Dec. 21, 1943. J. TOPPING, JR 2,337,213

PRESSURE CONTROL LOUD SPEAKER ENCLOSURE

Filed Nov. 3, 1941

Fig. 1.

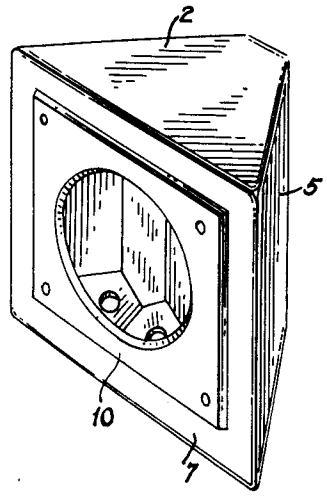


Fig. 2.

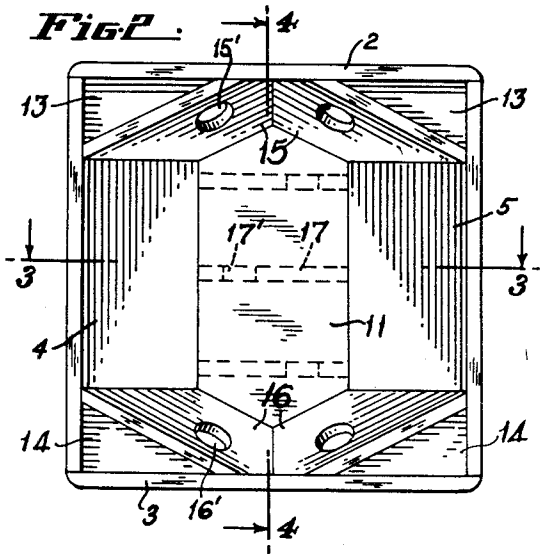


Fig. 3.

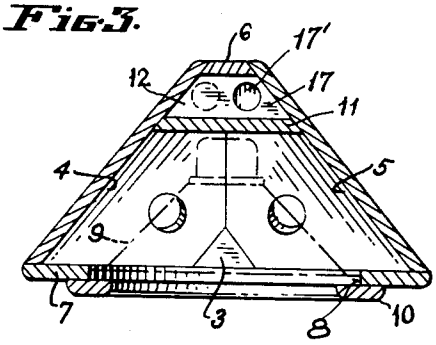


Fig. 4.

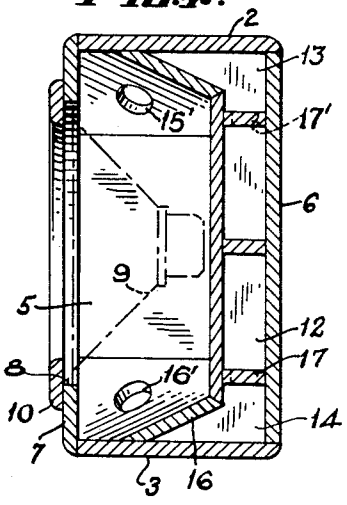
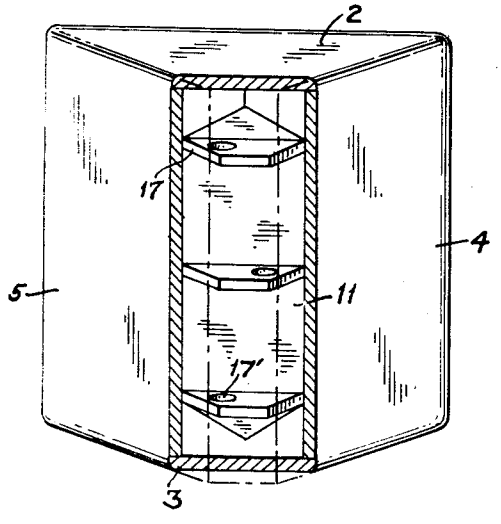


Fig. 5.



INVENTOR.
JOSEPH TOPPING Jr.
BY
J. E. Trabucco
ATTORNEY.

Patented Dec. 21, 1943

2,337,213

UNITED STATES PATENT OFFICE

2,337,213

PRESSURE CONTROL LOUD-SPEAKER ENCLOSURE

Joseph Topping, Jr., San Francisco, Calif.

Application November 3, 1941, Serial No. 417,677

7 Claims. (Cl. 181—31)

This invention relates to improvements in enclosures for loud speakers, and its primary object is to provide an improved enclosure for cone-type loud speakers, having a construction capable of acoustically locking mechanical vibrations at the source of audio sound vibrations, eliminating enclosure pressure disturbance of the original wave form and permitting sound vibration movement into free space without pressure re-shaping and resistance to coil movement.

