Aug. 4, 1964 G. D. SEARS ETAL 3,143,182

SOUND REPRODUCERS

Filed July 17, 1961

Fig. 1

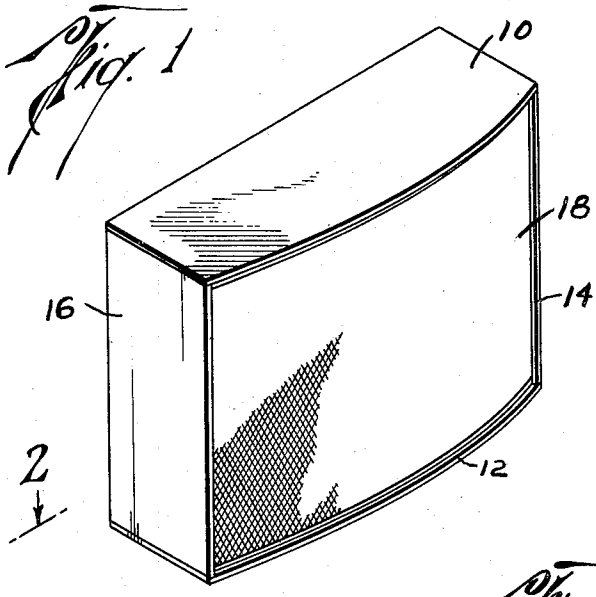


Fig. 2

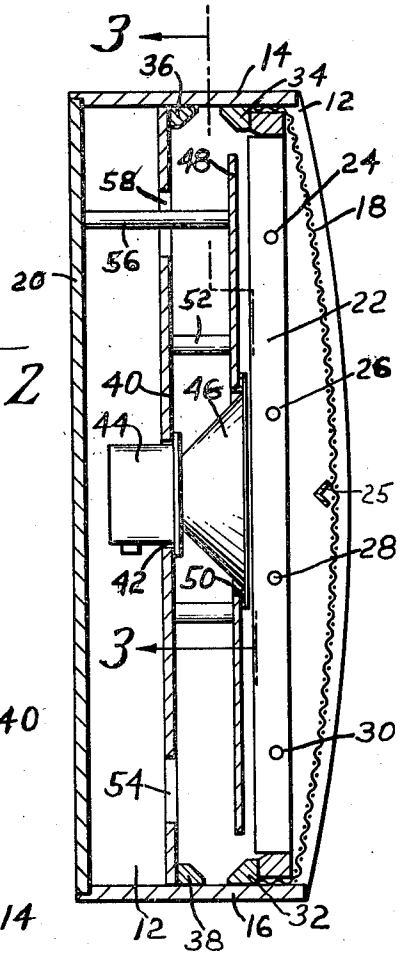
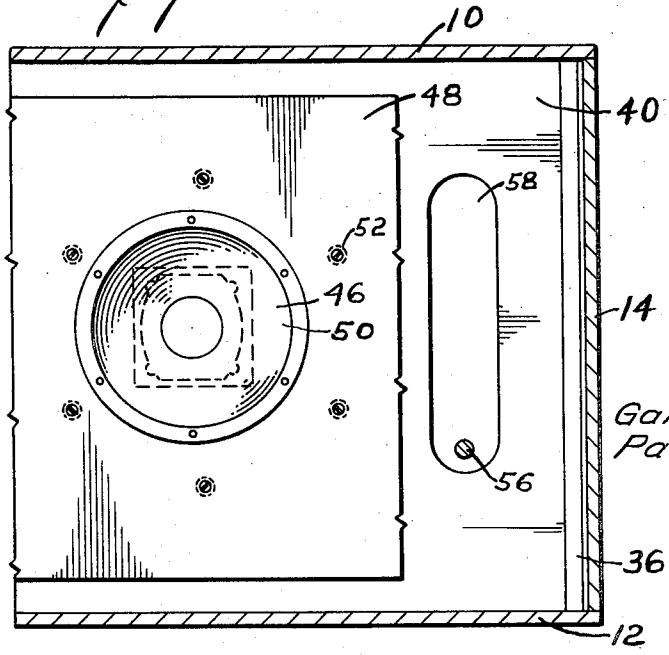


Fig. 3



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SOUND REPRODUCERS

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This invention pertains generally to sound reproducers and particularly to a loudspeaker having a plurality of cavities and a plurality of sound reproducing surfaces.

