Dec. 24, 1929. E. HUETER 1,740,651

SOUND GENERATOR

Filed Jan. 30, 1925

Fig. 1.

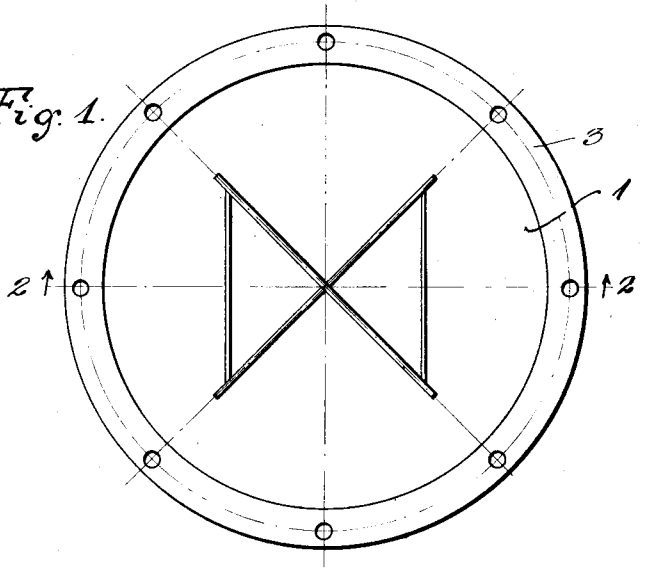


Fig. 4.

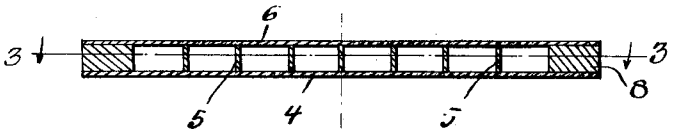


Fig. 3.

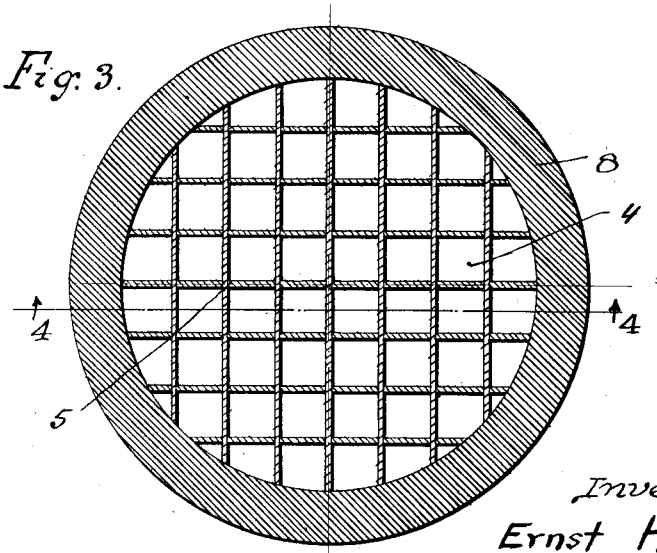
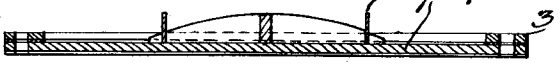


Fig. 2.



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UNITED STATES PATENT OFFICE

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SOUND GENERATOR

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The present invention refers to diaphragms which, for practical reasons, are mainly used as generators, viz flat or differently shaped objects, actuated mechanically or by electricity. Such generator diaphragms have the disadvantage of not reproducing speech and music accurately, for instance, owing to distortion. These distortions are principally due to the resonance propensities of the regular diaphragm, inasmuch as, on one hand, sound frequencies near the natural frequency of the respective diaphragm are, relatively, reproduced much louder than sounds beyond this zone; and on the other hand, the natural vibrations of the object rise above the forced, i. e. the intended vibration. All of this is based upon the fact that the diaphragm has a mass, as well as resetting power, and thus becomes a vibrating system (a diaphragm actuated in one direction by the impulse to be reproduced and in the opposite direction by the resiliency of the diaphragm).

