

[54] **LOUDSPEAKER CABINET WITH SOUND REFLECTORS**

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[22] Filed: **Jan. 22, 1973**

[21] Appl. No.: **325,537**

[52] U.S. Cl. **181/31 A, 181/31 B**

[51] Int. Cl. **G10k 13/00, H04r 1/28**

[58] Field of Search **181/31 A, 31 B, 31 R**

[56] **References Cited**

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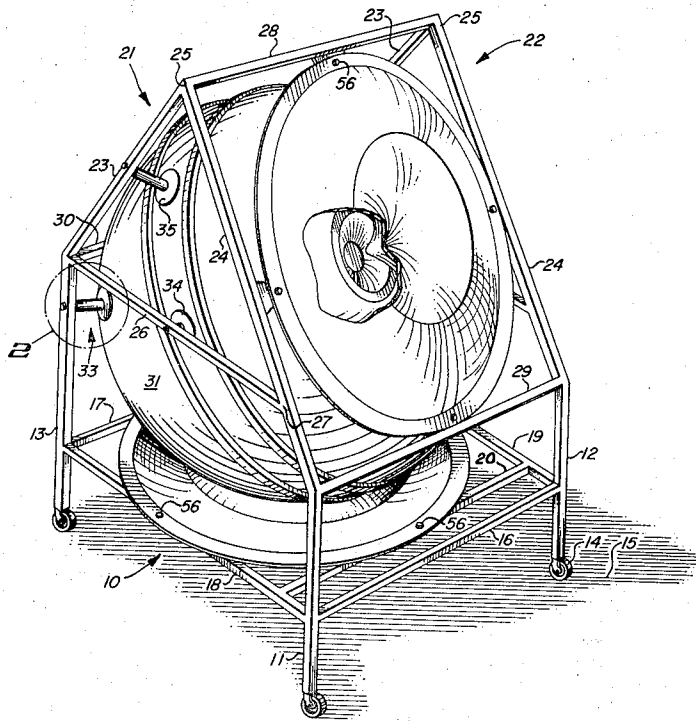
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[57] **ABSTRACT**

This specification discloses a loudspeaker cabinet comprising a frame on which is mounted a spherical receptacle carrying a pair of loudspeakers in angularly spaced relation, together with a sound reflector operatively associated with each speaker and of a special design. Each reflector is of fiberglass and has an inner reflecting surface consisting of two concave annular surfaces which meet at an apical line. The inner of these annular surfaces is generated by rotating an arc of a circle through 360° with an end of the arc the pivot point. The outer annular surface is generated by moving an arc of another circle through 360°.

