May 3, 1932. F. SHIDA 1,856,791

VIBRATOR FOR LOUD SPEAKERS

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Fig. 1.

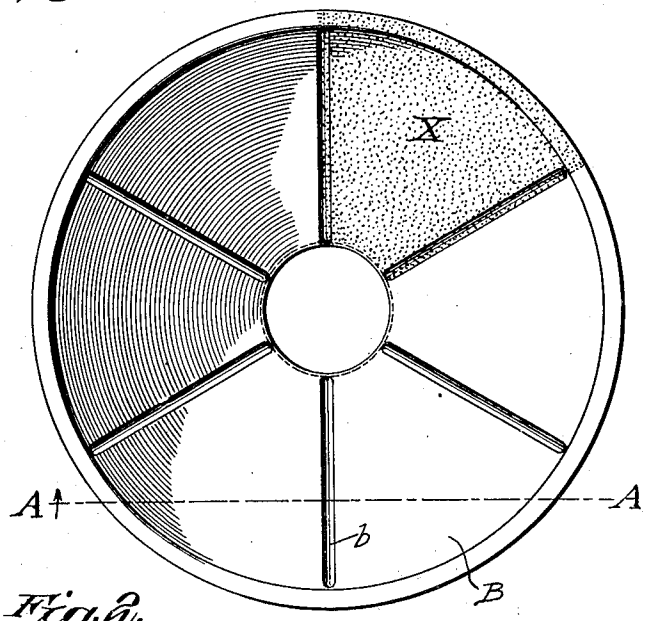

Fig. 2.

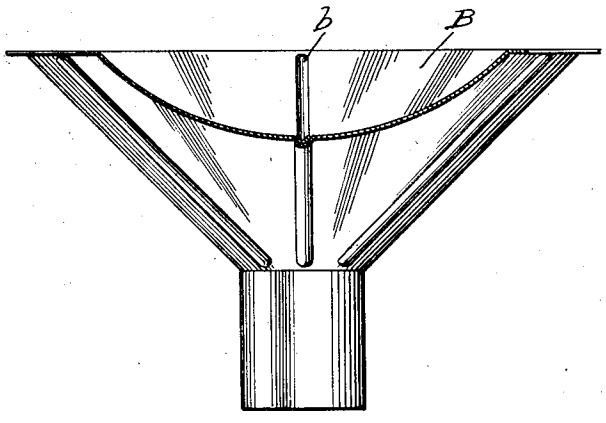

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Fig. 3.

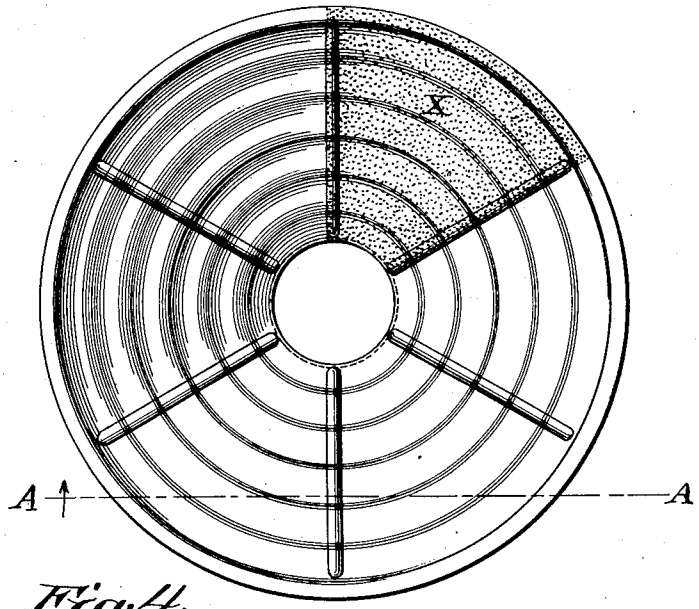
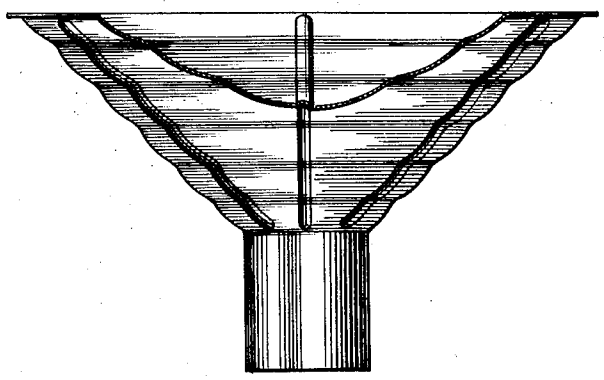


Fig. 4.



