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Westlund

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

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 325,537, Jan. 22, 1973.

[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

[56] **References Cited**

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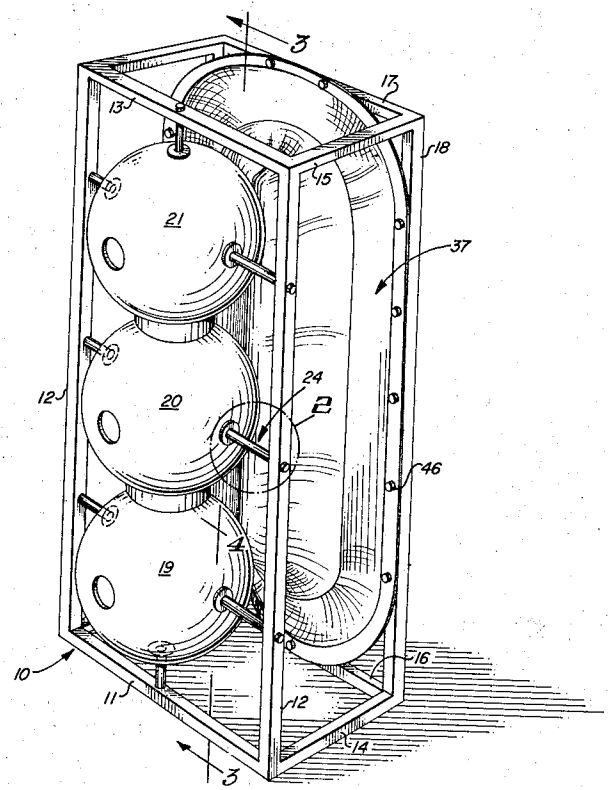
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[57] **ABSTRACT**

This specification discloses a loudspeaker cabinet comprising a frame on which is mounted a plurality of spherical receptacles in alignment with each receptacle having a loudspeaker mounted therein and a sound reflector common to all of the speakers and consisting of a generally oval shape fiberglass member presenting a compound concave reflecting surface characterized by a central apical ridge that is located closely adjacent to the loudspeakers.

