April 14, 1970 HARUO ISHIKAWA 3,506,087

ACOUSTICAL ENCLOSURE

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FIG. 1

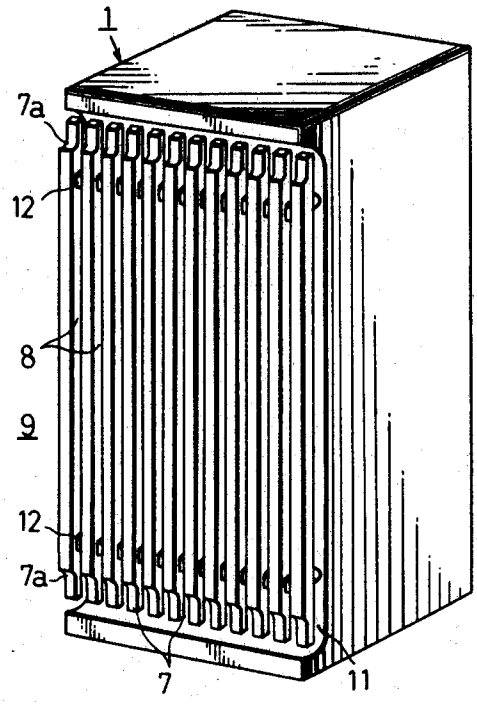


FIG. 6a

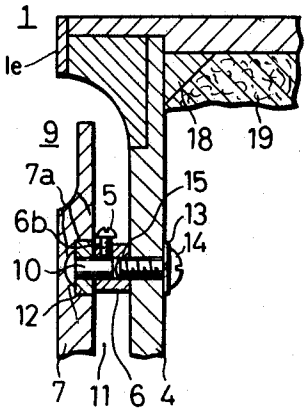


FIG. 6b

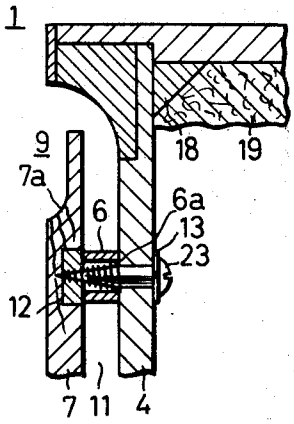
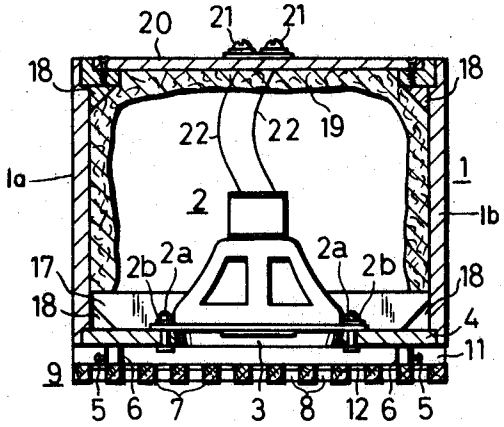


FIG. 2



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FIG. 4

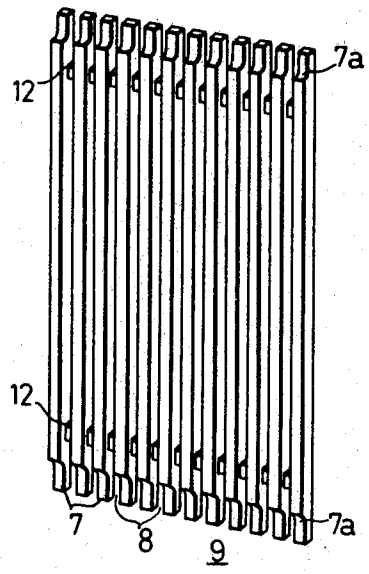


FIG. 3

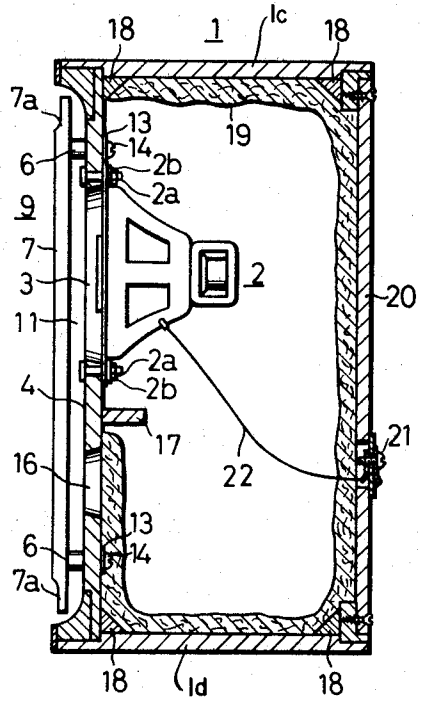
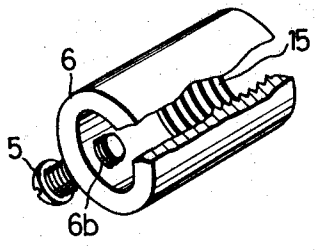


