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SOUND REPRODUCING APPARATUS

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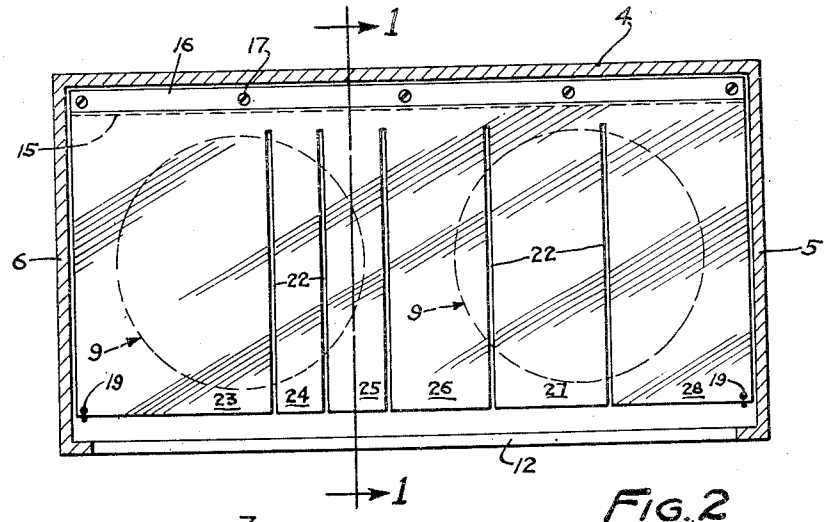


FIG. 2

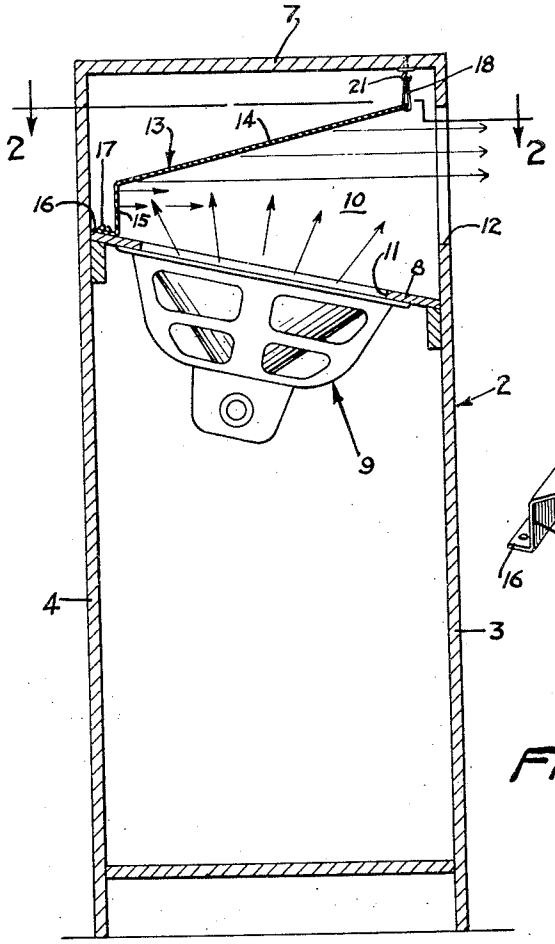


FIG. 1

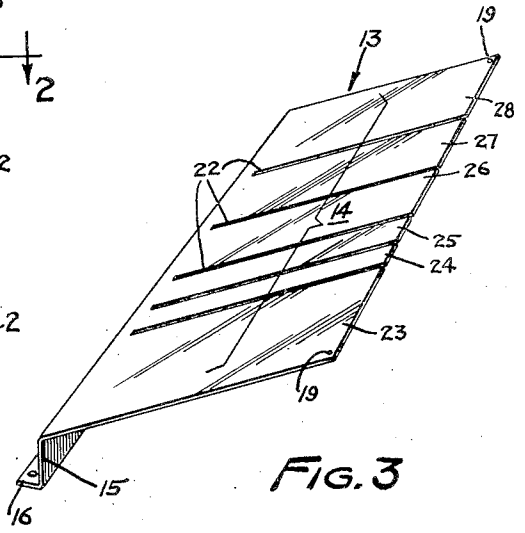


FIG. 3

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SOUND REPRODUCING APPARATUS

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The present invention relates to new and useful improvements in sound reproducing apparatus, and more particularly to a highly efficient resonator adapted for mounting in the usual acoustic or resonance chamber of the instrument or apparatus in operative relation to one or more loud speaker units of conventional construction, which resonator materially improves the performance of the speaker units relative to fidelity and quality of the tone or sound emanating from the apparatus, when in operation.