During the past several years, as greater emphasis has been placed upon new and improved high fidelity sound systems, correspondingly increased activity in the design and arrangement of sound reproducers such as loudspeakers has occurred. During the various experimentations and adaptations of loudspeakers and loudspeaker cabinets, there has developed a tendency to use a plurality of speaker cabinets and speaker cones to achieve proper frequency response in the range of audible frequencies. Such plurality of speaker cabinets and speaker cones has resulted in increased cost and complication of the overall sound system. Also present sound reproducing systems have become quite cumbersome and bulky in addition to being expensive while lacking in true high fidelity reproduction of the original sound.

Thus, it is an object of the present invention to provide an improved sound reproducing unit which comprises, in its entirety, a loudspeaker.

A further object of the present invention is to provide a sound reproducing unit having a plurality of cavities comprised of a plurality of sound reproducing surfaces which are driven by a single driver unit to achieve greater dynamic range with wide frequency response of high quality definition.

Still another object of the present invention is to provide a sound reproducing unit which incorporates principles heretofore adapted solely to string musical instruments.

Yet another object of the present invention is to provide a sound reproducing unit having a plurality of sound producing surfaces wherein sound vibrations are achieved by direct action on the wood surfaces, such surfaces having a plurality of bridging posts, a sounding post and further utilizing indirect action of air in the cavities on the wood surfaces.

In the drawing, FIGURE 1 is a perspective view of a sound reproducing unit incorporating the present invention;

FIGURE 2 is an enlarged cross-sectional plan view of the cavities and sound producing surfaces of the unit shown in FIGURE 1, taken alng line 2—2 thereof; and

FIGURE 3 is a partially broken away cross-sectional elevational view taken along line 3—3 of FIGURE 2.

Briefly stated, the invention comprises a sound reproducing unit which encompasses the sound reproducing functions of a string musical instrument such as a cello or violin wherein a plurality of sound reproducing surfaces are combined with a sound resonating chamber to which sound vibrations are imparted by an integrated driving mechanism. A box chamber is provided which is enclosed on the sides and back and slotted on the front. A plate is suspended in front of the box chamber at a selected distance by a plurality of bridging posts, thereby creating an outer cavity. The plate constitutes an outer sound reproducing surface which is coupled to the front of the box chamber by bridging posts, and to the back of the box chamber by a sounding post. Sound vibrations are induced upon all of the surfaces and within the cavities by a driving mechanism 46. Such driving mechanism 46 becomes an integral part of the outer plate and

the front of the box chamber so that the outer plate works against the front of the box chamber to vibrate the front and outer plates through an opposing magnetic field effect. Sound vibration is also conducted to the surfaces between the outer plate and the front plate of the box chamber by the bridging posts, and between the outer plate and the back of the box chamber by the sounding posts.

Referring now to the drawing figures in detail, FIGURE 1 is a perspective view of the sound reproducer wherein the invention is incorporated. Upper panel 10 is disposed from lower panel 12 by side panels 14 and 16 with grille cloth 18 providing a cover for the front of the cabinet.

FIGURE 2 shows a cross-sectional plan view of the cabinet taken along line 2—2 of FIGURE 1. The exterior of the sound reproducer is a cabinet comprised of side panels 14 and 16, rear panel or cover 20, and grille cloth 18. Grille frame 22 is mounted to base 12 by fasteners 24, 26, 28, and 30. Support member 25 provides additional support for the grille cloth 18. Grille mount uprights 32 and 34 also provide support and mounting means for grille cloth 18. Suitable fastening means such as screws (not shown) may be used to couple uprights 32 and 34 to side panels 14 and 16. Similarly, uprights 36 and 38 are used for positioning coil mounting board 40 and uprights 36 and 38 and also be coupled to the side panels 14 and 16 by suitable fastening means such as screws.

