June 10, 1930. M. C. HOPKINS 1,763,054

LOUD SPEAKER

Original Filed Jan. 7, 1927

Fig. 1.

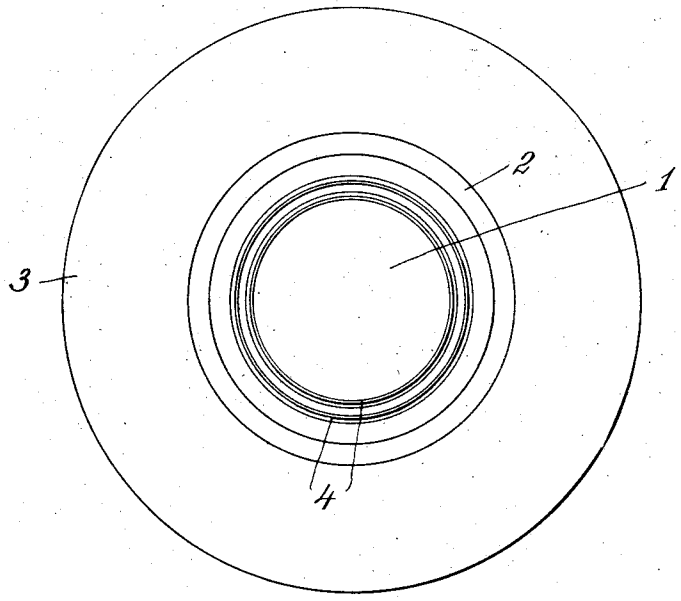


Fig. 2.

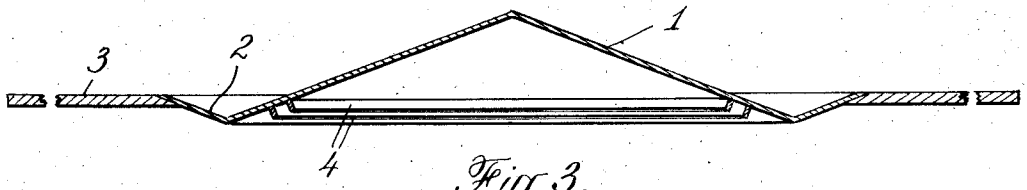
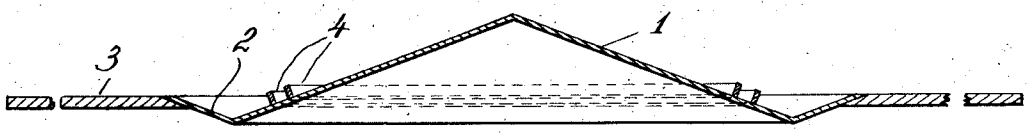


Fig. 3.



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UNITED STATES PATENT OFFICE

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LOUD-SPEAKER

Application filed January 7, 1927, Serial No. 159,554. Renewed April 22, 1930.

This invention relates to sound reproducing devices of the loud speaker type and particularly to an improved diaphragm for use therein.

The invention has special reference to loud speakers having a relatively large diaphragm, which, due to its large size, is liable to distortion and warping to such an extent as to produce inaccurate and untrue sound reproduction. The invention is particularly applicable to diaphragms of the conical type. When conical diaphragms are made of large diameter, the inherent strength of the conical formation becomes less apparent and therefore, they are liable to distortion particularly adjacent the outer edge of the cone.

Although the improvement to be herein described is applicable to any diaphragm, which is subject to the above noted objections, it was particularly intended for use in a loud speaker of the type disclosed in my copending application, Serial No. 77,033 filed December 22, 1925. In that application a cone made of relatively light and stiff cover paper is surrounded by a sound board or resonator, there being a flexible connection between the cone and the sound board such that the cone responds to the high frequencies and perhaps the intermediate frequencies while the low frequencies are transmitted through the flexible connection to the sound board. In such a device if the outer portion of the cone is liable to distortion, the intermediate frequencies are not accurately reproduced and the low frequencies are not accurately transmitted to the sound board.