6 Claims, 4 Drawing Figures



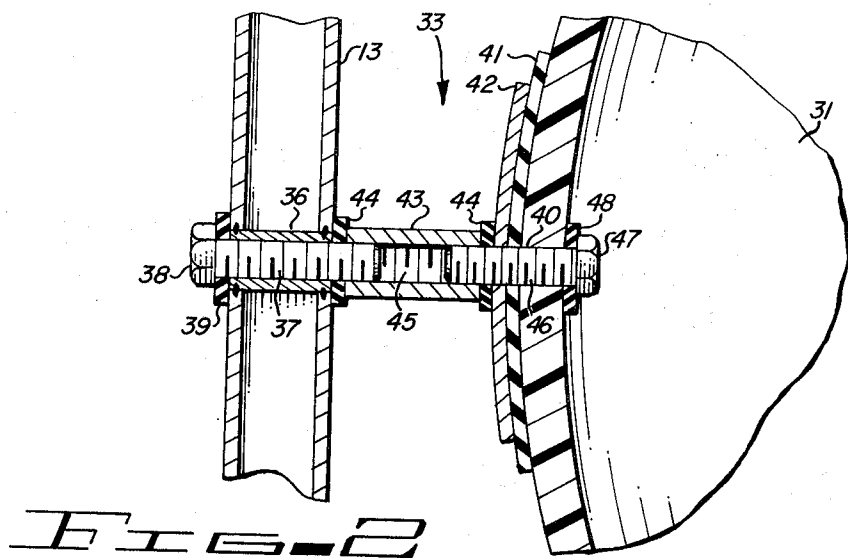
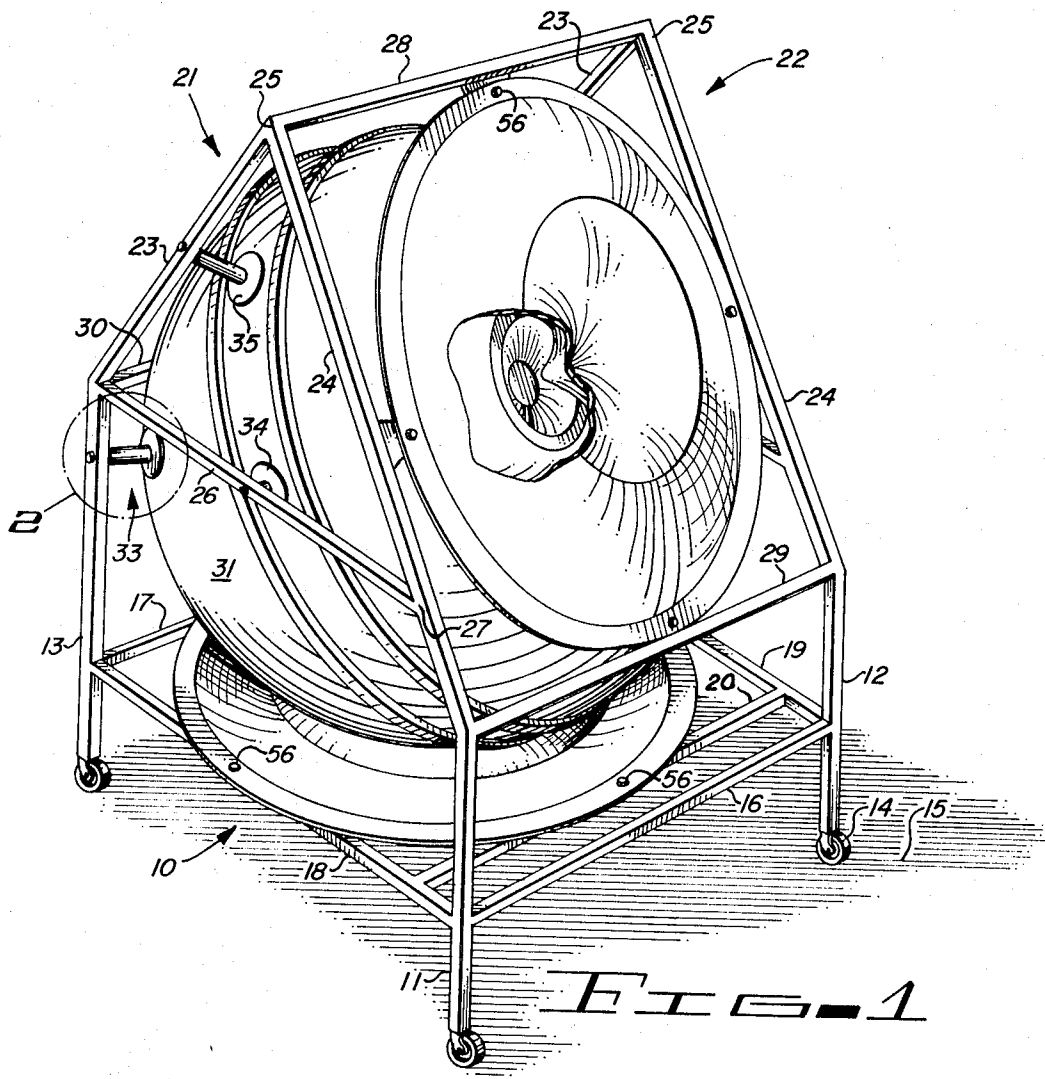


