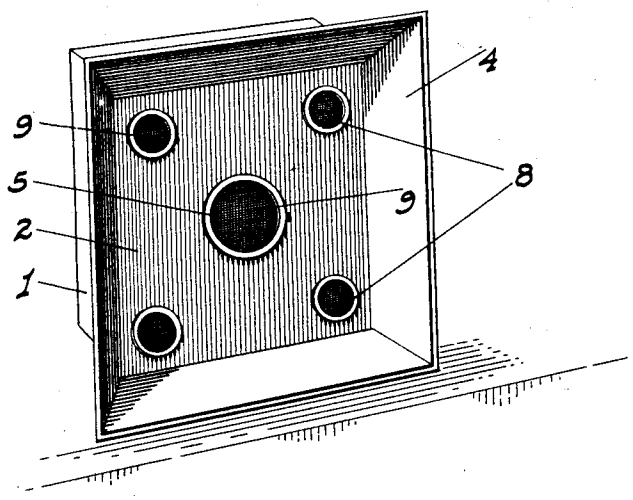
Aug. 30, 1932. LE ROY A. SPRAGUE ET AL 1,875,171

SOUND PROJECTING APPARATUS

Filed Aug. 14, 1929

Fig. 1



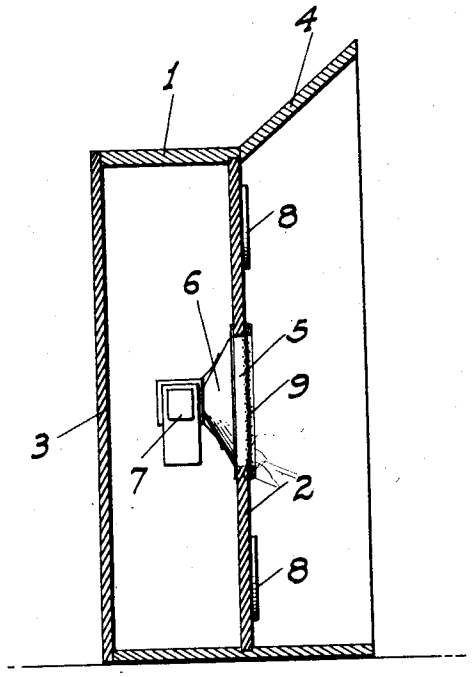


Fig. 2

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SOUND PROJECTING APPARATUS

Application filed August 14, 1929. Serial No. 385,917.

This invention relates to sound projection, and particularly to an apparatus to be employed in conjunction with a loud speaker such as is used in radio and other sound amplifying apparatus for the purpose of projecting the sounds emanating from such speakers a greater distance than is possible with the loud speaker alone.

The principal object of our invention is to provide an apparatus, adapted to be mounted in connection with any standard loud speaker of the dynamic or cone type, so arranged that practically all sound waves released on the outside or back of the speaker cone will be utilized and projected into the atmosphere in a common direction with those issuing from the interior of the speaker. Not only therefore is the total volume of sound increased but such inside and outside waves are projected in such synchronized and harmonious relation to each other as to cause the sound to carry much further, with a relatively slight decrease in volume, than has previously been thought possible, and with no decrease in the clarity of the tones.

Our improved projection apparatus is therefore very adaptable for use in theaters showing talking pictures, since the voices or music are distributed with practically equal volume and clearance to all parts of the theater.

The apparatus is also admirably adaptable for the use of speakers or orators at large gatherings, whether indoors or outdoors, who have heretofore lacked any effective means for projecting their voices so as to reach or be intelligible to the entire audience.

The apparatus is also very suitable for permanent mounting on the top of buildings to broadcast therefrom for advertising or for other purposes; and being capable of being made as a portable device it is also useful for mounting on a moving vehicle. This feature also makes the device valuable for advertising purposes, since sounds emanating from the apparatus can be clearly heard a considerable distance from the apparatus and with great clearness even above the ordinary street or traffic noises.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawing similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a perspective view of our improved apparatus.

Fig. 2 is a vertical cross section of the same.

Referring now more particularly to the characters of reference on the drawing, the apparatus comprises a casing or box 1, preferably square in form and somewhat shallow in depth relative to its face area. The sides of the box may be of wood or other relatively vibrationless material, while the front and back of the box are panels 2 and 3 respectively of a material having definite sound insulating or deadening characteristics as to sound waves or vibrations of a certain character only. The parts of the box are rigid and tightly fit with each other. A relatively deep outwardly flaring flange 4 extends about the box and projects from the front of the same. If desired the bottom member of this flange may be flat instead of flaring so as to enable the device to be supported on top of a flat surface of any desired character.