Another object of my invention is to provide an improved loud speaker enclosure having a built-in acoustic network construction which is capable of improving the performance of a cone-type loud speaker over its entire response range.

A further object of my invention is to provide an improved loud speaker enclosure having a built-in acoustic network which increases considerably the operating efficiency of the loud speaker it encloses.

Other and further objects of my invention will be pointed out hereinafter, or will be indicated in the appended claims, or will be obvious to one skilled in the art upon an understanding of the present disclosure. For the purpose of this application I have elected to show herein certain forms and details of a loud speaker housing representative of my invention; it is to be understood, however, that the embodiments of my invention herein shown and described are for the purpose of illustration only, and that therefore it is not to be regarded as exhaustive of the variations of the invention, nor is it to be given an interpretation such as might have the effect of limiting the claims short of the most comprehensive scope of the invention in the art.

In the accompanying drawing:

Fig. 1 is a perspective view illustrating an enclosure for cone-type loud speakers, embodying the preferred principles of my invention;

Fig. 2 is a front view of the same showing the front side thereof removed;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2; and

Fig. 5 is a rear view showing parts of the enclosure broken away and in section.

In its preferred form my invention comprises a cabinet or enclosure which is of general triangular shape in horizontal cross section. The enclosure is made up of substantially parallel top and bottom sides 2 and 3, two angularly disposed sides 4 and 5, which converge toward and are joined together or to a narrow rear side 6, and a front side 7 having a centrally disposed circular opening 8 through which a cone-type loud speaker 9 is adapted to extend. Suitably secured to the front side 7 is a bezel 10 which carries the loud speaker. Secured at its lateral side edges to the angular sides 4 and 5 and positioned directly to the rear of the central opening 8 is a buffer baffle 11. The upper and lower edges of the buffer baffle 11 are spaced from the enclosure's top and bottom sides 2 and 3, thereby providing upper and lower passageways connecting a rear compartment 12 located between the said buffer baffle and the rear side 6 with forwardly disposed upper and lower compartments 13 and 14. Positioned in the upper part of the enclosure and partially enclosing the upper compartment 13 are two partitions or baffles 15 which extend across the converging corners formed at the juncture of the top 2 with the sides 4 and 5 and which are angularly disposed to one another as well as with respect to the sides 4 and 5, the top 2 and the buffer baffle 11. The partitions 15 at their side edges are secured to one another, to the top side 2, to the angular sides 4 and 5 and to the buffer baffle 11. The forwardly disposed side edges of the partitions 15 abut the front side 7 of the enclosure. The angular position of the partitions 15 is such that the upper compartment 13 is divided into two substantially triangular shaped areas which are joined together at their rear ends, the said joined ends being connected to the upper end of the rear compartment 12. Suitable air holes 15 are provided in the partitions 15 for the passage of sound vibrations from the front chamber within which the loud speaker is housed to the upper compartment 13.

Positioned in the lower part of the enclosure and partially enclosing the lower compartment 14 are two partitions or baffles 16 which extend across the converging corners formed at the juncture of the bottom 3 with the sides 4 and 5 and which are angularly disposed to one another as well as with respect to sides 4 and 5, the bottom 3, the buffer baffle 11 and the upper partitions 15. The partitions 16 at their side edges are secured to one another, to the bottom side 3, to the angular sides 4 and 5 of the enclosure, and to the buffer baffle 11. The forwardly disposed side edges of the partitions 16 abut the front side 7 of the enclosure. The angular position of the partitions 16 is such that the lower compartment 14 is divided into two substantially triangular shaped areas which are joined together at their rear ends, the said joined ends being connected to the lower end of the rear compartment 12.

Suitable air holes 16' are provided in the partitions 16 for the passage of sound waves from the front chamber wherein the loud speaker is housed to the lower compartment 14.

Dividing the rear compartment 12 into a number of areas are substantially horizontal baffles 17, each having an air hole 17' of suitable size and shape for the passage of sound vibrations from one area of the said compartment to another. The air holes 17' are in staggered relationship with respect to one another so that sound waves passing from one area of the rear compartment 12 to another cannot do so without first encountering one of the baffles 17.