FIG. 3

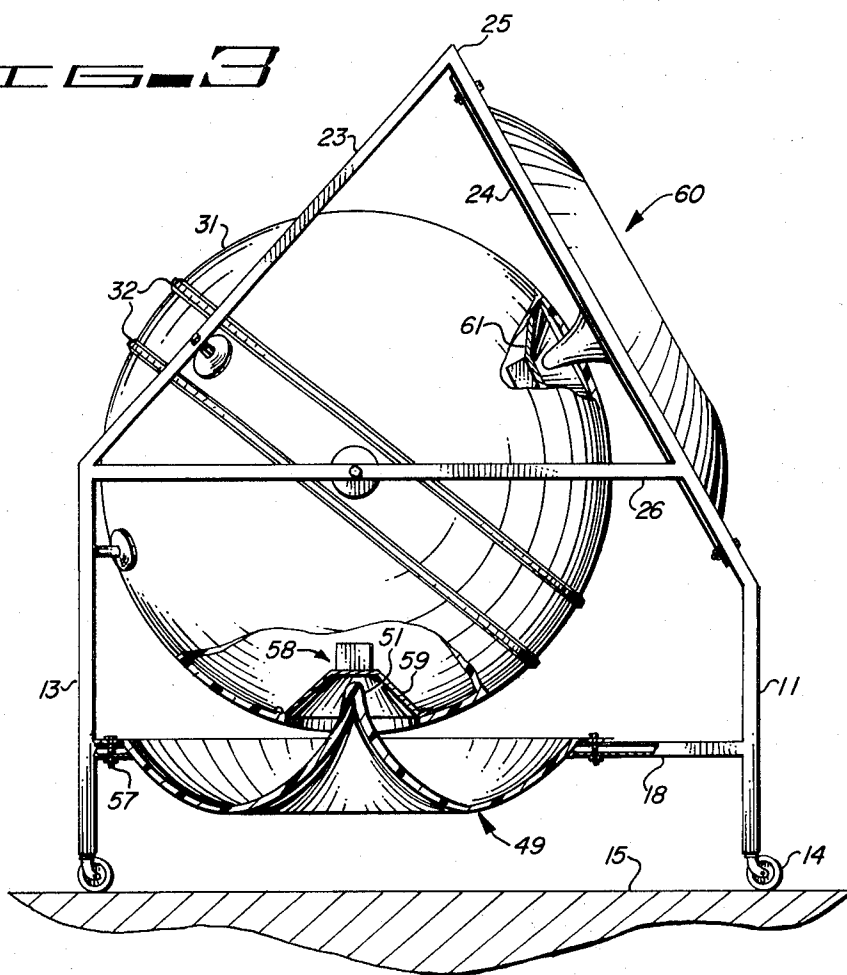
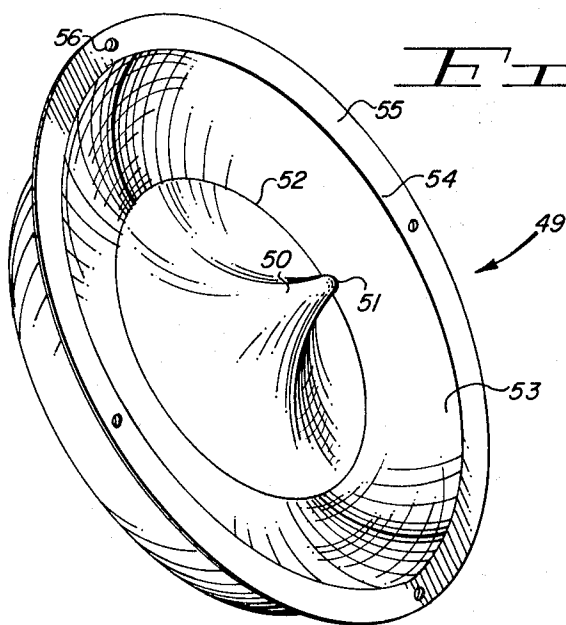


FIG. 4



LOUDSPEAKER CABINET WITH SOUND REFLECTORS

The present invention relates to loudspeaker cabinets and is concerned primarily with a cabinet in which a pair of sound reflectors of novel special design are associated with a pair of loudspeakers.

