Sept. 5, 1939. V. C. MACNABB 2,171,940

SOUND REPRODUCING APPARATUS

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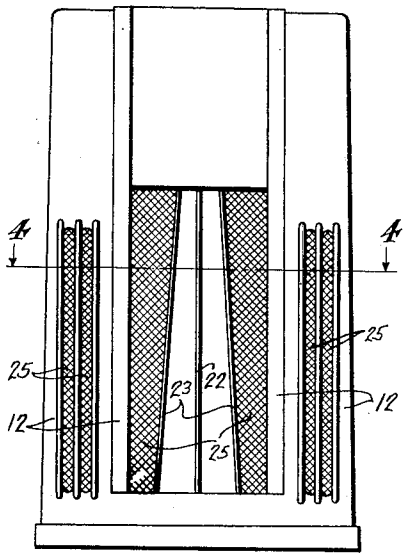


Fig. 1.

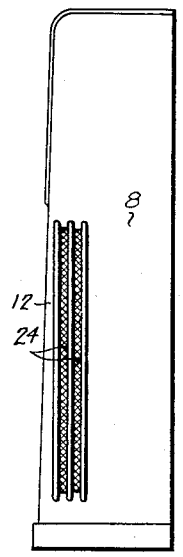


Fig. 2.

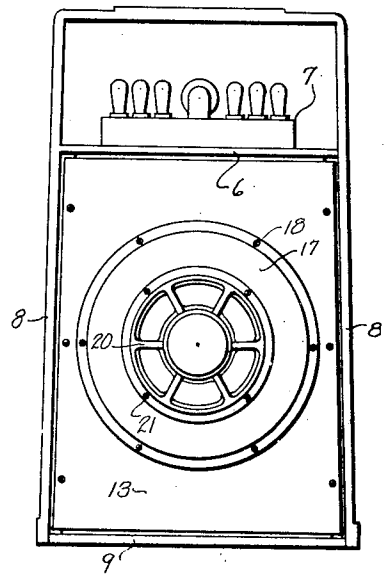


Fig. 3.

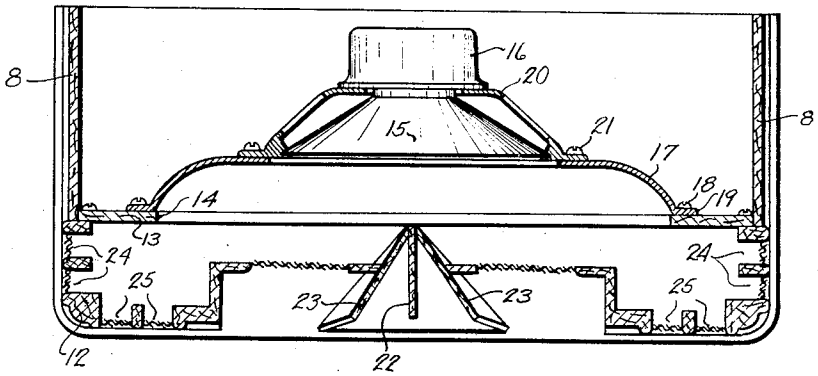


Fig. 4.

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SOUND REPRODUCING APPARATUS

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2 Claims. (Cl. 181—31)

This invention relates to sound reproducing apparatus, and more particularly to radio broadcast receivers.

An object of the invention, generally, is to improve the efficiency and acoustical properties of sound reproducing apparatus of the character described.

In conventional radio receiving units employing loud speakers having diaphragms of conic type, the speaker cone is generally attached at its forward end directly to a baffle member which extends across the sound chamber of the unit. It has been determined that with such assembly arangement, and particularly where a conic diaphragm of relatively large size is employed, insufficient loading of the speaker obtains. Such condition is detrimental to the quality of sounds produced, particularly manifest in the bass response, the higher frequency tones being effected to a lesser degree than those of lower frequency. It has heretofore been proposed to correct this unsatisfactory condition by spacing the forward end of the cone rearwardly of the baffle and interposing between these members a short horn-like structure or shell of special configuration which aids by increasing the air column in direct communication with the speaker diaphragm. Such means provide for a more efficient loading of the speaker cone with attendant improvement in the quality of the bass response and of the radio reception, generally.

However, it has been found that such means augment the normal tendency of the speaker to project tones of wave length equal to or less than the dimension of the cone, in general the higher frequency tones, in a beam-like manner, or in much the same way that a search light projects light rays. Since these higher frequency tones are the ones which lend distinctiveness and quality to speech or music, a listener situated out of the path of the sound beam and deprived of these tones, except as the same may be received indirectly, as by reflection from the walls of the room, does not enjoy clear and satisfactory reception.

An object of the invention is to provide an improved sound reproducing unit involving an electro-dynamic, cone type speaker, embodying means for increasing the efficiency of the speaker and improving its bass response, and means for counteracting the aforesaid undesirable features, resulting in part from the means employed for improving the bass response, whereby to obtain radio reception which is full and clear with respect to both bass and treble tones.

Another object of the invention is attained in the provision of improved means for preventing beam-like projection of the sounds from the speaker and for causing the tones, esecially those in the higher frequency ranges, to be partially directed toward the sides of the unit and upwardly toward the ears of the listeners.

