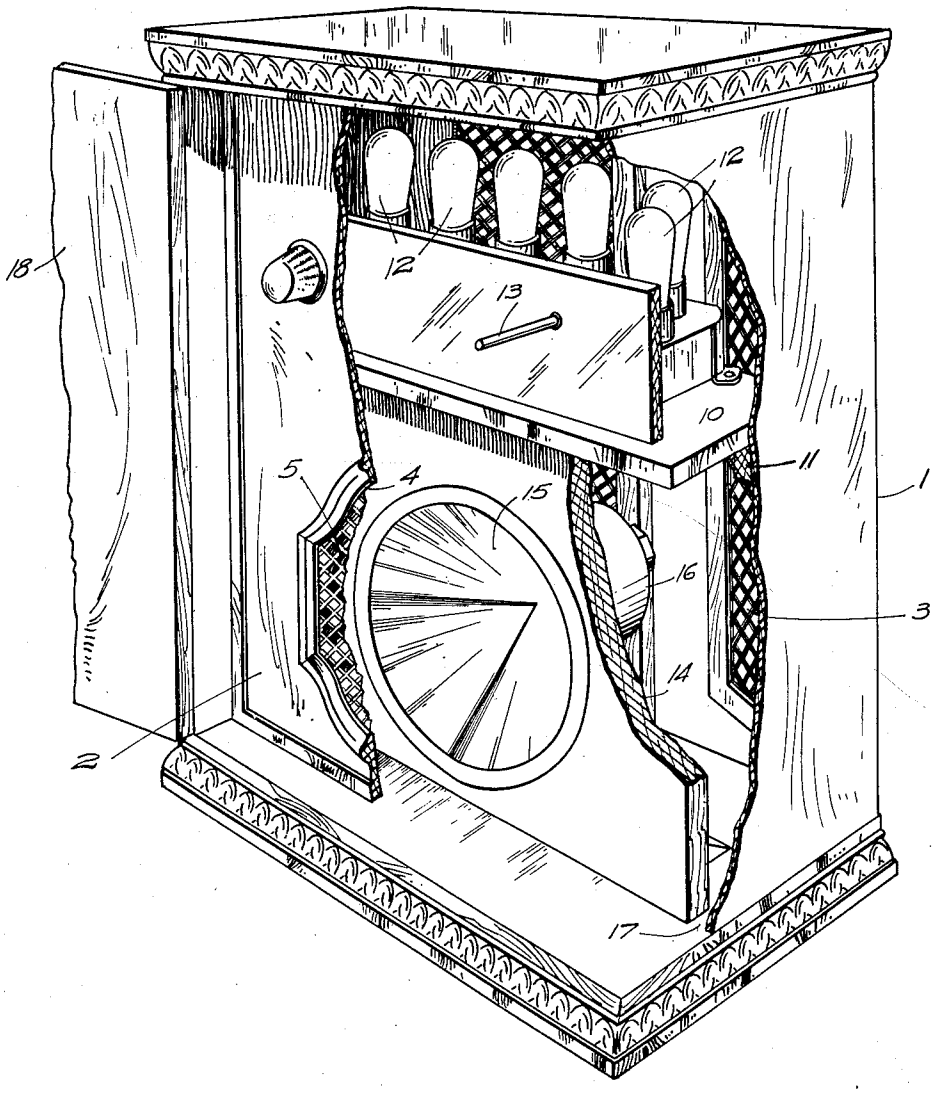
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LOUD SPEAKER MOUNTING

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LOUD SPEAKER MOUNTING

Application filed September 19, 1928. Serial No. 306,869.

Our invention relates broadly to sound-reproducing apparatus and more particularly to apparatus of the type wherein a loud speaker is supported in the interior of a cabinet in operative relation to an opening in one of the walls thereof.

In designing combined radio sets of the console type wherein the radio receiving apparatus and the loud speaker are contained in a single large cabinet, the problem of preventing cabinet resonance has heretofore been extremely difficult to solve.

In certain receiving sets with which we are familiar, a loud speaker of the cone type is employed, the cone diaphragm being so mounted that one of the cabinet walls constitutes a baffle for the purpose of reinforcing low frequencies, as disclosed in the patent to Rice et al. No. 1,631,646. In sets of this type, however, the enclosed space at the rear of the diaphragm becomes a resonance compartment and unpleasantly accentuates certain low frequencies in the output of the loud speaker.

This effect is particularly noticeable and objectionable when the loud speaker is reproducing masculine speech, causing the speech to assume a drum like or booming sound which is extremely unnatural.

Furthermore, since the thermionic devices used in a radio receiving set are often microphonic, as explained in the patent to Allen, No. 1,401,121, the resonance phenomena in sets of the console type is aggravated by regenerative effects resulting from the transfer of sound energy from the loud speaker to the tubes, both through the air and through the walls of the cabinet.

It is, accordingly, an object of our invention to provide means whereby a loud speaker may be so mounted within a cabinet that undesirable resonance phenomena shall be eliminated.

Another object of our invention is to provide means whereby a loud speaker may be so mounted within a cabinet, that also contains a radio set comprising thermionic tubes, that sound energy from the loud speaker shall be prevented from causing effects analogous to those caused by electrical regeneration.

Another object of our invention is to provide, in radio receiving apparatus of the console type, means whereby the cabinet shall be presented from reinforcing, through resonance, certain of the sound frequencies existing in the output from a loud speaker supported within the said cabinet.

The novel features that we consider characteristic of our invention are set forth with particularity in the appended claims. The invention itself, both as to its organization and its method of operation, together with additional objects and advantages thereof will best be understood from the following description of a specific embodiment, when read in connection with the accompanying drawing.