A further object of the invention is to provide a simple, inexpensive resonator member which readily lends itself for mounting in the usual resonance chamber of a radio, amplifier, electric organ or other sound reproducing apparatus, where applicable, in operative relation to the usual loud speaker unit thereof, whereby the audio and other frequency sound waves emitted from the speaker unit impinge against said member and cause it to vibrate and thus materially improve and amplify the tone or sound emanating from the apparatus.

A further object of the invention is to provide a simple one-piece metallic resonator member of sheet material adapted for mounting in the usual sound or resonance chamber of a sound reproducing apparatus, said resonator having means at its rear end for immovably securing said end to fixed means at the rear of the sound chamber, said member extending forwardly therefrom over the usual speaker units, with its front edge disposed adjacent to and over the usual sound emitting opening in the front wall of said resonance chamber, the front edge portion of the resonator member being resiliently supported within the resonance chamber, thereby to relieve the main body portion of the resonator member from internal stresses, whereby the overhanging portion of said member is free to vibrate in accordance with the intensity of the audio and other frequency sound waves directed thereagainst from the speaker units.

Another important object of the invention resides in slitting the resonator member from its front edge to the rear portion thereof at uneven intervals along the length thereof, thereby to provide, in effect, a plurality of independent resonator elements of different widths, located in a common plane, and whereby the composite resonator member is capable of covering a wide band of frequencies, thus assuring maximum fidelity and tone quality over the entire range of frequencies, as well as increased power without distortion.

Other objects of the invention reside in the unique construction of the resonator whereby it readily lends itself for manufacture in quantity production at extremely low cost; in the provision of such an apparatus which may readily be embodied in conventional amplifiers, radios, electric organs, and various other musical instruments to improve the fidelity and tone quality thereof, and without requiring any major alternations to be made in the sound reproducing apparatus to be so equipped; and in the provision of such a device which does not require the

skill of an experienced mechanic to install it in the usual resonance chamber of a sound reproducing apparatus.

These and other objects of the invention and the means for their attainment will be more apparent from the following description taken in connection with the accompanying drawings.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a sectional elevation on the line 1—1 of Figure 2, showing only the cabinet, sound chamber and speaker unit of a conventional sound reproducing and amplifying apparatus, such as a console-type radio or amplifier, and showing the invention embodied in the usual sound chamber thereof;

Figure 2 is a sectional plan view on the line 2—2 of Figure 1, showing the preferred manner of slitting the resonator plate to cover a wide band of frequencies, and indicating two speaker units; and

Figure 3 is a perspective view of the novel resonator herein disclosed, removed from the sound chamber to illustrate its simple construction.

In the selected embodiment of the invention herein disclosed, there is illustrated in Figures 1 and 2, for purposes of disclosure, a portion of a sound reproducing apparatus including a cabinet, generally designated by the numeral 2, comprising front and rear walls 3 and 4, side walls 5 and 6, and a top wall 7.

Fixedly mounted within the upper portion of the cabinet is a transverse wall 8 which provides a support for one or more electro-dynamic speaker units, generally designated by the numeral 9. The wall 8 has openings 11 therein which register with the sound-emitting openings of the loud speaker units, whereby when the latter are functioning, the audio and other frequency waves emitted therefrom are directed in an upward direction, as indicated by the arrows in Figure 1.

Apparatus of this general type is usually provided with an acoustic or resonance chamber 10, which is in direct communication with the loud speaker unit or units. The function of chamber 10 is to amplify the tone emanating from the apparatus into a room, or the like, through an opening 12 provided in the front wall 3 of the cabinet. The acoustic or sound chamber 10 is defined by the transverse wall 8, and the upper portions of the front, rear and side walls of the cabinet, and the top wall 7.

An important feature of the present invention resides in the unique means provided within the acoustic chamber 10 for improving the fidelity and quality of the tone or voice emanating from the acoustic chamber 10 when the apparatus is in operation. Such means is shown comprising a resonator member, generally designated by the numeral 13, shown comprising a main body portion 14 terminating at the rear of the acoustic chamber 10 in an upright wall portion 15, preferably provided at its bottom with a longitudinally extending flange 16 adapted to be seated against the rear portion of the transverse wall 8 and fixedly secured thereto by such means as screws 17.

The main body 14 of the resonator member extends forwardly and upwardly from the upper end of the upright wall portion 15, and has its front marginal edge slightly spaced from the front wall 3 of the cabinet at an elevation preferably above the uppermost portion of the sound emanating opening 12 of the acoustic chamber 10.