These and other objects and advantages will be explained in the following description which is to be considered with the accompanying drawing, Fig. 1 of which is a front elevation of a radio cabinet embodying the means of my invention; Figs. 2 and 3, respectively, are side and rear elevational views of the same, and Fig. 4 is a sectional plan view taken at line 4—4 of Fig. 1.

Referring now by characters of reference to the drawing, the illustrated cabinet is partitioned by a horizontal shelf 6 which supports radio apparatus 7 and forms the upper wall of a sound chamber also bounded by the cabinet side walls 8, and floor 9. The sound chamber, by preference, is open at its rear, and substantially open at its extreme front, its frontal opening being obstructed only by sound deflecting means to be hereinafter described, and relatively narrow upright portions 12, and loosely woven cloth mesh which serve primarily to enhance the appearance of the cabinet. The sound chamber is divided by a relatively thin wooden partition, or so-called baffle 13 which extends in a vertical plane spaced inwardly from the front face of the cabinet. The baffle 13 extends completely across the sound chamber and reaches from floor 9 to shelf 8, being attached by any suitable means along its marginal edges to the walls bounding the sound chamber. Baffle 13 is provided with a large circular opening 14, forming a passage for sounds produced at the conical diaphragm 15 of a loud speaker 16, the speaker being indirectly attached to baffle 13 with its diaphragm coaxial with opening 14 and spaced rearwardly of the baffle.

Secured to the baffle 13 is a concavo-convex annular shell 17, which may be formed of sheet metal, the shell curving rearwardly and inwardly from the margin of the baffle opening 14, and being secured to the baffle as by means of screws 18 which extend through a flange 19 on the shell. The inner or lesser opening in shell 17 is of a diameter substantially equal to the large end of the speaker cone 15, which terminates forwardly in the plane of the lesser shell opening. A cone frame, or housing 20, customarily provided in electro-dynamic loud speakers, is secured as by screws 21 to the shell 17.

The shell 17 provides a cavity through which sounds from the speaker cone are radiated. Such cavity improves the loading of the speaker cone which, in addition to other advantages accruing therefrom, tends to reduce the amplitude of vibration of the diaphragm at its resonance frequency and prevents undesirable "booming" noises. It has been found that amplification and the quality of the bass response is greatly improved by the use of the described shell, but that this or other means employed for a corresponding purpose, augments the undesirable tendency of the speaker to project the tones in a beam-like manner, present to some degree in all speakers of conic type. As has been heretofore mentioned, one of the purposes of the invention is to obtain the advantages accruing from the described shell, yet to avoid the undesirable effects thereof, and also to provide means for improving, generally, the distribution and dispersion of the sound waves emanating from the speaker.

Secured edgewise to the front face of baffle 13 and extending vertically and centrally of the opening 14 therein, is an elongate member 22 of ply-board or other suitable material. Projecting sidewardly and forwardly at angles of approximately 45° to the baffle, from a vertical line which bisects opening 14, are two deflectors 23 disposed on opposite sides of member 22 and secured to that member along its inner vertical margin. The deflectors 23 extend forwardly to the front of the cabinet and also in a generally vertical direction the full height of the sound chamber. In addition to their angular or laterally diverging relation with respect to each other, the deflectors 23 are inclined to the vertical, converging toward their upper ends. Thus it will appear that sound waves emanating from the speaker and impinging the deflectors 23 will be deflected with a slight upward trend toward the sides of the cabinet. The sound waves primarily effected by the deflectors 23 are those of relatively high frequency which normally are projected beam-like, and these are caused to spread and become diffused with the lower frequency tones, resulting in uniformly clear reception in all parts of the room forwardly of the unit.

Those portions of the cabinet side walls forwardly of the baffle 13 are provided with openings 24, and these, together with openings 25 formed between the structural members 12 at the cabinet front and the opening cabinet back transmit sounds from the unit.

Having described my invention with reference to a preferred embodiment thereof, it will be understood that various changes and modifications may be made in the apparatus herein set forth without departing from the spirit and full intendment of the invention as defined by the following claims.

I claim:

1. In a radio cabinet having walls defining a speaker compartment, a baffle extending in a vertical plane across said compartment, partitioning the same into forward and rear chambers, said baffle having a relatively large circular opening therethrough, a concavo-convex annular shell secured to said baffle and projecting into said rear chamber, a conical speaker diaphragm mounted in the rear chamber coaxially with and adjacent to said shell, and a dihedral deflector in said forward chamber extending vertically across the path of sound waves transmitted through said shell, said deflector comprising a pair of elongated, angularly related panels arranged with their reflecting surfaces facing laterally and upwardly whereby to effect lateral and upward deflection of sound waves emanating from the speaker.

2. In a radio cabinet having walls defining a speaker compartment open at the front and rear of the cabinet, a conical speaker diaphragm positioned centrally of said compartment with its axis extending horizontally, a baffle extending in a vertical plane across the speaker compartment, said baffle being spaced between the mouth of said diaphragm and the cabinet front, said baffle having a circular opening of diameter substantially greater than that of the diaphragm mouth, located coaxially with the diaphragm, a concavo-convex annular shell connected between said diaphragm and baffle, forming a cavity in said baffle through which sounds from the speaker are projected, and means forming sound deflecting surfaces inclined to face laterally and upwardly, said deflecting means extending vertically and centrally along the forward face of said baffle and being adapted to deflect sound waves from the speaker upwardly and toward the sides of the cabinet, said cabinet having openings in its side walls for passing the said deflected sound waves.

VERNON C. MACNABB.