March 15, 1938. C. A. HARTMANN 2,110,908

MEANS FOR DAMPING ACOUSTIC APPARATUS

Filed March 6, 1935

FIG. 1

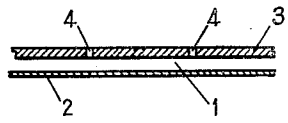


FIG. 3

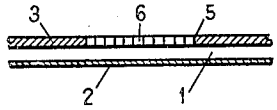


FIG. 2

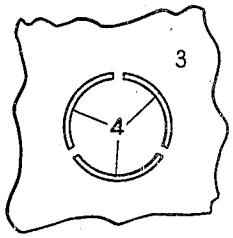


FIG. 4

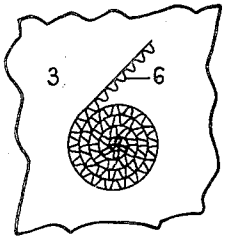


FIG. 5

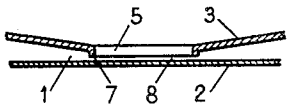


FIG. 6

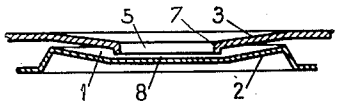
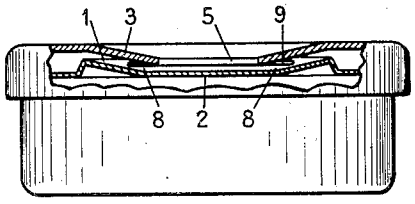


FIG. 7



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MEANS FOR DAMPING ACOUSTIC APPARATUS

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3 Claims. (Cl. 181—31)

The invention relates to an oscillation system for acoustic apparatus especially for electro-acoustic instruments such as telephones, microphones, and the like, having a resonance chamber for the oscillating body or diaphragm.

The invention is directed to the means for improving sound transmission by damping the resonance of the diaphragm or oscillating body. To obtain good frequency curves it is necessary to damp the existing resonance and particularly the inherent self resonance of the oscillating body. There are several means available for obtaining the desired damping which may, for example, consist in the influencing of the oscillating body through the air present in the resonance chamber.

The invention relates to the aforesaid type of apparatus for damping the oscillating body and is characterized in that the resonance chamber formed by the body, and the covering arranged in front of it, remains in contact with the outside air through narrow channels with the object of affording a high frictional resistance to the air currents emerging through the apertures. An experiment has shown, and good results are obtained in the arrangement in which the degree of the desired effect of the oscillating body depends on the size of the air channels in the resonance chamber. The velocity of the air currents, as is well known, becomes greater as the flow channels are made narrower. This effect permits further improvement in that the air channels are arranged in such a position in the resonance chamber that the air currents generated therein are dissipated in a direction as far as possible parallel to the surface of the oscillating body or diaphragm.

Several modifications of the application of the invention are illustrated in the drawing.

In the examples illustrated in Figs. 1 to 6 only the central portion of the covering placed in front of the membrane or diaphragm is shown, together with part of the membrane behind it. They are shown in section and in plan, the remaining parts of the oscillating system being omitted.

Figure 7 is a side view of a telephone receiver unit with a part in section showing the oscillating system.

In all the examples the resonance chamber 1, in front of membrane or diaphragm 2, is bounded by the protective cover 3 above and around on the side walls, and remains in contact with the outside air through an opening or channel in the center of the protective cover 3.

As an example, Figures 1 and 2 represent the channels as a number of narrow annular slits 4 in the protective cover 3. As these slits, in practice have only a very small diameter or width, depending upon the size of the resonance chamber, the air currents produced by the oscillations of the diaphragm are forced to escape through these narrow slits to the exterior, thereby setting up considerable frictional resistance which results in the damping of the diaphragm so that its capacity for sound transmission is substantially improved. The openings may be varied to fit the characteristics of the diaphragm and the resonance chamber.

Instead of annular slits the protective covering can also be provided, as in the examples of Figures 3 and 4, with a space 5 which is covered by a coiled metal strip 6. The strip 6 is constructed for example by corrugation so that in the coiled position minute air channels are formed by the corrugations through which the connection between the resonance chamber 1 and the outside air is established.

In the example shown in Figures 5 and 6 the protective covering 3 is provided with a central circular aperture 5 whose margin is enlarged by being bent around at 7 towards the diaphragm membrane 2 so that in this way a very narrow annular space 8 is produced determined by the extent of the flange, for the passage of air from the resonance chamber 1 outwards. By this arrangement the air currents at the annular space 8 preserve a flow that is more nearly in a direction parallel to the surface of the diaphragm. By suitably adapting the protective covering 3 to diaphragm 2 this effect can be increased, for example by the use of a conical shaped diaphragm, the protective covering 3 is given the same form on its inner side as the diaphragm, as shown in Figure 6.

The example in Figure 7 which represents a telephone receiver unit differs from the others especially in that the small air channels which are formed by a thin annular disc 9 of aluminum or some other metal, which is arranged between diaphragm 2 and the protective cover 3 around the central aperture 5 of the covering 3 to which it is connected. An annular air space 8 is formed around the under side of the outer edge of the disc 9 through which the air currents are made to flow in a direction that is parallel to the diaphragm and accomplish the desired damping. The degree of damping can be adjusted by means of the size of disc 9 or the position of the opening 8. Of course, as in all the above examples, the size of the air gap constitutes an important

feature and it can be varied within wide limits.

Having described the invention, what is considered to be new and is desired to be protected by Letters Patent will now be set forth in the following claims.

What is claimed is:

1. In an acoustic apparatus, a casing having a cone-shaped cover, a cone-shaped vibratory diaphragm in said casing, said cover and said diaphragm mounted one inside the other so that the sides of the cones are parallel, a resonance chamber formed in said casing between the parallel sides of said cover and said diaphragm, said cover having an aperture therein to permit said diaphragm to have access to the outside air through said resonance chamber, an annular disc mounted on the inside of said cover around said aperture and extending diagonally between the parallel surfaces toward said diaphragm but out of contact therewith, said disc operating to dampen the movements of said vibratory diaphragm by controlling the air currents generated by the vibratory diaphragm so that they take place in a direction at an angle with respect to the movement of the diaphragm and between the disc and the vibratory diaphragm.

2. In an acoustic apparatus, a casing having a cover, a vibratory diaphragm in said casing, a resonance chamber formed between said diaphragm and said cover, said cover and said diaphragm having their center parts cone-shaped with the surfaces of the cones parallel to each other, and a separate flat disc on said cover extending into said resonance chamber between the cone-shaped surfaces for damping the movements of said vibrating diaphragm.

3. In an acoustic apparatus, a casing having a truncated cone-shaped cover, a truncated cone-shaped vibratory diaphragm in said casing, said cover and said diaphragm mounted one inside the other so that the sides of the cones are parallel, a resonance chamber formed in said casing between the parallel planes of said cover and said diaphragm, said cover having an aperture in the small end to permit said diaphragm to have access to the outside air, and an annular disc mounted on the inside of said cover around said aperture and extending horizontally with respect to the base or top of said cone-shaped cover toward said diaphragm, operating to dampen the movement of said vibratory diaphragm by limiting the passage of air currents between the resonance chamber and the outside air.

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