

Jan. 31, 1961

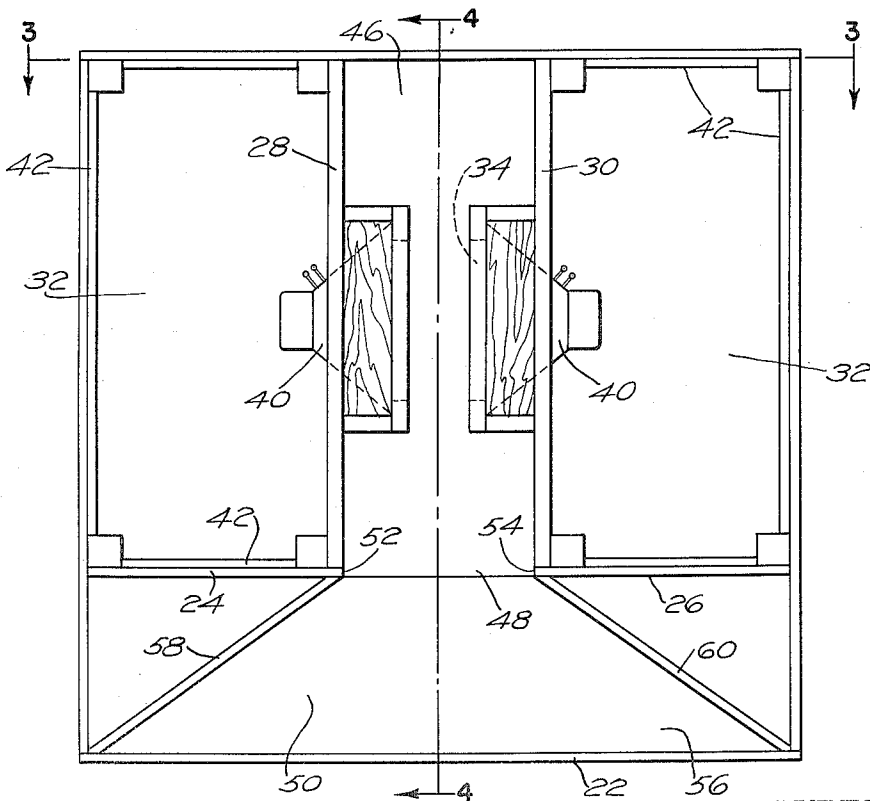
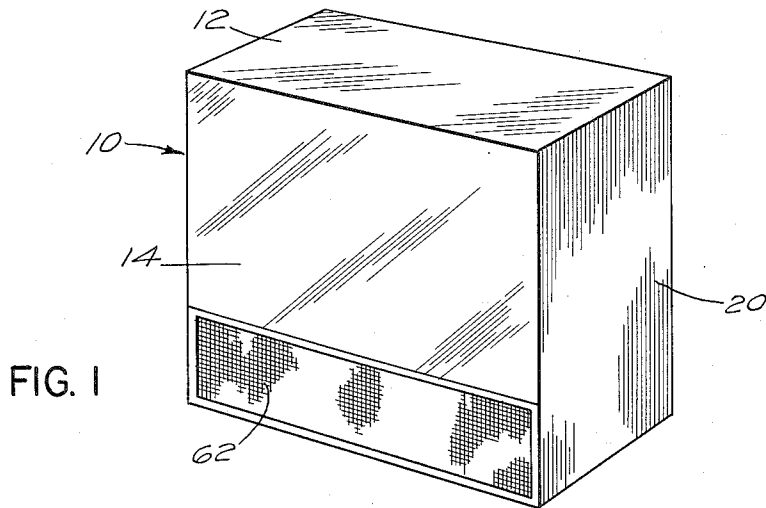
C. C. FARWELL