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Patented May 3, 1932

1,856,791

UNITED STATES PATENT OFFICE

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VIBRATOR FOR LOUD SPEAKERS

Application filed April 8, 1931, Serial No. 528,695, and in Japan January 27, 1931.

This invention relates to improvements in the construction of vibrators for loud speakers. The object of the invention is to produce a light-weight vibrator which is able to resist the distorting effect of the electrical sound impulses and hence to reproduce clear, undistorted sounds without materially increasing the weight of the vibrator.

The essential requirements of a good vibrator for a loud speaker are (1) the lightness in the weight and (2) the stiffness of the vibrator in order to effect the exact reproduction of the transmitted electrical sound waves into mechanical vibrations without distortion. In order to approximate these requirements, it has been the general practice heretofore, to use a light and thin paper and other suitable materials in the forms of a semi-sphere, cone and other similar shapes of smooth or corruagted surfaces. These constructions, however, fall short of the second essential requirement above mentioned. As the result, therefore, they incur the disadvantage of being liable to undesirable distortions. Because of these distortions the sounds produced by the loud speakers equipped with such vibrators lack the desired clearness and naturalness.

According to the present invention, this difficulty is overcome by providing several appropriate and balanced stiffening members preferably comprising radial grooves or projecting ridges on the surface of the vibrator, the latter being made of paper, cloth or other suitable materials of either smooth or corrugated type. When the vibrator is made of several plies of thin paper, cloth, or other suitable materials, the sheets are so cut and put together as to overlap each other at each groove or projecting ridge, thus making those portions doubly stiff and obviating the tendency towards undesirable distortions without material increase to the weight of the vibrator.

The accompanying drawings illustrate by way of example one embodiment of the invention,

Fig. 1 being a plan view of a vibrator of the smooth surface type;

Fig. 2 a sectional elevation thereof on line A—A of Fig. 1;

Fig. 3 a plan view of a vibrator of the corrugated type, and

Fig. 4 a sectional elevation thereof on line A—A of Fig. 3.

The vibrator may be prepared as follows:—

First, wooden pattern for the cone, either corrugated or smooth, is prepared with radial grooves corresponding to grooves *b* of the cone B. Then, an extremely thin and light sheet of Japanese paper is cut to the shape and size exactly to fit and cover the segmental areas from groove to groove, inclusive, as indicated at X in Figures 1 and 3. These segmental paper pieces are carefully and evenly pasted in layers on the pattern until the cone acquires sufficient strength. Inasmuch as the edges of the adjacent segmental pieces overlap at each groove, the thickness at the grooves is twice that of the intermediate parts. In this way a substantial reinforcement of the grooves is effected, resulting in greatly increased strength to the cone without materially increasing the weight of the cone itself. For this reason, the conical vibrator made in accordance with this invention as described above has the characteristics of producing clear, natural and undistorted sound vibrations.

In the accompanying claims, the term "ridges" is to be understood in a comprehensive sense as embracing grooves, ribs, corrugations or other equivalent reinforcements or stiffened portions.

What is claimed is:

1. A vibrator for a loud speaker provided with reinforced radial ridges.

2. A vibrator for a loud speaker formed of a web of light material having radial ridges, said material being of greater thick-

ness in the line of said ridges than elsewhere.

3. A vibrator for a loud speaker, provided with radial ridges, said vibrator being made from segmental pieces which overlap at said ridges.

4. A vibrator for a loud speaker provided with radial reinforcing ridges, said vibrator being formed of several plies of suitable light materials, the several plies comprising segmental pieces which overlap at the said ridges.

In witness whereof, I hereunto subscribe my name this 27th day of February, 1931.

FUMIO SHIDA.