The object of the present invention is to so construct the diaphragm as to eliminate any distortion at the places above mentioned. This is accomplished by securing to the diaphragm, near the outer edge thereof, one or more ring like members which act as annular stiffening ribs, each forming a continuous circumferential contact with the face of the diaphragm, and thereby maintaining the diaphragm in true and accurate form. I have found that these stiffening ribs may be made in a simple, inexpensive and practical way by forming them of relatively thin strip material and securing edgewise against the face of the diaphragm. When so made they fully answer the purposes above set forth.

The preferred embodiment of the invention is illustrated in the accompanying drawing in which

Fig. 1 is a rear view illustrating the diaphragm in assembled relation with the sounding board of a loud speaker unit, and

Fig. 2 is an enlarged sectional view thereof.

Fig. 3 is a sectional view of the modification.

Referring to the drawings in detail the improved device comprises a conical diaphragm or tympanum 1, constructed of relatively light and stiff cover paper, being secured around its outer edge, by a flexible connection 2, to a sound board or resonator 3. This is the preferred construction and arrangement in which it is contemplated to use the improved diaphragm, which unit is described in more detail in applicant's co-pending application for loud speaker, Serial No. 77,033, filed December 22, 1925.

As an improvement on the diaphragm as disclosed in the application above referred to, in the present instance the diaphragm 1 is provided with one or more ring-like members 4. These ring-like members are preferably constructed of relatively thin material similar to that used for the construction of the diaphragm 1, and are secured edgewise against the inner face of the diaphragm 1 and preferably at right angles thereto as shown in the drawing.

As hereinbefore stated where these conical diaphragms 1 are made in large sizes they lose considerable of the inherent strength and stiffness of the conical shape, resulting in a tendency towards slight distortion at points around the circumference of the cone adjacent its outer edge where it is connected at 2 to the sound board 3.

It will be perfectly obvious that where there is distortion of any part of the cone a true and accurate regeneration of sound cannot be obtained and as this distortion is more apparent adjacent the outer edge of the cone where the low tones are transmitted to the sound board these low tones will not be reproduced in a true and accurate manner and

it is therefore, at these points adjacent the outer edge of the diaphragm that the annular or ring-like members 4 are secured.

The invention has been described in connection with a conical diaphragm but is equally applicable to any type of substantially conical or flat diaphragm where the same defect, as above outlined, is apparent and sought to be overcome. The preferred construction as illustrated also shows only two ring-like or annular members 4 but it is within the scope of the present invention to provide any number, more or less, of these members 4 as the occasion may demand.

If desired the annular reinforcing members 4 may be secured to the convex side of the cone as shown in Fig. 3.

What I claim is:

1. In a sound reproducer, the combination with a conical diaphragm, of a series of ring-like members of relatively thin strip material, secured edgewise against the dished face of said cone.

2. In a sound reproducer, the combination with a conical diaphragm, of a series of ring-like members of relatively thin strip material, secured edgewise against the dished face of said cone and at right angles thereto.

3. In a sound reproducer, the combination with a conical diaphragm, of a series of ring-like members of relatively thin strip material, secured edgewise against the dished face of said cone, intermediate the apex and base thereof and at right angles thereto.

4. In a sound reproducer, the combination with a conical diaphragm, of a series of ring-like members of relatively thin strip material, secured edgewise against the dished face of said cone, adjacent the outer edge thereof and at right angles thereto.

5. In a sound reproducer, the combination with a conical diaphragm, of a sound board secured to the outer edge of said diaphragm, a series of ring-like members of relatively thin strip material secured edgewise against the dished face of said conical diaphragm, at right angles thereto and intermediate the apex and base thereof.

6. In a sound reproducer, the combination with a conical diaphragm, of at least one ring-like member of relatively thin strip material secured edgewise against one face of the conical diaphragm intermediate the apex and base thereof and at right angles thereto.

7. In a sound reproducer, the combination with a diaphragm of at least one continuous ring-like member of relatively thin strip material secured edgewise against one face of the diaphragm and at right angles thereto.

In testimony whereof I affix my signature.

MARCUS C. HOPKINS.