2 Claims, 6 Drawing Figures



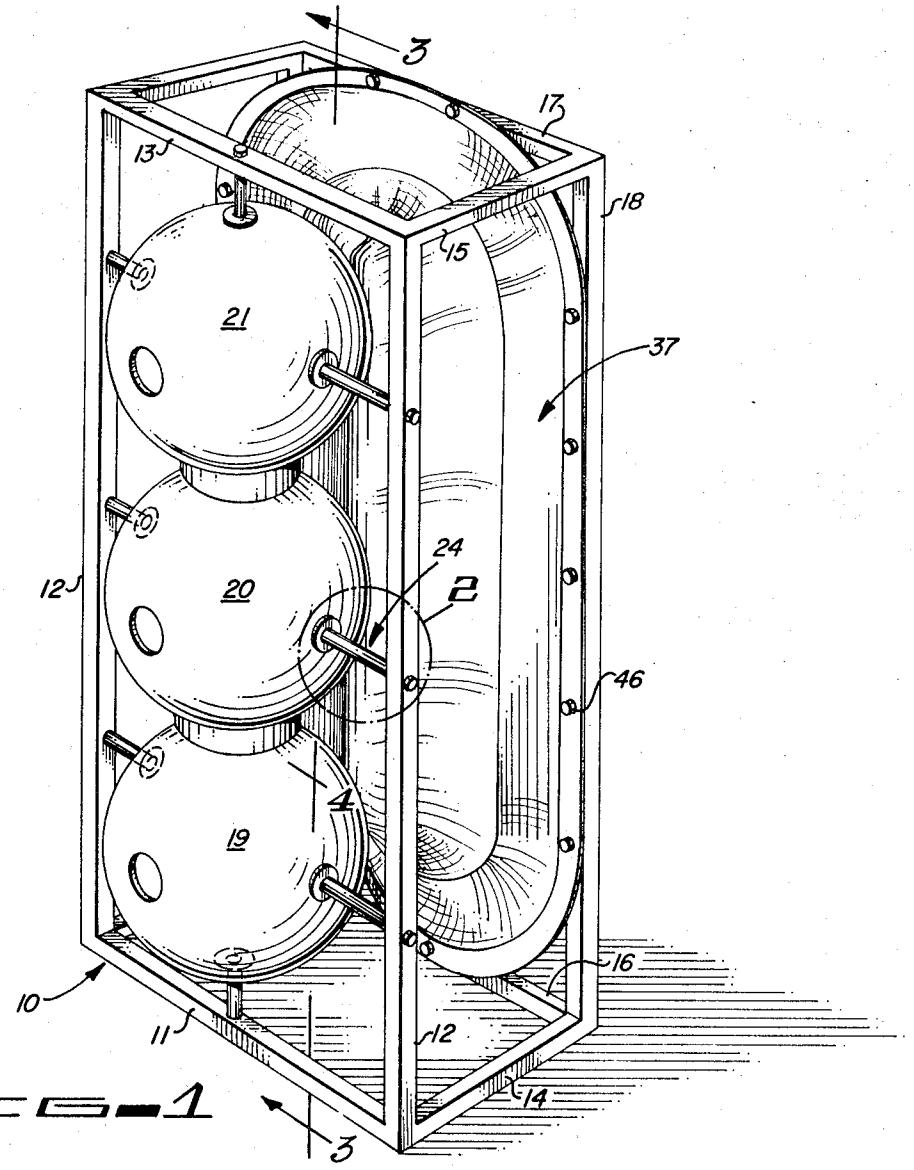

3
17
13
18
15
21
37
24
2
12
20
46
4
19
16
10
11
12
14
3

Fig-1

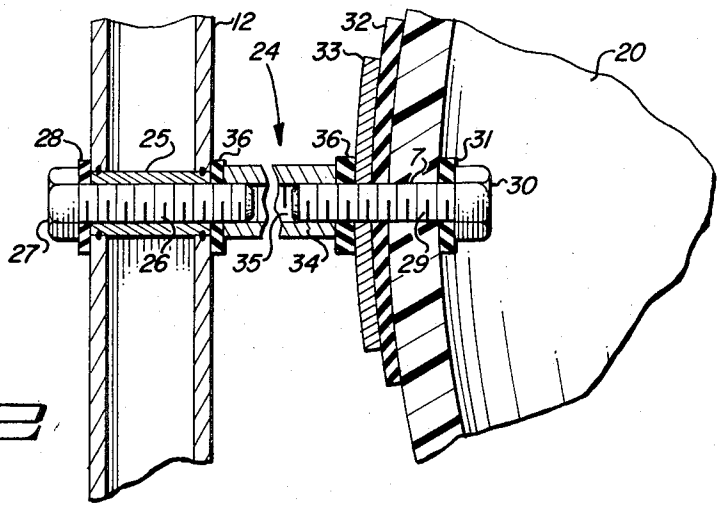

12
32
24
33
20
28
25
36
36
31
3
30
27
26
35
34
29

Fig-2

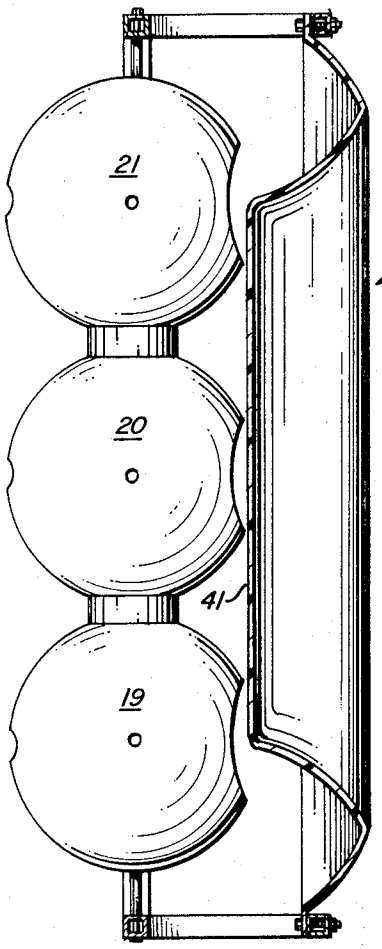


Fig-3

Fig-4

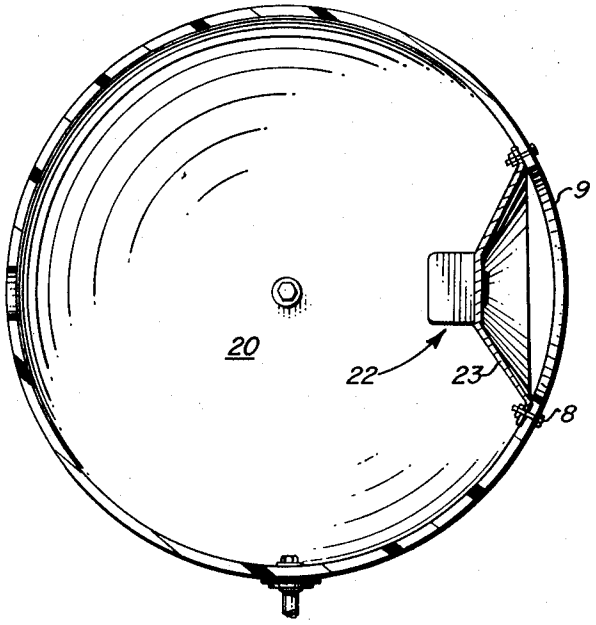


Fig-5

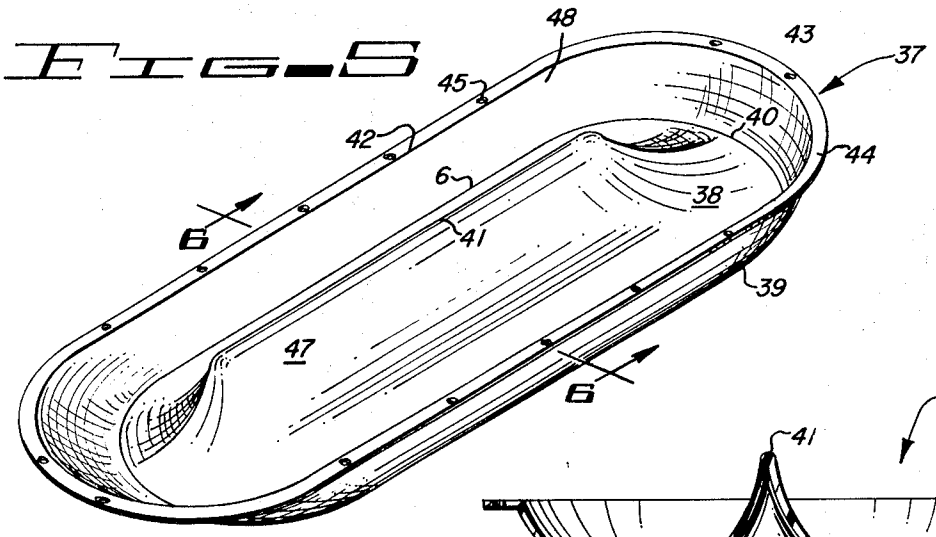


Fig-6

LOUDSPEAKER CABINET WITH SOUND REFLECTORS

This application is a continuation-in-part of the co-pending application of James R. Westlund, Ser. No. 325,537 filed Jan. 22, 1973 and entitled "Loudspeaker Cabinet with Sound Reflectors."

The present invention relates to loudspeaker cabinets and is concerned primarily with a novel arrangement of a plurality of loudspeakers arranged in alignment and a fiberglass sound reflector that is common to all speakers.

BACKGROUND OF THE INVENTION

In the co-pending application above identified there is disclosed a loudspeaker cabinet comprising a frame in which is mounted a spherical receptacle containing two loudspeakers in angularly spaced relation with a sound reflector associated with each loudspeaker . Each sound reflector is of fiberglass and presents a compound reflecting surface comprising an inner concave conical section terminating in a point and an outer annular concave surface which joins in with the inner section at an apical line. The point of each sound reflector partially enters a loudspeaker.