BACKGROUND OF THE INVENTION

At the present time, it is now recognized as desirable to associate a sound reflector with the loudspeaker of stereophonic equipment. However, cabinets provided for this purpose are not particularly adaptable to the inclusion of a pair of loudspeakers with a sound reflector operatively associated with each speaker. Moreover, the known art is believed to be singularly lacking in a sound reflector which is particularly adapted for close association with a loudspeaker.

OBJECTS OF THE INVENTION

With the foregoing conditions in mind, the present invention has in view the following objectives:

1. To provide a loudspeaker cabinet comprising a frame in which is mounted a spherical receptacle carrying two loudspeakers with a sound reflector for each speaker being mounted on the frame in close operative association with the speaker.

2. To provide a loudspeaker cabinet of the type noted in which the loudspeakers open onto the outer surface of the spherical receptacle.

3. To provide, in a loudspeaker cabinet of the character aforesaid, a sound reflector of fiberglass and presenting a concave reflecting surface made up of two annular concave surfaces which meet at an apical line.

4. To provide, in a loudspeaker cabinet of the kind described, a sound reflector including an inner concave reflecting surface which is generated by rotating an arc of a circle through 360° with an end of the arc being the pivot point, and an outer concave annular surface which is generated by moving an arc of another circle through 360° .

5. To provide, in a loudspeaker cabinet of the type noted, sound reflectors including peripheral flanges for mounting them in the frame.

Various other more detailed objects and advantages of the invention, such as arise in connection with carrying out the above ideas in a practical embodiment, will, in part, become apparent and, in part, be hereafter stated as the description of the invention proceeds.

SUMMARY OF THE INVENTION

The foregoing objects are achieved by providing a loudspeaker cabinet comprising a frame including four vertical legs which are connected at points above their lower ends by four horizontal struts and with one pair of legs being longer than the other pair. A pair of A-frames connect the upper ends of the longer legs with the upper ends of the shorter legs. Thus, each A-frame has a short side and a long side. An upper transverse strut connects the upper ends of the longer legs and a second transverse strut connects the upper ends of the shorter legs. Each A-frame includes a cross bar extending from the end of its shorter side to a point spaced from the end of its longer side.

A spherical receptacle of plastic is mounted in the frame being secured to the cross bars and sides of the A-frames, a bar which connects the apices of the A-frames, the strut which connects the upper ends of the

shorter legs and to the longer legs adjacent their upper ends. This receptacle carries a pair of loudspeakers in angularly spaced relation. One of these loudspeakers assumes a position at the bottom of the receptacle in which it opens downwardly and the other loudspeaker assumes a position opposite to the space defined by the longer sides of the A-frames, the apex bar and the strut connecting the upper ends of the shorter legs.

Another lower strut extends between the two lower struts in parallel relation to the upper two. A sound reflector includes a flange which is secured to this last mentioned so-called intermediate strut and the remaining three of the lower struts. A second sound reflector is secured to the apex bar, the sides of the A-frames and the strut connecting the upper ends of the shorter legs. Each of these sound reflectors is of fiberglass and presents an inner reflecting surface provided by an inner concave conical member and an outer annular concave surface with the two meeting at an apical line. The point of the conical portion enters a loudspeaker.

For a full and more complete understanding of the invention, reference may be had to the following description and the accompanying drawings wherein:

FIG. 1 is a perspective of a loudspeaker cabinet embodying the precepts of this invention, with a portion of a sound reflector broken away;

FIG. 2 is a sectional view taken on an enlarged scale of the connection between a frame element and the spherical receptacle; this view is of the area enclosed by the broken line circle marked 2 of FIG. 1;

FIG. 3 is a side view partly in section and partly in elevation of the cabinet; and

FIG. 4 is a detailed perspective of one of the sound reflectors.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like reference characters denote corresponding elements throughout the several views, and first more particularly to FIG. 1, the loudspeaker cabinet of this invention is shown as including a frame identified in its entirety by the reference character 10. Frame 10 includes a pair of shorter front legs 11 and 12 which will be hereinafter referred to as the front legs and a pair of longer legs 13 which will be identified as rear legs. Only one of the legs 13 is illustrated in FIGS. 1 and 3, because the remaining leg is obscured by the structure illustrated. Each of the legs 11, 12 and 13 is provided with a castor 14 at its lower end which enables the cabinet to be readily moved over a supporting surface such as the floor shown at 15.

