V-shaped in section pressed therefrom and surrounding and spaced from the first-mentioned rib, there being radial ribs extending from the first rib toward the second rib, the said radial ribs also being of V-shape in cross-section and diminishing uniformly in depth and width from the inner rib toward the outer rib and said diaphragm having a marginal clamping portion outside the said ribs.

4. A metal diaphragm for receivers or transmitters, the said diaphragm having a polygonal rib V-shaped in section pressed therefrom and enclosing an extended flat central portion, the said diaphragm also having a polygonal rib V-shaped in section pressed therefrom and surrounding and spaced from the first-mentioned rib, there being radial ribs extending from the first rib toward the second rib, the said radial ribs also being of V-shape in cross-section and diminishing uniformly in depth and width from the inner rib toward the outer rib, the diaphragm also having a rib pressed therefrom and surrounding the second rib and said diaphragm having a marginal clamping portion outside the said ribs.

In testimony whereof, I hereunto affix my signature.

ARTHUR S. THAYER.