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M. C. HOPKINS

1,763,055

LOUD SPEAKER

Filed Jan. 7, 1927

Fig. 1

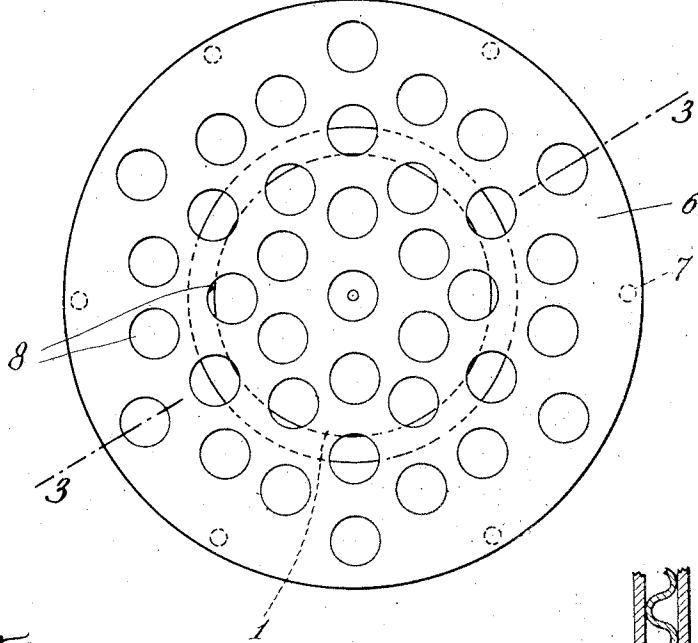


Fig. 2,

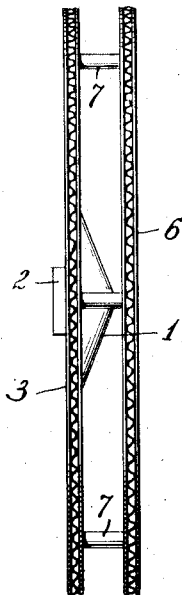


Fig. 4,

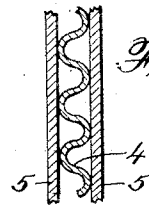
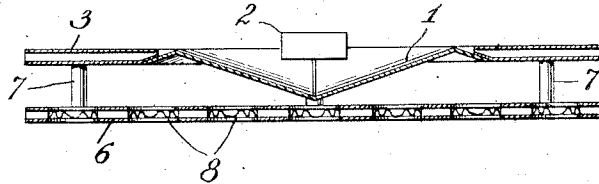


Fig. 3,



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LOUD-SPEAKER

Application filed January 7, 1927. Serial No. 159,555.

The present invention relates to a loud speaker suitable for use with radio-receiving sets or as announcers for telephone and like wired circuits, which will reproduce the sound waves without the distortion of a horn or other amplifying device, the sound so re-generated retaining substantially the same balance of high and low tones as the original sound from which the actuating force was derived.

The loud speaker of this invention, like the loud speaker described in my copending application Serial No. 77,033, filed Dec. 22, 1925, comprises a central relatively light and stiff diaphragm or tympanum preferably conical in shape, and a surrounding external sound board or resonator. In such loud speakers the central diaphragm responds to the relatively high frequencies and will effectively reproduce the high tones or sounds, and the relatively low frequencies will be transmitted to the sound board so that it will respond to the relatively low frequencies and will effectively reproduce them.

It is desirable that the sounding board or resonator have an area substantially greater than the area of the central diaphragm, and the principal object of the present invention is to provide a loud speaker having a sounding board of ample area without unduly increasing the size of the speaker. To this end, I have provided a supplemental sounding board having a periphery substantially coextensive with the periphery of the main sounding board, and have mounted it so that it extends substantially parallel with said main sounding board and is connected thereto at intervals adjacent its outer periphery to the outer periphery of the main board. By thus connecting the outer edges of the two sounding boards together, the vibrations from the diaphragm will be imparted to the sounding board surrounding it, which, in turn, will transmit the vibrations when they reach its outer edge, to the second or supplemental sounding board.

If the sound waves are to be reproduced clearly and without distortion, it is essential that the supplemental sounding board shall not interfere with the sound coming

from the central diaphragm and the sounding board. In order to obstruct the sound waves emanating from the sound board and from the diaphragm as little as possible, the supplemental diaphragm is provided with relatively large apertures through which the sound may readily pass.

A further object of the invention is to provide a sounding board which will reproduce the relatively low frequencies as effectively as possible, and to this end, the invention comprises the use of corrugated board for the formation of the sounding boards.

The preferred form of my invention is illustrated in the appended drawings, in which

Figure 1 is a front view of the loud speaker embodying my invention;

Fig. 2 is a side view of the same;

Fig. 3 is a central sectional view taken through the loud speaker on line 3—3 of Fig. 1; and

Fig. 4 is a detail sectional view of the sounding board.