2,969,848

BASS SPEAKER ENCLOSURE

Filed May 8, 1958

2 Sheets-Sheet 1



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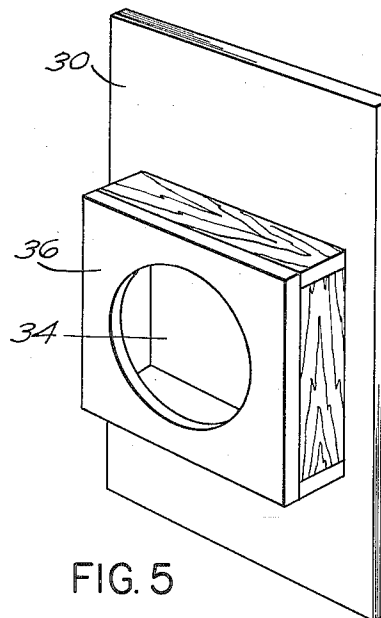
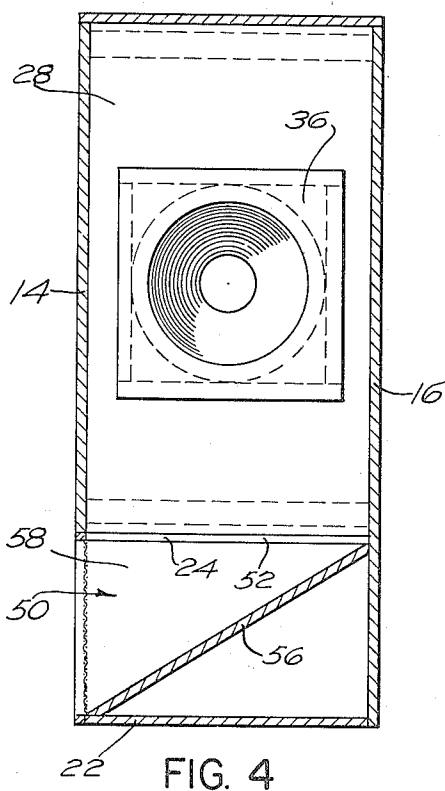
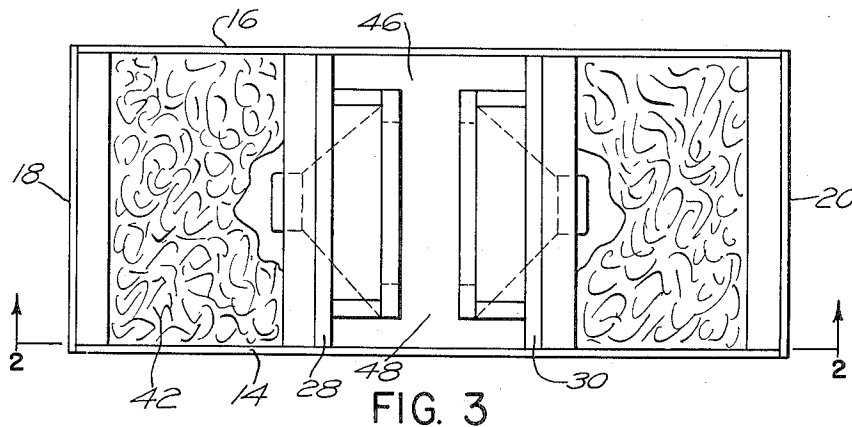
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BASS SPEAKER ENCLOSURE

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5 Claims. (Cl. 181—31)

This invention relates to improvements in bass speaker enclosures. Objects of the invention are to increase the efficiency of sound production, increase the clarity and clearness of the resultant tones, and reduce distortion. As is well known in this art, a horn is a device for transforming high pressure and low velocity to low pressure and high velocity. According to the invention, two bass speakers are mounted in opposition to each other and are wired in the same circuit so that they vibrate exactly in phase and carry the same frequencies, each speaker thus loading the other. The amount of loading of course depends on how far the speakers are spaced apart. The spacing between the speakers, as hereinafter explained, is such that the diaphragm of each speaker, when vibrating, is kept under pressure at all times in addition to the normal air loading. This results in better compliance on the part of the speaker cones and the emission of clearer and better tones.

For a more complete understanding of the invention, reference may be had to the following description thereof, and to the drawing, of which—

Figure 1 is a perspective view of a cabinet embodying the invention;

Figure 2 is a sectional view of the same, on a larger scale, taken on the line 2—2 of Figure 3;

Figures 3 and 4 are sections on the lines 3—3 and 4—4, respectively, of Figure 2; and

Figure 5 is a perspective view of one of the mounting panels employed in the cabinet.

The cabinet 10 may be of rectangular exterior shape, with a top 12, front wall 14, back wall 16, side walls 18 and 20, and bottom 22. The front wall 14 extends down from the top 12 only as far as a horizontal partition consisting of two spaced segments 24, 26 which respectively abut the side walls 18 and 20. Vertical mounting panels 28, 30 extend from the front wall 14 to the back wall 16 and from the top 12 to the spaced edges of the horizontal partition segments 24 and 26 respectively. The space between these panels constitutes the throat of the horn structure for the speakers. The mounting panels, together with the cabinet top and walls and horizontal partition segments enclose two chambers 32 completely except for a circular opening 34 in each panel for the mouth of a speaker. Each panel may have a central portion 36 offset toward the other panel, the openings 34 being in these offset portions.

A speaker 40 is mounted on each of the panels 28, 30, the mouth of the speaker spanning the opening 34, the speaker itself being within one of the enclosed chambers 32. These chambers are lined with sound absorbing material 42, such as jute padding or an equivalent. To minimize undesired vibration of the walls of the chambers 32, the joints where the walls meet each other and the top and bottom members of the chambers are reinforced with rigid blocks which are preferably secured in place by screws and glue.

Surrounding the space between the mouths of the

2

speakers 40 is a throat 46 which is the space between the mounting panels 28 and 30. Due to the offset of the central portions 36 of the panels, the width of the throat 46 is greater than the distance between the mouths of the speakers 40.