The series of partitions, baffles and triangular shaped compartments, being positioned in the manner illustrated serve to break up and finally cancel the slow and sustained sound waves set in motion in the enclosure by the loud speaker. Another function of the series of partitions, baffles and triangular shaped compartments is that of frequency response control with respect to mass motion of the total cone or cones used. The structure comprising the present invention functions in such a manner that the performance of a cone-type loud speaker over its entire response range is considerably improved, thereby materially increasing its operating efficiency. A definite dimensional characteristic is obtained through the cancellation of the loud speaker's back-wave motion, an important phenomenon in the production of natural tones, this being accomplished by reducing to a minimum the wall or surface reflections and lower frequency distortion. By providing within the enclosure suitable pressure control means, over-excursion of the moving cone is unlikely, thereby confining the wave motion distortion content to the coil of the loud speaker located at the center of the cone, and to the electrical circuit. The operating life of the loud speaker is thereby materially prolonged. Inasmuch as the cone-type loud speaker is completely housed and sealed within the enclosure, an over all and material reduction of mechanical sound vibrations is accomplished, thereby permitting a further improvement of the general sound reproduction and a reduction of vibrating action having a detrimental effect with respect to operating components of the associated mechanical, electrical and electronic instruments of the loud speaking device.

An enclosure embodying the principles of this invention, being adapted to cancel those sound vibrations ordinarily impairing the natural tones produced by loud speakers, constitutes a distinct improvement over the transducer or microphone housings now commonly used.

Having described my invention, what I claim is:

1. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing comprising a substantially triangular top and bottom, two rearwardly converging sides connected to the top and bottom, and upper and lower baffles extending across the converging corners formed at the juncture of the sides with the top and bottom, each baffle having an air opening for the passage of sound vibrations rearwardly to the space at the converging corners.

2. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing comprising a substantially triangular top and bottom, two rearwardly converging sides secured to and disposed between the top and bottom, a front side having a sound opening secured to the top, the bottom and the sides, an upper pair of baffles having air openings extending across the upper converging corners formed at the juncture of the top with the sides, and a lower pair of baffles having air openings extending across the lower converging corners extending at the juncture of the bottom with the sides.

3. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing comprising a substantially triangular top and bottom, two rearwardly converging sides joined to and disposed between the top and the bottom, a front side having a sound opening for the forward movement of sound vibrations from a loud speaker positioned in the housing, an upper pair of perforated baffles extending across the upper converging corners formed at the juncture of the top with the sides, a lower pair of perforated baffles extending across the lower converging corners formed at the juncture of the bottom with the sides, and a substantially vertical baffle extending across the rear corner of the housing formed by the converging sides.

4. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing comprising a substantially triangular top and bottom, two rearwardly converging sides joined to and disposed between the top and the bottom, a front side having a sound opening for the forward movement of sound vibrations from a loud speaker positioned in the housing, an upper pair of perforated baffles extending across the upper converging corners formed at the juncture of the top with the sides, a lower pair of perforated baffles extending across the lower converging corners formed at the juncture of the bottom with the sides, a substantially vertical baffle extending across the rear corner of the housing, and one or more substantially horizontal perforated baffles dividing the space between the vertical baffle and the converging sides into two or more connected chambers.

5. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing which in horizontal cross section is substantially triangular in shape, having an opening for the outward movement of sound waves from a loud speaker mounted in the housing, and a series of baffles having air openings, the said baffles being arranged across the corners of the housing to provide a number of interconnected compartments of substantially triangular shape for the movement of sound waves from the loud speaker.

6. In a loud speaker enclosure for cancelling rearwardly moving sound vibrations, a housing which in horizontal cross section is of general triangular shape, a baffle mounted at the front side of the housing having a sound opening for the outward movement of sound waves from a loud speaker normally positioned in the enclosure, upper and lower pairs of angularly disposed baffles positioned in the housing across the converging corners thereof, each having an air opening for the passage of sound waves directed rearwardly from the loud speaker, and a series of interconnected compartments formed in the enclosure by the baffles and the sides of the enclosure, the said baffles and compartments forming an acoustic structure for cancelling the rearwardly directed sound waves from the loud speaker.

7. In a loud speaker enclosure, a housing comprising five sides, two of which form the top and bottom of the enclosure and are in substantially parallel relationship and are of general triangular shape, and the other three of which form the

front and the lateral sides of the enclosure and are arranged in triangular formation with their side edges joined one to another and their opposite ends secured to the side edges of the top and bottom sides, the front side having a sound opening for the outward movement of sound waves from a loud speaker positioned in the housing, and an acoustic structure within the housing for cancelling sound waves moving rearwardly from the loud speaker, the said acoustic structure comprising upper and lower pairs of angularly disposed baffles positioned in the housing across the converging corners thereof, also a rear vertical baffle extending across the rear corner of the housing, the said upper and lower baffles having air openings therein.

JOSEPH TOPPING, JR.