FIG. 5



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ACOUSTICAL ENCLOSURE

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Int. Cl. G10k 13/00
U.S. Cl. 181—31 6 Claims

ABSTRACT OF THE DISCLOSURE

A decorative grille made up of spaced vertical bars is mounted in spaced relation in front of the front plate of a speaker cabinet by means of spacer sleeves secured to the front plate of the cabinet and pins on the rear side of the grille fitting into axial bores of the sleeves and held in place by set screws.

The present invention relates to acoustical enclosures for sound reproducing apparatus, more particularly stereophonic equipment, television sets, radio sets, voice frequency devices, etc., and particularly to the provision of a decorative grille on the speaker cabinet.

While acoustical enclosures of many kinds are known they have not been entirely satisfactory from the point of view of appearance, security of protection for the loudspeaker and acoustical characteristics.

An object of the present invention is to provide an improved acoustical enclosure of good appearance and strong structure while at the same time assuring emission of sound from the loudspeaker without distortion.

A further object of the invention is to provide a speaker cabinet having a decorative and protective grille which is supported in spaced relation in front of the front plate of the cabinet and is easily attached and removed for replacement or cleaning.

For the above mentioned purposes, the acoustical enclosure of the present invention comprises a cabinet having a front plate which is provided with an opening for mounting a loudspeaker inside the cabinet. A grille overlying the front plate is made of hard materials, for example wood, and is formed of a plurality of slender vertical bars which are spaced apart from one another and are joined by at least two cross members. The grille is mounted in spaced relation in front of the front plate of the cabinet by means of spacing sleeves which are secured to the front plate of the cabinet and pins projecting rearwardly from the grille and received in axial bores in the spacing sleeves. The pins are releasably held in the bores so that the grille is securely held in place but can easily be removed, for example for cleaning.

Other objects and advantages of the invention and details of construction of a preferred embodiment will be apparent from the following description with reference to the drawings in which:

FIG. 1 is a perspective view showing an acoustical enclosure in accordance with the invention in the form of a speaker box for stereophonic equipment,

FIG. 2 is a horizontal cross section,

FIG. 3 is a vertical section,

FIG. 4 is a perspective view of the grille, and

FIG. 5 is an enlarged perspective view of one of the spacer sleeves with a portion broken away to show the sleeve wall in section.

FIGS. 6*a* and 6*b* are sectional views showing means for mounting the grille.

In FIGS. 1, 2, and 3 there is shown a speaker enclosure **1** having side walls **1***a* and **1***b*, a top wall **1***c*, a bottom wall **1***d*, a removable back plate **20** and a front plate **4**.

The front plate is provided with an opening **3** for a speaker **2** and with a sound opening **16**. The speaker **2** is attached to the rear of the front plate **4** by bolts **2***a* and nuts **2***b* and is connected to input terminals **21** on the back plate **20** by wires **22**. A horizontal cross plate **17** is secured to the rear of the front plate **4** below the speaker opening and the corners of the cabinet are reenforced by triangular reenforcing members **18**. The enclosure has an inner lining **19** of material such as glass wool.

A grille **9** is mounted in spaced relation in front of the front plate **4** of the cabinet by means of spacers **6** so as to provide a space **11** between the rear of the grille and the front surface of the front plate **4**. The grille **9** is preferably made of hard material such as wood, plastic or light metal and in the embodiment shown in the drawings comprises slender vertical bars or strips of Japanese cypress having a square cross section and connected by cross members **12** disposed near the upper and lower ends of the bars. The bars **7** are spaced apart to provide spaces **8** between adjacent bars. By reason of the spaces **8** between the bars **7** of the grille and the space **11** between the grille and the front plate **4** of the speaker cabinet, sound emitted by the speaker **2** is transmitted freely and distributed uniformly so that the sound effect is improved and an agreeable sound can be heard. Moreover the grille is easily removed for cleaning.

Sound emitted from the loudspeaker **2** carries well because the enclosure is not covered by speaker grille cloth such as knitted or woven fabric as shown in United States Patent No. 3,326,321 and the enclosure vibration is not transmitted to the grille so that the grille does not vibrate and produce undesirable noise. Moreover, the grille is of strong and simple construction and good appearance and provides protection for the loudspeaker mounted in the opening **3** of the front plate **4** of the cabinet. The shape of the vertical bars **7** of the grille can, if desired, be modified, for example by making the outer faces of the vertical bars **7** slightly arcuate and by chamferring the ends of the bars as indicated at **7***a*. Alternatively, the cross sectional shape may be of other suitable form such as circular, triangular, elliptical, polygonal, etc. Various modifications with respect to the connecting cross members **12** may also be selected at will. For example, the cross members may extend obliquely or may be disposed radially from the center of the grille or they may be combined with the vertical members to form a lattice.

