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D. W. MARTIN
DIFFUSED-TONE CABINET

2,801,704

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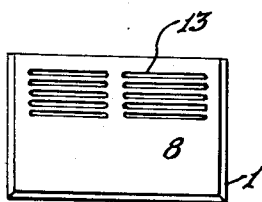


FIG. 1.

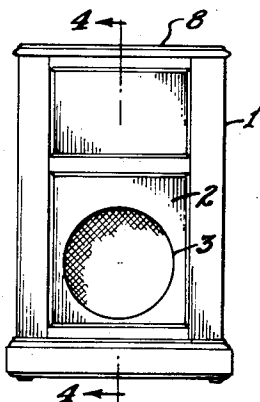


FIG. 2.

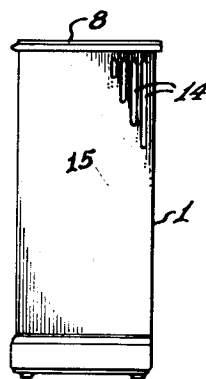


FIG. 3.

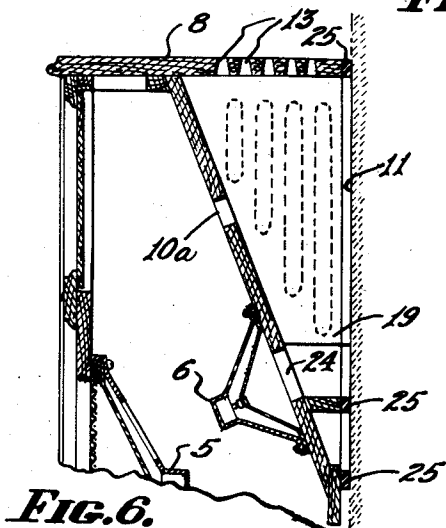


FIG. 6.

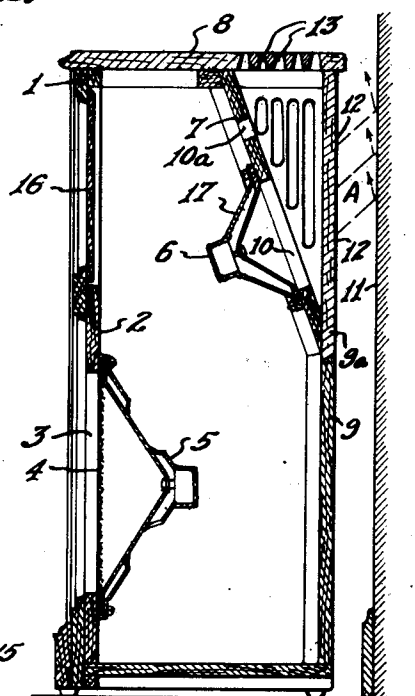


FIG. 4.

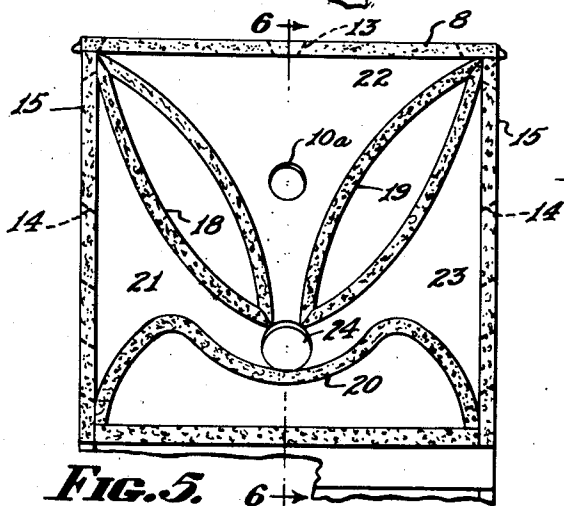


FIG. 5.

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1

2,801,704

DIFFUSED-TONE CABINET

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5 Claims. (Cl. 181—31)

My invention relates to tone cabinets for the reproduction of sound, and more particularly to tone cabinets wherein the sound produced by loudspeakers contained within the cabinet is diffused in such manner as to achieve the effect of a sound source larger than the cabinet itself.

Generally speaking, the ordinary tone cabinet, whether it be for the reproduction of sound by a radio, an electronic organ, extension speakers, and like instruments, is defective in that the entire sound, whatever its nature, emanates from a localized source inside the cabinet, this undesirable characteristic being commonly known as "directivity." Where "directivity" is present, the sounds emanating from the cabinet take on a particularly artificial and disturbing quality which is magnified in the reproduction of organ music, orchestral, choral and like work. Numerous attempts have been made heretofore to alleviate this condition by diffusing the sound so as to create the illusion that it is coming from a larger source.