The throat 46 communicates through an opening 48 with a horn-like part of the structure having a space 50 with an expanding cross-sectional area. The opening 48 is rectangular and is defined by the opposed edges 52 and 54 of the horizontal partition segments 24, 26 and by the front and back walls of the cabinet. The horn space 50 is defined by a sloping reflecting board 56 which extends downward and forward from the back wall 16 to the front edge of the bottom 22 and by side plates 58, 60. The reflecting board is trapezoidal in shape, the upper end being the same width as that of the opening 48, the lower end being the same width as that of the cabinet 10. The side plates 58, 60 are triangular in shape and taper downwardly from respective edges 52, 54 to the front corners of the bottom 22, the forward edges of the plates 58, 60 being flush with the front wall 14 of the cabinet. A screen 62 of sound-transmitting fabric is mounted on the front of the cabinet between the lower edge of the front wall 14 and the forward edge of the bottom 22 to conceal the mouth of the horn space 50.

The actual dimensions of a cabinet and the elements contained therein will vary with the size and kind of the speakers employed. By way of example, but not limitation, the following dimension may be given to an enclosure for 12" speakers. The external dimensions of such a cabinet may be 44" in width, 18" in depth and 44" in height. The horizontal partition is 18" above the bottom 22 of the cabinet so that the height of the chambers 32 is about 24", the width and depth of each chamber being a little less than 18". The output or functional diameter of a speaker cone is usually about .8 times its maximum or rated diameter. Thus the functional diameter of a 12 inch speaker is 9.6 inches, the functional circumference is 30.2 inches, and the functional area is 72.4 sq. in. In the cabinet hereinbefore described the "circumferential area" is defined as the product of the functional circumference of one of the speakers and the distance between the panel offsets 36.

For effective mutual loading of the speakers 40, in addition to atmospheric pressure, it is necessary that the circumferential area be materially less than the functional area. It has been experimentally determined that satisfactory results are had when the circumferential area is about 70% of the functional area. The proper spacing between speakers of a given size can thus be calculated. For example, the functional area of the two 12 inch speakers is about 145 sq. in. of which 70% is about 101.4 sq. in. This is the desired value for the circumferential area. Dividing by 30.2 which is the functional circumference, the quotient is about 3.4 in. The offset portions 36 of the mounting panels 28, 30 are therefore spaced apart about 3.4", and the openings 34 are 10" in diameter. The surrounding throat space 46 is about 12" wide, so that the rectangular opening in the horizontal partition is about 12" x 18". To avoid or minimize unwanted vibrations, the cabinet is preferably heavily constructed, the walls, top and bottom being of ¾" plywood. The reflecting board 56 and side plates 58 and 60 may be made of ½" plywood. Thus the space between the mouths of the speakers opens into the larger space of the throat which in turn opens into the horn space 50, the high pressure waves at the mouths of the speakers thus being progressively transformed to low pressure waves emitted from the mouth of the horn space.

I claim:

1. In combination, a cabinet enclosing two chambers with an air space between them, two bass speakers mounted respectively in said chambers with mouths opening into said space and directly opposed to each other, said mouth being separated by said air space only, each said speaker being completely enclosed except for its mouth in its corresponding chamber, and a horn-like structure communicating with said space and extending therefrom with an expanding cross section.

2. A cabinet as described in claim 1, the inside dimensions being such that the circumferential area between the speakers is materially less than the functional area of the speakers.

3. A speaker cabinet having a rectangular exterior shape with a top, front wall, back wall, and side walls, two horizontal rectangular partition segments in a common plane spaced below said top and spaced from each other to leave an opening between them, two mounting panels extending from said front wall to said back wall and from said top to a corresponding segment of said partition and defining an uninterrupted air space between them, each said panel having an opening to be fitted by the mouth of a speaker, each said panel with said top, partition and walls completely enclosing a chamber except for said speaker opening, and a horn-like structure beneath said partition communicating with said opening and extending downward and forward with an expanding cross-section.

4. A speaker cabinet having a rectangular exterior shape with a top, front wall, back wall and side wall, two horizontal rectangular partition segments each having three of its edges secured respectively to said front wall, said back wall and one of said side walls, the fourth edges of said segments being spaced apart, two vertical

rectangular mounting panels within said cabinet, each said panel having its four edges secured respectively to the top, front wall and rear wall of said cabinet and the fourth edge of one of said segments, said panels each having a central portion offset toward the other panel, each offset portion having an opening adapted to be spanned by the mouth of a speaker, each said panel with the cabinet walls and partition segment forming a chamber which is completely enclosed except for said opening, a sounding board sloping forward and downward from said rear wall at the level of said partition to said front wall, and two plates diverging downward from the lower edges of said mounting panels, and extending forward from said sounding board.

5. In combination, a cabinet enclosing two chambers with an air space between them, two bass speakers mounted respectively in said chamber with mouths opening into said space and directly opposed to each other, said mouths being separated by said air space only, the dimensions inside the cabinet being such that the circumferential area between the speakers is approximately 70% of the functional area of the speakers, each said speaker being completely enclosed except for its mouth in its corresponding chamber, and a horn-like structure communicating with said space and extending therefrom with an expanding cross-section.

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