While the aforesaid loudspeaker cabinet with its sound reflectors is adapted to meet many conditions of usage, there are other conditions which are not completely satisfied thereby. Thus there are occasions when it is desirable to locate a plurality of loudspeakers at the lateral or peripheral boundary of a particular area or space so that the sound therefrom is reflected and dispersed throughout the space with a fairly uniform degree of concentration over the entire area.

OBJECTS OF INVENTION

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

1. To provide, a loudspeaker cabinet and sound reflector assembly which includes a plurality of loudspeakers arranged in alignment together with a sound reflector that is common to all the speakers.

2. To provide, in a loudspeaker cabinet and sound reflector assembly of the type noted, a frame in which is mounted a plurality of spherical receptacles in alignment with a loudspeaker mounted in each receptacle and with the loudspeakers in alignment.

3. To provide, in an assembly of the character aforesaid, a sound reflector of fiberglass and having a compound reflecting surface comprising inner and outer sections. Each of these sections is of generally oval configuration with the inner section terminating in an apical ridge which is disposed closely adjacent to all of the loudspeakers.

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 generally rectangularly shaped frame in which is mounted a plurality of spherical receptacles in alignment. A loudspeaker is assembled in each receptacle and opens onto the external surface of the receptacle. These loudspeakers are also in alignment.

Mounted on the frame is a fiberglass sound reflector presenting a compound concave reflecting surface comprising inner and outer sections. Each of these sections is of generally oval shape but is more particularly identified as being defined by straight sides and curved ends. Thus, the inner section has a concave reflecting surface generated by moving an arc of a circle about and within the periphery of the inner section. The two sections of the reflecting surface meet and merge in with one another at the periphery of the inner section. The periphery of the outer section is provided with an outstanding flange which constitutes means for mounting the sound reflector in the frame.

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

FIG. **1** is a perspective of a loudspeaker cabinet and sound reflector embodying the precepts of this invention.

FIG. **2** is a detailed section on an enlarged scale through one of the assemblies for mounting a spherical receptacle in the frame. This sectional view is taken from the area encircled by the broken line marked **2** in FIG. **1.**

FIG. **3** is a side view partly in section and partly in elevation and is taken on the plane of the line **3—3** of FIG. **1.**

FIG. **4** is a detailed section through one of the receptacles and loudspeaker carried thereby.

FIG. **5** is a perspective of the sound reflector per se; and

FIG. **6** is a detailed transverse section through the sound reflector being taken on the plane of the line **6-6** of FIG. **5.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing wherein like reference characters denote corresponding parts throughout these several views and first more particularly to FIG. **1,** a loudspeaker cabinet made in accordance with the principles of this invention is shown as including a frame which is referred to in its entirety by the reference character **10.** For the purposes of this specification, the frame **10** will be described as in a vertical position as such a position is believed to be preferred for actual usage of the cabinet. Frame **10** comprises a front bottom cross strut **11,** front side struts **12,** and a front top cross strut **13.** Extending rearwardly from the lower ends of each strut **12** are bottom side struts **14** and extending rearwardly of the upper ends of side struts **12** and upper side struts **15.** Connecting to the ends of bottom side struts **14** remote from side struts **12** is a rear bottom cross strut **16** while a top cross strut **17** extends between the ends of the top side strut **15** remote from struts **12.** Rear side struts **18** extend between the ends of rear cross struts **16** and **17.**

It is evident that the struts **11, 12** and **13** define a front framework substantially within a plane. Mounted in this front framework by a plurality of mounting assemblies to be later described are a plurality of spherical receptacles **19, 20** and **21.** In this connection it is noted that while three of these spherical receptacles are herein disclosed, the invention is not to be limited

to this particular number. There may be only two or more than three of such receptacles.