To assure proper functioning of the resonator member 13 at all times, regardless of the intensity of the sound waves emitted from the loud speaker units, the front edge

portion of the resonator plate is shown suspended by resilient supporting elements 18, which may be in the form of light springs or rubber bands. The supporting elements 18 may be attached to the resonator member 13 by means of openings 19 provided at the front corners of the resonator plate, as best illustrated in Figure 3. The opposite or upper ends of the resilient supporting elements 18 may be secured to the top wall 7 by suitable hooks 21. By thus supporting the front edge of the main body of the metallic resonator plate 14, any stresses which may tend to develop therein as a result of its overhanging condition, will be completely eliminated, thereby assuring proper functioning of the resonator at all times. It is to be understood that the front and side edges of the resonator member must be spaced from their respective cabinet walls to permit said member to freely vibrate and respond to the sound waves emitted from the speaker units.

To increase the efficiency of the resonator member and to assure its functioning over a wide band of frequencies, said member is slitted from its front edge rearwardly to a point adjacent to the upright wall portion 15, as indicated at 22 in Figures 2 and 3, thereby to provide, in effect, a plurality of independent resonator plates 23, 24, 25, 26, 27 and 28. These independent resonator plates are of different widths, as shown in Figures 2 and 3, whereby the composite resonator member will respond to the high and low pitch tones emitted from the loud speaker units in such a manner as to greatly improve the fidelity and quality of the tone emanating from the apparatus through the opening 12.

In the operation of the invention herein disclosed, the high frequency sound waves emitted from the loud speaker units are directed upwardly into the acoustic or resonance chamber 10 and impinge against the various plate elements 23 to 28, inclusive, of the composite resonator member 13, whereby the various plate elements of the resonator plate are caused to vibrate in accordance with the intensity of the audio and other frequency sound waves directed thereagainst by the loud speaker units. This develops a resonance in the plate elements 23 to 28, inclusive, which may be carried rearwardly to the upright wall portion 15 of the composite resonator member 13. The upright wall portion 15 may serve, in effect, as a sound board, whereby the resonated signal or tone is directed forwardly through the opening 12 in the cabinet and into the room.

By reference to Figure 1, it will be noted that the location of the main body portion 14 of the resonator member 13 constitutes, in effect, an upper resonant wall of the resonance chamber 10. Because of the fixed mounting of the resonator member 13 at the rear of said chamber, the acoustical and resonance characteristics of the resonance chamber 10 are greatly improved, with the result that a true and accurate reproduction of the sound or tones emitted from the loud speaker units will be accurately reproduced with high fidelity and quality over a wide band of frequencies.

In the drawing we have shown the resonator member or plate 13 as being formed from a single blank of sheet

metal, but it is to be understood that we do not wish to be so limited, as obviously it could be made of two or more similar sections mounted in alignment with one another, and the same results obtained.

We claim as our invention:

1. The combination with a sound reproducing apparatus comprising a cabinet having an acoustic or sound chamber therein provided with an electro-dynamic loud speaker unit, of a resonator member comprising a main body portion of sheet metal, means for fixedly securing a marginal edge of said resonator to a wall of the sound chamber with the main body portion of the resonator positioned in the path of the sound waves emitted from the speaker unit, the remaining edge portions of said resonator being free to respond to the action of the sound waves emitted from the speaker unit, thereby materially improving the fidelity and quality of the tone emanating from the apparatus.

2. An apparatus according to claim 1, wherein the main body portion of the resonator member is provided along one edge with a longitudinally extending flange to facilitate fixedly securing the resonator to a wall of said chamber.

3. An apparatus according to claim 1, wherein the resonator member comprises a plurality of spaced parallel plate elements of different widths, said elements being supported at one end only whereby they are free to vibrate independently of one another to assure coverage over a wide band of frequencies, and thus assure true and accurate reproduction of all high and low pitch tones.

4. The combination with a sound reproducing apparatus comprising a cabinet having an acoustic or sound chamber therein provided with an electro-dynamic loud speaker unit, of a resonator member made from a single blank of sheet metal comprising a main body portion bent longitudinally thereof to provide front and rear angularly disposed sections, said rear section being formed with a longitudinal mounting flange adapted to be fixedly secured to a fixed member within the sound chamber with the front section of said main body portion being disposed in operative relation to the speaker unit, said front section being transversely slitted from its front edge to the rear portion thereof, thereby to provide a plurality of spaced parallel independent resonator elements of different widths, said resonator elements being supported at their rear ends only, whereby they are free to vibrate independently of one another in accordance with the intensity of the high and low audio frequencies of the loud speaker unit, thereby to produce an after-sound or reverberation which is extremely pleasing to the ear.

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