In the drawing, the numeral 1 designates the central diaphragm or tympanum which is preferably of conical shape and actuated in the usual manner by an electrical actuating mechanism 2. While the electrical actuating mechanism may be of any desired construction, I prefer to use an electrical movement such as is shown and described in an application I have filed concurrently herewith. Surrounding the diaphragm 1 is a sounding board 3 which, according to the present invention is made of corrugated board. As shown in the drawing the diaphragm has a forwardly bent edge which is secured to the sounding board 3. The forwardly bent edge of the diaphragm constitutes a connection between the diaphragm and the sounding board which has sufficient flexibility to permit the diaphragm to respond to relatively high frequencies and which has sufficient stiffness to transmit the relatively low frequencies to the sounding board, as explained in the co-pending application above referred to, Serial No. 77,033. This corrugated board, as shown in Fig. 4, is a well known type of board which is readily

obtainable on the market and comprises a central corrugated sheet 4 with uncorrugated paper sheets 5 secured to each side thereof.

For efficient reproduction of the sound waves it is necessary that the sounding board which is adapted to reproduce the relatively low frequencies shall be of a certain proportion with respect to the size of the central diaphragm. In order that the outside dimensions of the loud speaker may be reduced to a minimum without affecting the reproducing qualities of the speaker due to a decrease in the size of the sounding board, I have provided a supplemental sounding board or resonator 6, which is preferably arranged in front of the diaphragm 1 and the sounding board 3, and which is spaced parallel therefrom. This supplemental sounding board, like the main sounding board which surrounds the central diaphragm, is made of corrugated board so that the sounds which it reproduces will be clear in tone and not distorted.

In order that the supplemental sounding board may receive the vibrations from the main sounding board I have provided suitable connecting members 7 for connecting the outer edges of the two sounding boards together. These connections preferably comprise connecting posts which are arranged at intervals around the periphery of the speaker. By thus arranging the connecting members 7 at intervals, the sound waves which emanate from the main sounding board and from the diaphragm are allowed to pass out between the two sounding boards. It is also necessary that the sound waves which emanate from the sounding board and the diaphragm shall be permitted to pass straight out without material interference. In order that this may be accomplished, I have provided the supplemental sounding board with a plurality of relatively large apertures 8 arranged over substantially the entire surface of the sounding board. These relatively large apertures allow the sound waves to pass through the supplemental sounding board with a minimum of interference and without distortion.

It will thus be seen that I have provided a loud speaker which has a sounding board of ample size with respect to the diaphragm without materially increasing the size of the speaker as a whole, and that the vibrations which are transmitted from the central diaphragm to the main sounding board, will, when they reach its outer edge be transmitted through the connecting members 7 to the supplemental sounding board 6, which will effectively aid the main sounding board in reproducing the relatively low frequencies without in any way affecting or materially interfering with the sound waves emanating from the main sounding board and the diaphragm.

As the central diaphragm is located be-

tween the spaced parallel sounding boards, it will be readily seen that the entire speaker may be easily covered with an ornamental material through which the sound waves may readily pass and that the speaker may be placed upon the market as an artistic article well adapted for use in public places or in homes.

I claim:

1. A loud speaker comprising a diaphragm, a plurality of parallel spaced resonators of corrugated board, means for transferring vibrations from the diaphragm to one of the resonators and means for transferring vibrations from one of the resonators to the other.

2. A loud speaker comprising a diaphragm, a plurality of spaced parallel resonators made of corrugated board, one of said resonators having a plurality of openings therein, means for transferring vibrations from the diaphragm to one of the resonators and means for transferring vibrations from one of the resonators to the other.

3. A loudspeaker comprising a diaphragm, a sounding board, a connection between the edge of the diaphragm and the sounding board having flexibility sufficient to permit the diaphragm to respond to relatively high frequencies and having stiffness sufficient to transmit the relatively low frequencies to the sounding board, a supplemental sounding board and means for transferring vibrations from the first sounding board to the supplemental sounding board.

4. A loudspeaker in accordance with claim 3 in which the supplemental sounding board is parallel to the first sounding board.

5. A loudspeaker comprising a conical diaphragm, a sounding board, a connection between the edge of the conical diaphragm and the sounding board having flexibility sufficient to permit the conical diaphragm to respond to relatively high frequencies and having stiffness sufficient to transmit the relatively low frequencies to the sounding board, a supplemental sounding board and means for transferring vibrations from the first sounding board to the supplemental sounding board.

6. A loudspeaker in accordance with claim 3 in which the supplemental sounding board is parallel to the first sounding board and wherein the means for transferring vibrations from the first sounding board to the supplemental sounding board are arranged adjacent the outer edges of the sounding boards.

7. A loud speaker in accordance with claim 3 wherein the said sounding boards are formed of corrugated board.

In testimony whereof I affix my signature.

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