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H. HECHT

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DIAPHRAGM ESPECIALLY FOR SOUND RECEIVING AND RADIATING APPARATUS

Filed Feb. 9, 1925

Fig. 1.

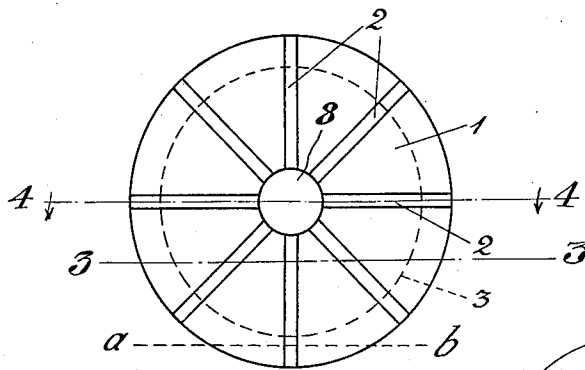


Fig. 2.

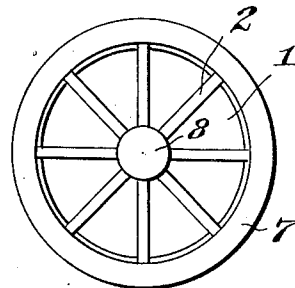
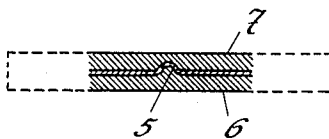


Fig. 5.

Fig. 3.

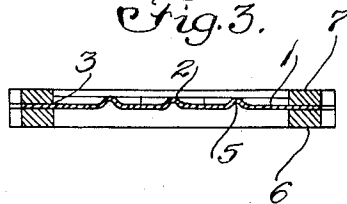


Fig. 4.



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DIAPHRAGM ESPECIALLY FOR SOUND RECEIVING AND RADIATING APPARATUS

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The invention relates to the structure of a diaphragm for producing oscillations especially for apparatus producing or receiving sound in any medium as for instance for telephones or the like.

The problem of the invention consists in producing a diaphragm of a high natural frequency with as small a mass as possible. For similar purposes it has hitherto been proposed to provide upon diaphragms stiffening ribs or the like extending radially from the central zone of the diaphragm towards the rim. In all these cases however the ribs do not extend to the fastening means between which the rim of the diaphragm is held. This construction is therefore objectionable since between the clamping means of the diaphragm and the outer ends of the ribs there will be a flexible zone depending for its size upon how near to the clamping means the ribs extend, which zone lessens considerably the stiffening effect of the ribs.

On the other hand according to the present invention the stiffening ribs of the diaphragm are extended to the rim of the diaphragm so as to be held along with the diaphragm itself by the fastening means at the rim.

The invention may be understood more clearly from the following description and the drawing in which—

Figure 1 shows a plan view of the diaphragm and

Figure 2 shows a section of the diaphragm and clamping means, the diaphragm section taken on the line *a—b* of Figure 1.

Figure 3 shows a similar section as Figure 2, taken on the line *3—3* of Figure 1.

Figure 4 shows a similar section on line *4—4* of Figure 1, and

Figure 5 shows a modification.

In Figure 1 stiffening ribs 2 of the diaphragm 1, which is constructed of metal or other suitable material, extend in a radial direction from the middle zone or heavy central portion 8 of the diaphragm to the very edge of the diaphragm. The dotted line 3 represents the inner edge of fastening flanges between which the diaphragm is held. It may clearly be seen in this figure that the ribs extend over the whole flange 3.

Figure 4 indicates clearly the construction of the central portion of the diaphragm. From the figure it will be noted that the highest portion of the ribs is flush with the top of the central zone 8, while the lowest part of the ribs is flush with the bottom of the central zone 8, so that the depth of the ribs or corrugations is equal to that of the central zone.

As stiffening ribs shown in Figure 1 may be pressed in the metal sheet of the diaphragm itself, the clamping means should be formed so as to fit snugly not only to the plane of the diaphragm but also to the concave and convex faces of the ribs as is shown in Figure 2, which as stated above is a cross section of Figure 1, on the line *a—b*. For this purpose the lower clamping surface 6 is provided with ribs fitting into the grooves on the diaphragm and the upper flange 7 with corresponding grooves fitting over the diaphragm ribs as shown at 5 in Figure 2.

Naturally the invention is not limited narrowly to radiating diaphragms for sound apparatus but may be applied to all cases in which oscillations of relatively high frequency have to be produced by means of an oscillatory system of as small mass as possible. As to the design of oscillatory structures according to the present invention one may choose any desirable form or structure. For example it is not absolutely necessary that the whole diaphragm itself be held by the flanges 6, 7, if the ribs are clamped at the outer ends in a satisfactory manner as shown in Figure 5. In its broadest sense the invention consists of a diaphragm structure the extraordinary stiffness of which is obtained by substantially radial stiffening means which extend from the center of the diaphragm into the clamping means so that no zones of flexure are allowed anywhere. The diaphragm 1 may be formed by stamping it out of a piece of metal in which case the ribs may at the same time be stamped into the diaphragm and then clamped between suitable clamping means or the ribs may be welded on a plain diaphragm or, as another alternative, the diaphragm with the ribs and the flange may be

cast as one piece, any of which ways may be employed in practising the invention.

The advantages of the invention are that in the above manner of construction, oscillatory diaphragms are obtained of very high rigidity and of relatively very small mass, and that diaphragms of this kind are surprisingly insensitive to variations of temperature. The pitch of such diaphragms and the air space between the diaphragm and the magnetic field, when used in electromagnetic apparatus, are remarkably constant since there is no tendency for the diaphragm to expand or contract.

What I claim is:

1. In an oscillatory diaphragm, stiffening ribs and a thick rim portion to which said stiffening ribs are rigidly attached.

2. In an oscillatory diaphragm, stiffening ribs, a central zone forming a part of the diaphragm and a thick rim portion, said stiffening ribs being rigidly connected to both said central zone and said thick rim portion.

3. In an oscillatory diaphragm, stiffening ribs and a thick central portion, said stiffening ribs being connected rigidly to said thick central portion.

4. In an oscillatory diaphragm, stiffening ribs extending radially to the rim of the diaphragm and a thick rim portion to which said stiffening ribs are rigidly connected.

5. In an oscillatory diaphragm, hollow radial stiffening ribs pressed into the diaphragm and extending to the clamping edge at the rim of the diaphragm.

6. In an oscillatory system comprising a diaphragm including hollow radial stiffening ribs and fastening means at the rim portion of the diaphragm, the said ribs extending between the said fastening means and the said fastening means being provided with ribs and grooves corresponding to the ribs on the diaphragm.

7. An oscillatory diaphragm of light weight and high pitch comprising a circular plate having radial corrugations, a clamping rim for clamping the edge of the diaphragm, said radial corrugations extending beyond the inner edge of the clamping rim.

8. An oscillatory diaphragm of light weight and high pitch comprising a circular plate having a solid central portion and radial corrugations, a clamping rim for clamping the edge of the diaphragm, said radial corrugations extending therefrom beyond the inner edge of the clamping rim.

In testimony whereof I affix my signature.

HEINRICH HECHT.