Some improvements have been noted in cabinets wherein a plurality of loudspeakers are operated in complementary relation, each of the speakers being arranged to reproduce efficiently only within a limited band of frequencies in the audio frequency spectrum. Thus some cabinets have been provided in which a plurality of speakers is arranged to radiate acoustic energy through the front wall of the tone cabinet. It has been suggested that a more pleasing tone distribution can be obtained by mounting a pair of loudspeaker units in a cabinet or housing in such fashion that they propagate sound waves in directions substantially at right angles to each other, one direction being generally horizontal, while the other direction is generally vertical. It has also been suggested that the sound waves be directed to the rear of the cabinet in such manner that they will be reflected from a boundary of the room adjacent the rear of the cabinet causing the sound to be diffused and the effect of a point source of sound minimized. All in all, however, systems of the character described above have not been wholly satisfactory in that good diffusion of sound has often resulted in low efficiency, particularly in the high frequency range. Similarly, high efficiency of the loudspeaker unit has resulted in poor diffusion of the sound.

It is, therefore, a principal object of my invention to provide a diffused tone cabinet particularly effective for producing high efficiency, especially in the low frequency range, in combination with good diffusion of sound within the high frequency range.

Yet another object of my invention is to achieve a high degree of tone-diffusion with a single driver unit for the frequency range in which directivity is a problem.

It is a further object of my invention to provide a diffusing tone cabinet particularly suited for home installations, which is both compact and susceptible to styling appropriate to the home in which it is used.

These and other objects of my invention which will appear hereinafter or which will be apparent to the skilled worker in the art upon reading these specifications, I accomplish by that construction and arrangement of parts

2

of which I shall now describe an exemplary embodiment. Referring now to the figures of the drawings wherein: Figure 1 is a plan view of a cabinet in accordance with my invention.

5 Figure 2 is a front elevational view of the cabinet.

Figure 3 is a side elevational view of the cabinet.

10 Figure 4 is a vertical sectional view taken along the line 4—4 of Figure 2, the figure additionally illustrating the manner in which the cabinet would be placed adjacent a wall.

Figure 5 is a partial rear elevational view of a modified form of cabinet in accordance with my invention.

Figure 6 is a sectional view taken along the line 6—6 of Figure 5.

15 In the description which follows, I shall describe my invention as it applies to a tone cabinet for an electronic organ; but it will be understood that my invention will find utility in other uses wherein it is desired to reproduce sound.

20 Referring to the figures of the drawings there is illustrated a tone cabinet 1 having a front panel 2 provided with a sound emission opening 3 covered by a suitable acoustically transparent material, such as the grille cloth 4. A direct radiator loudspeaker 5 is mounted on panel

25 2 concentric with the sound emission opening 3 in the manner illustrated; and this speaker will be for the transmission of low-frequency sound. For most uses, I have found a fifteen-inch cone speaker to be highly desirable. Medium and high frequency sound is produced through the speaker 6 which is mounted on an inclined baffle 7 extending between the top wall 8 and rear wall 9 of the cabinet, in the manner best seen in Figure 4 of the drawings. The baffle 7 is provided with a sound emission opening 10 in front of the cone of loudspeaker 6 and a bass-reflex port 10a located above the loudspeaker 6. The baffle 7 is inclined at an acute angle with respect to the rear wall 9 of the cabinet or with respect to the wall 11 of the room when the rear panel of the cabinet is removed. It will be understood that the cabinet is designed to be located near the wall 11 in approximately the manner illustrated in the drawings. The acoustic power generated by the loudspeaker 6 will pass through sound emission opening 10 in the baffle and will pass outwardly through the openings or louvres 13 in top wall 9 of the cabinet as well as louvres 14 in the side walls 15 thereof, it being understood, of course, that the louvres will be confined to the areas thereof lying to the rear of the baffle 7. The rear wall portion 9a lying to the rear of the baffle 7 may comprise an imperforate back panel of plywood or rockboard.

50 A solid, rigid front panel portion 16 is preferred above loudspeaker 5. This panel is important to good low-frequency response of loudspeaker 5 and also prevents directional highs from loudspeaker 6. If desired the panel portion 16 may be an integral extension of panel 2. I also find that modulation of the high frequency speaker cone by acoustic coupling to the low frequency cone through the enclosure can be greatly reduced by covering the back 17 of the cone-housing for the loudspeaker 6 with a suitable insulating material, thereby providing an acoustical seal effective to inhibit the acoustic coupling of the two speakers.

It will be understood, of course, that suitable circuit means—which form no part of the present invention—will be provided for cross-over between the two speakers. For example, the low frequency speaker 5 may be arranged to respond at approximately 500 C. P. S. or lower, whereas the high frequency speaker 6 will cross over at 200 C. P. S. or higher.

70 The tone cabinet just described has been found to be extremely effective for the reproduction of organ music. The location of the low frequency speaker 5 near the

3

intersection line of the wall and floor improves the loading and efficiency of the sound reproduction at low frequencies where directivity is no problem because the wave length is long. The position of the high frequency speaker 6 results in a horn action, which increases its efficiency, compensating in part for absorptive losses in cabinet and wall materials. It also provides enhanced diffuseness of high frequency sound, in contrast to high directivity which would result if the high frequency speaker were pointed through the front of the cabinet. In addition, the inclined baffle tilts the high frequency speaker from the horizontal, thereby eliminating standing wave difficulties which would be encountered if the speaker were simply spaced from the wall without inclination.