In the embodiment described above, the grille is formed of separate members which are joined with one another but alternatively the grille may be molded integrally by extrusion or injection-molding of plastic, especially synthetic resinous material. Suitable materials and methods of molding are well known in this field.

Means for mounting the grille **9** in spaced relation in front of the front plate **4** are shown in FIGS. 6*a* and 6*b*. In the embodiment illustrated in FIG. 6*b*, four spacers **6** are disposed near the four corners of the grille **9** between the grille and the front plate **4**. Each of the spacers **6** is composed of a metallic sleeve having an axial bore **6***a*. The grille **9** is attached to the front plate by means of screws **23** which extend through holes in the front plate **4** and through the spacing sleeves **6** and are screwed into the cross member **12** of the grille. Instead of being metallic, the spacers **6** can be formed of such material as wood or plastic and may be adhesively fixed in place instead of using screws or bolts.

The grille **9** is attached to the front plate **4** so as to be easily removed. When the grille is removed, the front part of the cabinet which is usually invisible behind the

grille is accessible for cleaning and servicing so as to keep the speaker and cabinet in good condition.

In FIG. 6*a* the spacing sleeves **6** have axial bores which are internally threaded for a portion of the length as indicated at **15** in FIG. 5, the outer end portions of the bores being unthreaded. The spacing sleeves are secured to the front of the front plate **4** by bolts **14** which pass outwardly through washers **13** and through holes in the front plate **4** and screw into the internally threaded portions of the spacer sleeves. The grille **9** has pins **10** which protrude rearwardly from the cross members **12** as seen in FIG. 6*a* and are received in the outer unthreaded portions of the bores of the spacing sleeve. It will be seen that the heads of the pins **10** are concealed by vertical bars **7** of the grille. The pins **10** are releasably secured in the spacing sleeves by set screws **5** which are screwed into tapped radial holes **6***b* in the spacing sleeves. When the pins **10** are inserted in the spacing sleeves and the set screws **5** are tightened, the grille is held securely in place but can easily be removed by inserting a screwdriver in the space between the grille and the front plate of the cabinet and loosening the set screws **5**. As the set screws **5** are behind the grille, the appearance of the speaker cabinet is not spoiled. As seen in FIGS. 1, 3 and 6*a* the speaker cabinet has upper and lower marginal flange portions **1***e* which project forwardly of the front face of the front plate **4** and have outer surfaces approximately flush with the front of the grille but spaced outwardly from the ends of the grille in a direction parallel to the front plate.

While a preferred embodiment of invention has been illustrated in the drawings and is herein particular described, it will be understood that the construction can be suitably modified according to the design of the speaker cabinet.

I claim:

1. An acoustical enclosure comprising a cabinet having a front plate provided with an opening for mounting a speaker inside the cabinet, a grille of hard material comprising a plurality of spaced slender vertical bars and at least two cross members which interconnect said bars with vertical spaces between adjacent bars, said grille overlying and spaced from said front plate and means for solidly and removably supporting said grille in spaced relation to said front plate, said supporting means comprising internally threaded spacing sleeves disposed between said grille and front plate with axial bores of said sleeves orthogonal to said front plate, bolts extending through holes in said front plate and screwed into said sleeves to secure said sleeves to said front plate of the cabinet, pins projecting inwardly from said grille and received in said bores of said sleeves, and means for releasably securing said pins in said sleeves to secure said grille to said front plate, said grille being removable from the cabinet by releasing said releasable means without unscrewing said bolts from said sleeves.

2. An acoustical enclosure according to claim **1** in which each of said sleeves has a threaded radial hole extending into the portion of said bore receiving said respective pin, and in which said releasable securing means comprises a set screw threaded into said radial hole and operable by a screw driver inserted between said grille and front plate to tighten said set screw to secure said grille in place and to loosen said set screw to release said grille.

3. An acoustical enclosure according to claim **2**, in which said set screws are in position to be invisible from the front of said grille.

4. An acoustical enclosure according to claim **1**, in which said pins extend through said cross members and are invisible from the front of said grille.

5. An acoustical enclosure according to claim **1**, in which said cabinet has marginal flange portions which project forwardly of the front face of said front plate and have outer surfaces approximately flush with the front of said grille, said flange portions being spaced outwardly from the respective borders of said grille in a direction parallel to said front plate.

6. An acoustical enclosure according to claim **1**, in which said grille is made of material having a wood grain finish.

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