That is to say, if the mass of the diaphragm is great, resonance makes the energy required to oscillate the diaphragm large and a large force is necessary to return the diaphragm after it is deflected. If the weight of the diaphragm can be made small, the required resetting force inherent in the diaphragm may be correspondingly small. The diaphragm thus requires a smaller force to operate, it may be less rigid, and accordingly may be made thinner.

The object of the present invention is the creation of a diaphragm showing a non-pronounced resonance curve, i. e. one as flat as possible, in order to warrant a better reproduction, as free from distortion as possible, thereby causing a quicker succession of the natural vibrations. According to the invention this end is gained by the reduced weight of the vibrating system, whereby the resetting power may be reduced in the same degree, without changing the natural frequency of the system. Generally speaking, the natural frequency of a system serving as a generator, unless one is willing to stand a number of drawbacks, must be near the center of the register of speech frequencies. According to the present invention, by the specific construction of the diaphragm, one succeeds in greatly reducing the weight of the system, and at the same time in retaining such an amount of the resetting power as to keep the natural frequency of the diaphragm less pronounced within the desired zone, which leads to an improved reproduction of the sound.

The diaphragm of the invention consists of a (lattice) network, so arranged as to have a relatively large expansion vertically to the diaphragm plane, and upon which, as a working diaphragm, a homogeneous material is placed, in order to secure the required firmness, at the smallest weight.

The annexed drawing shows a generator diaphragm corresponding to the invention, in two forms:

Fig. 1 is a plan view of one form of my invention.

Fig. 2 is a cross sectional view on line 2—2 of Fig. 1.

Fig. 3 is a plan view of a second form of my invention taken on line 3—3 of Fig. 4.

Fig. 4 is a cross sectional view of the second form of my invention on line 4—4 of Fig. 3 with the upper plate removed to facilitate illustration.

In the form shown in Figs. 1 and 2, the diaphragm consists of plate 1, to which a number of reinforcing stays 2 have been attached. These stays need not be arranged symmetrically. They may be placed irregularly, thereby obtaining a greater number of divisional natural frequencies. A reinforcing ring 3 is provided about the periphery of said diaphragm.

A diaphragm with a relatively great resetting power, of light weight, is produced by employing the principles of my invention. Iron foil, for instance, may be used for the material of the diaphragm, as this will obviate an increase in the efficient weight, which would follow through additional iron plates or other armature needed wherever the diaphragm is actuated by magnetic power. If in such case the foil is not strong enough to receive the magnetic power lines, it may be reinforced by additional layers, in the respective place, or by using heavier foil from the beginning.

One form of such arrangement is shown in Figs. 3 and 4. The diaphragm consists of plates 4 and 6, made of suitable material, which plates are separated by network 5, and reinforcing ring 8.

The coverings for the lattice work are thin, homogenous and elastic and the lattice work itself is very light in weight. In one of the preferred forms of the invention, the plate 1 is made of a thin wood layer with wooden slats. In Fig. 3 the plates 4 and 6 are thin wooden layers and the lattice work 5 and the rim 8 are of wood or other light weight porous material. I have obtained successful operation with the plates 4 and 6 constructed of paper and the lattice work 5 and rim 8 of cork.

Such diaphragms, without great increase in weight, may be made large enough to dispense with an acoustic horn or amplifier to secure the required sound effect.

Claims:

1. A sound reproducer having a diaphragm comprising a sheet of elastic material and a plurality of reinforcing members of porous material and a second sheet of elastic material secured to said reinforcing members in spaced relation to said first mentioned sheet and a rim member connecting the peripheries of each of said sheets and predetermining the spacial relation thereof.

2. A sound reproducer having a diaphragm comprising a layer of wood, a plurality of reinforcing members extending at angles to each other across said diaphragm and a second layer of wood mounted on said reinforcing members in spaced relation to said first mentioned layer of wood and a rim member connecting the peripheries of said layers and predetermining the spacial relation thereof.

In testimony whereof I affix my signature.

ERNST HUETER.