The single figure of the drawing is a view, in perspective, of a radio receiving set of the console type comprising a preferred embodiment of my invention, a door and portions of the walls of the cabinet being omitted to facilitate description of the device.

The apparatus illustrated in the drawing comprises a cabinet 1 having a top, a bottom and a front panel 2. The rear of the cabinet is substantially open, being merely provided with a plurality of doors which carry screening material 3 such as cloth or cane to prevent access to the interior and permit exit of sound. The front panel has an opening 4 extending through it which may advantageously be covered by screening material 5 of any desired type, merely for the purpose of ornamentation.

A shelf 10 is supported within the cabinet by means of a plurality of devices, represented in the drawing by the cleat 11 supporting one end thereof, the edges of the shelf being maintained in intimate contact with the side and front walls of the cabinet. Radio receiving apparatus of any desired type, comprising a plurality of thermionic tubes 12, is supported upon the shelf 10, a plurality of controlling elements for the apparatus being provided with extensions 13

whereby they may be operated from the exterior of the cabinet.

A vertical partition 14 is disposed within the cabinet, between the shelf 10 and the bottom thereof and is positioned from one to five inches rearwardly of, and parallel to, the front panel 2. The partition is provided with an opening of sufficient size to accommodate the support therein of a large conical diaphragm 15 which is connected to, and arranged to be actuated by, electro-magnetic devices 16 affixed to the rear surface of the partition 14 by supporting means (not shown).

The side edges of the partition 14 are spaced a short distance from the side walls of the cabinet, as shown at 17, the distance being largely dependent upon the frequency to which the cabinet is resonant, as will be later explained more fully in detail.

Under certain circumstances, the top edge of the partition 14 is in immediate contact with the lower surface of the shelf 10 while, under other conditions, it may be desirable to leave a small opening between the partition and the shelf.

The front of the cabinet is provided with a plurality of doors 18 which may be closed when the device is not in use.

In the operation of the device, the electromagnetic unit 16 causes the cone 15 to vibrate, which sets up sound waves in the air. The sound waves escape through the screen 5 to the space outside the cabinet. At the same time, sound waves upon the other side of the partition 14 are created by the movements of the cone 15 and pass to the space outside the cabinet through the screen material 3 at the back. The distance from the rear face of the partition 14 through the back of the cabinet and around to the front face of the partition is long enough to prevent interference action between the waves set up upon the two faces of the partition.

The region between the rear of the partition 14 and the back of the cabinet is bounded at the top by the shelf and on the sides and the bottom by the walls and floor of the cabinet. It is, therefore, somewhat like a short and wide rectangular resonance horn and has a tendency to over-emphasize those frequencies to which its dimensions render it responsive. This tendency is largely overcome by the provision for leakage afforded by the passageways 17 between the edges of the partition and the walls of the cabinet or the floor or the shelf. Any air pressure created by the movement of the cone is relieved, to a certain extent, by flow of air through these passages. The pressure waves which otherwise would set up resonance in the cabinet are rendered ineffective by the pressure relief afforded by the passages 17. Also, these passages tend to cause the partition 14 to act like a baffle which is too small, permitting some interference between the waves created on the two faces of the partition.

For best effects, the frequencies which are over-emphasized by resonance action of the cabinet and the frequencies for which the system is rendered somewhat inefficient by the passages 17 should be approximately the same. Moreover, it is desirable that the size of the passages 17 and the distance of the partition 14 behind the panel 2 should be so chosen that the effect of the passages and of the cabinet resonance substantially balance each other. I have found that, for a cabinet 12 inches high and 22 inches wide and 12 inches from front to back in which the shelf 10 is 7 inches above the bottom, the partition 14 is preferably 1½ inches to the rear of the front panel 2, the passage 17 is approximately 2½ inches wide and the opening 4 is approximately the same size as the diaphragm 15.

With this design, there is no objectionable booming or drumming effect even at the lowest notes of a base voice. Moreover, the consequence of lessening the resonance in the cabinet member diminishes the mechanical vibration imparted to the shelf 10 and thus avoids regenerative effects through the mechanical vibration of the vacuum tubes 12.

Many variations of the details herein described will occur to those skilled in the art. A large departure from the exact dimensions mentioned herein may be made if the dimensions are so chosen that the principles of our invention are employed. No limitation is intended by the specific mention of said details and dimensions. The only intended limitations are those required by the prior art or expressed in the claims.

We claim as our invention:

1. In combination, a sound-reproducing device, including a baffle, a cabinet that has a tendency to accentuate by resonance-chamber effect, certain of the sound frequencies that said device is capable of reproducing, said cabinet being substantially open in the rear, said baffle being located within said cabinet and in spaced relationship with certain of the walls of said cabinet so that said tendency to accentuate is nullified.

2. In combination, a sound-reproducing device including a baffle, a cabinet having an opening in a wall thereof, said cabinet tending to accentuate, by resonance-chamber effect, certain of the sound frequencies that said device is capable of reproducing, said cabinet being substantially open at the rear, said device being located within said cabinet rearwardly of said opening and in spaced relationship to certain of the walls of said cabinet whereby said tendency to accentuate is substantially nullified.

3. In combination, a sound-reproducing

device comprising a relatively large diaphragm, a baffle surrounding the diaphragm, a cabinet that tends to accentuate, by resonance-chamber effect, at least one of the sound frequencies that said device is capable of reproducing, said cabinet being substantially open at the back, said device being supported within the cabinet by said baffle, certain of the edges of said baffle extending only into proximity to the interior surfaces of certain of the walls of said cabinet, whereby said cabinet is prevented from accentuating said frequency during actuation of said sound-reproducing device.

In testimony whereof, we have hereunto subscribed our names this 12th day of September, 1928.

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