Coil mounting board 40 has a central aperture 42 in which may be positioned a coil 44 which is part of a conventional speaker arrangement including a cone 46 coupled thereto. A front mounting board 48 or plate may have a substantially circular aperture 50 therein with the edge of cone 46 coupled thereto. The aperture 50 in mounting board 48 is not essential but such aperture permits easier mounting of cone 46. Front mounting board 48 is coupled to the coil mounting board 40 by a plurality of bridging or mounting posts 52. As may be seen more readily in the cross-sectional view of FIGURE 3, mounting posts 52 are mounted in a substantially circular configuration but eccentric to the aperture 50 in front mounting board 48. During movement of cone 46, front mounting board 48 and coil mounting board 40 tend to oppose the movement of each other.

Referring again to FIGURE 2, coil mounting board 40 has apertures 58 and 54 therein which are elongated in a vertical plane. Disposed intermediate the front mounting board 48 and back cover 20 is a sounding post 56 which passes through aperture 58 in coil mounting board 40. As shown in FIGURE 3, sounding post 56 is positioned near the lower edge of aperture 58.

As pointed out previously, the sound reproducer of the present invention provides an acoustical effect in the transmission of sound similar to the effect obtained with a string musical instrument such as a violin or cello through utilization of dual cavities created by three wooden surfaces or by other similar type surfaces. Thus, as cone 46 is driven in a conventional manner by the speaker coil 44, vibration is imparted by direct action on the wood surface of front mounting board 48 and by an opposing action of the coil 44 acting upon coil mounting board 40, and front mounting board 48. Bridge posts 52 impart vibration to the coil mounting board 40 and sounding post 56 imparts vibration to back cover 20 so that sound is developed which is a faithful reproduction of the original sound. The cavity system and opposing magnetic field arrangement utilized in the present invention eliminates the need for a plurality of loudspeakers which heretofore may have been mounted in a plurality of cabinets.

Although a preferred embodiment of the invention has been shown and described, the invention is defined by the following claims.

We claim:

1. A sound reproducer having an upper panel, a lower panel, first and second side panels, and a back panel coupled to said upper, lower, and said side panels to provide a chamber having a front portion and a back portion, a coil mounting board having a plurality of apertures therein and disposed in the chamber away from said back panel, driving means positioned in one of the apertures of said coil mounting board, a front mounting board adapted for coupling to said driving means in the front portion of the chamber, bridge means coupled to said front mounting board and to said coil mounting board, and a sounding post coupled to said front mounting board and to said back panel through an aperture in said coil mounting board, said driving means causing vibration of said front mounting board with lower frequency vibrations being transmitted through said sounding post to said back panel to provide resonance within the chamber.

2. A sound reproducer defined by claim 1 wherein the apertures of said coil mounting board include a central aperture substantially circular in configuration and first and second vertically elongated apertures which are near said first and second side panels respectively.

3. A sound reproducer defined by claim 2 wherein the aperture in said front mounting board is substantially circular in figuration and concentric to the central aperture in said coil mounting board.

4. A sound producing apparatus including in combination

upper and lower panels,

first and second sides coupled to each of said upper and lower panels,

front and rear panels coupled to said first and second sides and to said upper and lower panels to form a chamber,

a first mounting member coupled to said first and second sides in spaced relation to said rear panel, said first mounting member having a plurality of openings therein with one of said openings adapted for receiving driving means,

a second mounting member disposed intermediate said first mounting member and said front panel, said second mounting member having a smaller surface area than said first mounting member,

coupling means for coupling said second mounting member to said first mounting member, and

sounding post means coupled between said second mounting member and said rear panel while passing through one of said plurality of openings in said first mounting member whereby said first mounting member vibrates in accordance with vibrations caused when driving means are coupled in one of said plurality of openings in said first mounting member with lower frequency vibrations being transmitted through said sounding post means to said rear panel to provide resonance within the chamber.

5. A sound producing apparatus defined by claim 4 wherein said coupling means include a plurality of substantially rigid mounting posts.

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