Extending between legs 11 and 12 at points spaced above castors 14 is a front lower cross strut 16 and extending between rear legs 13 is a rear lower cross strut 17. A side strut 18 extends between leg 11 and one of rear legs 13 and another side strut 19 extends between leg 12 and the other of the rear legs 13. An intermediate cross strut 20 extends between side struts 18 and 19.

The upper end of leg 11 and one of legs 13 is connected by an A-frame designated generally 21. Another A-frame 22 connects the upper end of leg 12 and the other of rear legs 13. The A-frames 21 and 22 are substantial duplicates and only one of them is herein described in detail as that is believed to be sufficient for the purposes of this specification. Thus, A-frame 21 is

shown as comprising a short side 23 and a long side 24 which meet at an apex 25. A cross bar 26 extends from the lower end of side 23 to a point 27 spaced from the lower end of side 24. This cross bar 26 is substantially parallel to side strut 18. A so-called apex bar 28 extends between the apices 25, an upper front cross strut 29 extends between the upper ends of front legs 11 and 12 and an upper rear cross bar 30 extends between the upper ends of rear legs 13. It will be understood that the frame structure so far described may be of any appropriate material, with sheet metal which is fashioned into a tubular construction being indicated as the preferred material.

A spherical receptacle is designated 31. It is of plastic and from the aspect of practical manufacture, it is formed by first making two semi-spherical parts which are assembled and secured together and rolling bands 32 applied thereabout. Receptacle 31 is mounted in frame 10 by a plurality of fastening assemblies which are identified in their entirety at 33, 34 and 35. It will be noted that these fastening assemblies 33, 34 and 35 are shown as associated with elements of the A-frame 21 and the rear leg 13 closest thereto. It will be understood that there are three similar fastening assemblies on A-frame 22 and the other rear leg 13.

Referring to FIG 2, details of the assembly 33 are described and it will be understood that the assemblies 34 and 35 are similar thereto. Rear leg 13 is tubular as above pointed out and is of square cross-section. Extending between opposed walls of leg 13 is a sleeve 36 which defines a passage. A screw bolt 37 is received in this passage and has a wrench engageable head 38 with a resilient washer 39 being interposed between head 38 and leg 13. Receptacle 31 is formed with a passage 40 in alignment with sleeve 36 and fitted over that portion of the exterior surface of receptacle 31 about the end of passage 40 is a gasket 41 and over gasket 41 is a reinforcing member 42 with the gasket 41 and member 42 being formed with openings which align with passage 40. A spacer sleeve 43 is interposed between leg 13 and receptacle 31 with a washer 44 at each end of the sleeve. Sleeve 43 is formed with a threaded bore 45 which is engaged by the threads of screw bolt 37. Another screw bolt 46 is passed through passage 40, gasket 41, member 42 and a washer 44 into threaded engagement with the bore 45 of sleeve 43. Screw bolt 46 has a head 47 and a resilient washer 48 is interposed between the inner end of this head and the inner surface of receptacle 31. It is evident that the screw bolts 37 and 46 may be individually tightened to insure of an accurate and firm positioning of receptacle 31 in frame 10.

Referring more particularly to FIG. 4, a sound reflector is therein illustrated and referred to in its entirety at 49. It is made of fiberglass and while it is an integral one-piece structure, it includes certain sections which present an inner generally concave reflecting surface. Thus, inner section 50 is best described as being a concave cone having a point 51 and a circular periphery 52. Between point 51 and periphery 52, there is an annular concave reflecting surface which may be described as generated by rotating an arc through 360° with an end of the arc at point 51.