A centrally located orifice 5 is cut in the front panel 2, which orifice is substantially the same size as the mouth of the cone 6 of a standard loud speaker 7, which speaker is located inside the box and is set so that the mouth of the cone has an air-tight fit with the panel about said orifice. Likewise cut in the front panel in symmetrical relation to the central opening and preferably toward the corners of the box are other openings 8. These other openings are all equal size but are smaller than the central opening to an extent such that the combined area of these openings is substantially equal to that of the central opening. These openings 8 merely lead to the interior of the box and are not arranged in direct connection with the loud speaker. If the location of the apparatus demands, the

various openings may be covered by vibrationless screening 9 so as to prevent anything being possibly thrown into the box.

In the operation of the loud speaker the amplified sound waves as generated therein are transmitted to the cone and there are practically as many such waves on the outside or back of the cone as there are on the inside. Ordinarily such outside waves are lost since they are not concentrated and projected in any particular direction and only those on the inside of the cone are utilized; so that the speaker does not operate to its capacity or full efficiency.

With our apparatus however arranged in connection with such a speaker these outside waves are thrown against the back panel 3 and then outwardly and forwardly through the openings 8 in the same direction as the waves projecting directly from the inside of the cone through the central opening 5. The volume of sound projecting in a definite direction from the speaker is therefore practically doubled over what is usually obtained.

At the same time there is of course a slight variation in the time between the projection of the two sets of waves, since the outside or back waves must travel to the back panel and then to the front panel before leaving the apparatus; whereas the inside waves leave the apparatus directly or without any initial deflection of direction. This variation of time is so slight as not to be noticeable to the ear, and also the sound waves appear to be perfectly synchronized. The actual result of this arrangement however is that this slight time spacing between the sets of waves causes the duration of the waves as a whole to be filled out or lengthened, so that the sound carries without much decrease in volume for a considerable distance.

The principle involved may be considered something similar to that had with the production of an echo, except that in this case, as above stated, the lapse of time between the two sets of sound waves is so slight that no appreciable echo effect is obtained. The auxiliary openings 8 being symmetrically disposed relative to the main central opening the sounds all merge and combine evenly and the fact that the combined area of these auxiliary openings is the same as that of the main opening gives them equal sound carrying capacity. Owing to the use of sound deadening material for the front and back box panels against which the sound waves impinge, no vibrations are set up within the box by such waves to interfere with the clarity of the tones projected therefrom. The provision of these auxiliary openings also prevent the inevitable vibration of the cone, which is set up with the action of the sound waves, from tending to compress the air within the box such as would set up drumming or similar noises in the same.

The depth of the box may be varied within reason and somewhat according to the taste or the conditions under which the apparatus is to be operated. This is because deepening the box somewhat increases the depth of the tones and the distance to which they may be projected to attain the desired long range properties of the apparatus; while making the box more shallow sharpens the tones at the expense of the extreme long range.

As previously stated, the panels are sound deadening or absorbing to vibrations of a certain character only. The vibrations in question are those of high frequency and consequently high-pitched or nasal tones, which are absorbed. The low frequency vibrations, or those of low-pitch tonal qualities, are not affected, and are thrown from the back panel and through the openings with practically undiminished volume. This increases the carrying range and volume of these low frequency tones relative to the high frequency tones, without also increasing the volume of the high-pitch tones, so that the two are substantially equalized.

The usual predominance of the high pitch tones, and which causes the sounds emitted from loud speakers to be of "squawky" or nasal character as a whole, is thus eliminated.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention what we claim as new and useful and desire to secure by Letters Patent is:

1. A sound projecting apparatus comprising, in combination with the sound projecting cone of a loud-speaker, a means for projecting the sound waves emanating from the outside surface of the cone in the same direction as those projecting from the interior of the cone, and with approximately the same volume.

2. A sound projecting apparatus comprising, in combination with the sound projecting cone of a loud-speaker, a means for catching the sound waves thrown from the back surface of the cone and projecting them forwardly about and in spaced relation to the cone.

3. A sound projecting apparatus comprising, in combination with the sound projecting cone of a loud-speaker, a box in which the speaker is enclosed, the box having an opening in its front wall with which the mouth of the cone closely registers and having other openings through said front wall in sur-

rounding and spaced relation to said central opening and cone.

4. A device as in claim 3, in which both the front and back walls of the box are of a material having sound deadening properties with respect to high frequency pitches or vibrations.

5. A device as in claim 3, in which said other openings are symmetrically disposed relative to the first named opening and to the sides of the box, said first named opening being located centrally of the area of the front wall.

6. A device as in claim 3, in which the combined areas of said other openings substantially equal that of the first named opening.

In testimony whereof we affix our signatures.

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