In Figures 5 and 6, I have illustrated a modification of my invention wherein the speaker cabinet may be placed flush against the wall. In this instance horn-creating vanes 18, 19 and 20 are provided in the manner illustrated in Figure 5, the vanes in effect defining horns 21, 22 and 23 adapted to direct the sound toward the louvers 13 in top panel 8 and the louvers 14 in side walls 15. Where this construction is employed, it is preferred to locate the cone driver of the high frequency speaker 6 at the common junction of the three horns 21, 22 and 23 and reduce the size of the sound emission opening to the throat 24, also at the junction of the three horns. I prefer to cover the rear edges of the vanes with a resilient sealing means, such as felt, cork or other similar material, as indicated at 25, thereby precisely defining the horn boundaries and also allowing for variations from flatness in the wall surface contacted by the vanes. I have found that this construction improves the efficiency of the high frequency unit while at the same time preventing directivity toward the front of the cabinet.

Modifications may, of course, be made in my invention without departing from the spirit of it. For example, a back panel could be added in lieu of the wall 11 in the embodiment illustrated in Figure 6 of the drawings wherein it is desired to use the cabinet away from a wall. To this end, an imperforate panel similar to the panel 9a shown in Figure 4 could be provided, cleats being provided on the back of the cabinet to secure the panel in place. Preferably, the panel would be surrounded with a pad or gasket to effect a seal between it and the remainder of the cabinet. A conventional horn-driver unit can be used to good advantage in place of the cone loudspeaker 6, as employed in Figures 5 and 6. It will also be understood that the principle of my invention may be employed in the console of an organ or the like rather than in a separate cabinet.

Having thus described my invention in certain exemplary embodiments, what I desire to secure and protect by Letters Patent is:

1. In a tone cabinet having a front wall, side walls and a top, the said front wall having an opening therein, a first loud speaker for low frequency sound production mounted with its mouth in registry with said opening and its axis in a substantially horizontal plane, so as to direct the sound produced thereby outwardly from the front of the cabinet, a baffle mounted between said side walls and extending upwardly from the rear edges of said side walls intermediate the top and bottom thereof to the top of said cabinet intermediate the front and rear edges thereof, so as to define an acute angle with the rear edges of said side walls, said baffle having an opening in the lower portion thereof adjacent the apex of said acute angle, a second loud speaker for high frequency sound production mounted with its mouth in registry with said last named opening and its axis extending substantially normal to the plane of said baffle, the top and side walls of said cabinet having openings therein to the rear of

4

said baffle, whereby to project the sound produced by said second loud speaker upwardly and outwardly from the cabinet.

2. In a tone cabinet having a front wall, side walls and a top, the said front wall having an opening therein, a first loud speaker for low frequency sound production mounted with its mouth in registry with the opening in said front wall and its axis in a substantially horizontal plane, so as to direct sound produced thereby outwardly from the front of the cabinet, a baffle mounted between said side walls and extending upwardly from the rear edges of said side walls intermediate the top and bottom thereof to the top of said cabinet intermediate the front and rear edges thereof, so as to define an acute angle with the rear edges of said side walls, said baffle having an opening in the lower portion thereof adjacent the apex of said acute angle, a second loud speaker for high frequency sound production mounted with its mouth in registry with said last named opening and its axis extending substantially normal to the plane of said baffle, the top and side walls of said cabinet having openings therein to the rear of said baffle and a panel covering the back of said cabinet at least in the area above said baffle, said last named panel and said baffle defining a horn acting to project the sound produced by said second loud speaker upwardly and outwardly from the cabinet through the openings in the top and side walls thereof.

3. In a tone cabinet having a front wall, side walls and a top, the said front wall having an opening therein, a first loud speaker for low frequency sound production mounted with its mouth in registry with the opening in said front wall and its axis in a substantially horizontal plane, so as to direct the sound produced thereby outwardly from the front of the cabinet, a baffle mounted between said side walls and extending upwardly from the rear edges of said side walls intermediate the top and bottom thereof to the top of said cabinet intermediate the front and rear edges thereof, so as to define an acute angle with the rear edges of said side walls, said baffle having an opening in the lower portion thereof adjacent the apex of said acute angle, a second loud speaker for high frequency sound production mounted with its mouth in registry with said last named opening and its axis extending substantially normal to the plane of said baffle, horn creating vanes secured to the rear surface of said baffle, said vanes defining opposite walls of a top horn for directing sound toward an opening in the top of said cabinet and two side horns for directing sound toward openings in the sides of said cabinet, the throats of said horns having a common junction at the opening in said baffle, whereby the sound produced by said second loud speaker will be projected from the cabinet through the openings in the top and side walls thereof.

4. The tone cabinet claimed in claim 3 wherein said cabinet is adapted to be positioned with its back directly against the wall of a room, and wherein the rear edges of said vanes include resilient sealing means for contact with the said wall.

5. The tone cabinet claimed in claim 3 wherein a back panel is provided to enclose the back of said cabinet above said baffle.

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