An outer annular reflecting section 53 presents another inner concave reflecting surface between an inner edge which is coincident with the periphery 52 of inner section 50 and a peripheral line 54. The coinci-

dence of periphery 52 and the inner edge of section 53 is herein designated an apical line. Annular surface 53 is generated by moving an arc of a circle of a radius different from that used in generating section 50 through 360°. Connected to section 53 of periphery 54 is a marginal flange 55 formed with a plurality of angularly spaced openings 56. Each of these openings 56 is intended to receive a fastening member such as a screw or bolt and nut which is used in mounting the reflector 49 in frame 10. Thus, as shown in FIGS. 1 and 3, one of these fastening devices is passed through the opening 56 which overlies side strut 18, another one is passed through the opening 56 which overlies intermediate strut 20, another through the opening 56 (not illustrated) which overlies side strut 19 and another through the opening 56 which overlies a tab 57 which extends from lower rear strut 17.

It will be noted from FIGS. 3 and 4 that section 53 is directed from apical line 52, which is the peripheral edge of section 50, back in the same general direction that section 50 extends from apical line 52, that is towards point 51.

Receptacle 31 is provided with a loudspeaker 58 which includes a frusto-conical part 59 into which point 51 of conical member 50 is inserted in spaced relation thereto. A second reflector designated generally 60 is of the same construction and material as reflector 49. Sound reflector 60 is mounted on apex bar 28, sides 24 of A-frames 21 and 22 and upper cross strut 29 by fastening devices which pass through the openings 56 and are secured to tabs corresponding to the tab 57. Receptacle 31 has another loudspeaker at 61 which receives the point 51 of sound reflector 60. It will be understood that the loudspeakers 58 and 61 are connected by appropriate wiring, not illustrated, to electrical or electronic devices, also not illustrated.

It is evident that the structural design for reflectors 49 and 60 is intimately related with the spherical contour of receptacle 31 and the loudspeakers 58 and 61 therein so that sound waves are reflected from the respective reflector and then diverted by the spherical contour of receptacle to achieve an effective dispersion of the sound.

While a preferred specific embodiment is herein disclosed, it is to be clearly understood that the invention is not to be limited to the exact construction, mechanisms and devices illustrated and described because various modifications of these details may be provided in putting the invention into practice.

What is claimed is:

1. In a loudspeaker cabinet,
 - a. a frame,
 - b. a spherical receptacle mounted in said frame,
 - c. a loudspeaker carried by said receptacle and opening onto the outer surface thereof, and
 - d. a sound reflector mounted on said frame, said sound reflector being of fiberglass and comprising an inner concave conical section and an outer concave annular section, with said sections being integrally joined at an apical line and the conical section having a point partially entering said loudspeaker,
- said inner concave conical section being generated by rotating an arc of a circle through 360°, with an end of the arc at said point, and the outer concave annular section being generated by moving an arc of a circle of a radius different from that

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used in generating said inner concave conical section through 360°, with said outer concave annular section extending from said apical line back in the same general direction in which said inner concave conical section extends from said apical line, whereby it assumes a position in spaced relation to said spherical receptacle.

2. The loudspeaker cabinet of claim 1 together with a second loudspeaker in said receptacle and angularly spaced from said first loudspeaker and a second sound reflector of the same construction as said first mentioned sound reflector.

3. The loudspeaker cabinet of claim 2 in which the frame comprises four vertical legs, lower struts, upper struts and a pair of A-frames having apices and an apex bar connecting the apices, with one sound reflector being secured to the lower struts and the other sound reflector secured to an upper strut, the apex bar and said A-frames.

4. The loudspeaker cabinet of claim 3 in which there

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are two short front legs and two longer rear legs, and each A-frame has a short side, the lower end of which is connected to the upper end of a rear leg, and a long side, the lower end of which is connected to a front leg.

5. The loudspeaker cabinet of claim 3 in which a fastening assembly is used to mount the spherical receptacle in the frame, each of said fastening assemblies including a spacer sleeve having a threaded bore, a screw bolt passing through the passage in the receptacle and in threaded engagement with said bore, and another screw bolt passing through a passage in a frame element and in threaded engagement with the bore of said sleeve.

6. The loudspeaker cabinet of claim 5 in which all of the elements of the frame are tubular and of rectangular cross-section and in which the passage in the frame element is provided by a sleeve spanning the tubular cross-section thereof.

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