It will be understood that the receptacles **19, 20** and **21** are identical hence only one of them is herein described in detail as that is believed to be sufficient for the purposes of this specification. Referring now more particularly to FIG. **4** receptable **20** is shown as being of plastic with fiberglass being indicated as a preferred material. Receptacle **20** is formed with an opening at **9** behind which is mounted a loudspeaker designated generally **22.** Loudspeaker **22** includes a conical member **23** which is secured to receptacle **20** at the periphery of opening **9** as by the fastening elements indicated **8.** As shown in FIG. **1** receptacle **20** is mounted between side struts **12** by a pair of mounting assemblies each of which is referred to in its entirety of reference character **24.** One of these fastening assemblies **24** is shown in detail in FIG. **2.** Thus a side strut **12** is of sheet metal and is rectangularly in horizontal cross section. This strut **12** is formed with a pair of openings and mounted therein is a sleeve **25.** Received in sleeve **25** is a screw bolt **26** having a head **27** with a gasket **28** being interposed between head **27** and strut **12.**

Receptacle **20** is formed with an opening **7** through which passes a screw bolt **29** having a head **30** with a gasket **31** being interposed between head **30** and the inner surface of receptacle **20.** A packing **32** covers the exterior of receptacle **20** about opening **28** and outside of packing **32** is a reinforcing plate **33.** Screw bolt **29** passes through aligned openings in packing **32** and reinforcement **33.** A spacer sleeve **34** having a threaded bore **35** is interposed between strut **12** and receptacle **20** with a gasket **36** at each end. Screw bolts **26** and **29** are threaded into spacing sleeve **34** a required degree to achieve an accurate positioning of the receptacle **20** with respect to the adjacent strut **12.**

Receptacle **19** is anchored to struts **12** and front bottom strut **11** by similar mounting assemblies **24.** Receptacle **21** is secured to struts **12** and front top strut **13** by the same assemblies. A sound reflector is illustrated per se in FIG. **5** and is identified in its entirety by the reference character **37.** It is of fiberglass and comprises an inner section **38** and an outer section **39.** Inner section **38** has a periphery defined by straight sides **6** and curved ends **40.** This configuration might be said to be generally oval but is not a true oval because of the straight sides **6.** Inner section **38** has an apical ridge **41** which it will be noted from FIG. **3** is closely adjacent to the conical elements **23** of loudspeakers **22.**

The inner section **41** has a concave reflecting surface **47** generated by moving an arc of a circle with one end of the arc following the periphery made up of lines **6** and **40** and at the other end of the arc a line which determines the ridge **41.**

Outer section **39** has a concave reflecting surface **48** which is generated by moving one end of an arc along lines **6** and **40** with the other end of the arc determining the outer periphery of this section which includes straight sides **42** and rounded ends **43.** A flange **44** extends outwardly from the outer periphery of section **39** and is formed with openings **45.** As shown more clearly in FIG. **1** fastening elements **46** pass through these openings **45** and corresponding openings in rear struts **16, 17** and **18** to secure the reflector **37** in position in frame **10.**

OPERATION

While the manner in which the subject loudspeaker cabinet and sound reflector functions is believed to be obvious from the illustrations of the drawings and descriptions of parts set forth above, it will be briefly described by noting that sound waves from the loudspeakers **22** engage reflector **37** and are reflected therefrom about the receptacles **19, 20** and **21** into the area at one side of which the cabinet is located. The relation of the receptacles and the reflecting surface of sections **38** and **39** afford an efficient and even distribution of the sound waves over this area.

It is notable that while the lines **6** and **40** which define the periphery of the inner section **38** and inner edge of outer section **39** such lines are barely if at all discernable in the actual sound reflector because these sections **38** and **39** are integral with one another they merge together along lines **6** and **40.**

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, devices and mechanisms 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 plurality of spherical receptacles mounted in said frame in alignment,

c. a loudspeaker in each of said receptacles opening into the outer surface of the receptacle in which it is mounted, said loudspeakers being in alignment, and

d. a generally oval shaped sound reflector mounted in said frame and having a compound concave reflecting surface including an apical ridge which is disposed closely adjacent to said loudspeakers, said sound reflector comprising integrally joined inner and outer sections, said inner sections being generated by moving one end of an arc of a circle along said apical ridge and the other end of the arc along straight side lines and rounded end lines which determine the periphery of said inner section, said outer section being defined by an inner periphery comprising said straight side lines and rounded end lines and an outer periphery of straight side lines and rounded end lines, the concave surface of said outer section being generated by moving an arc of a circle along the peripheries of said outer section, with the outer section extending in a direction away from the periphery of the inner section and in the general direction of said apical ridge.

2. The loudspeaker cabinet of claim **1** in which the frame comprises a rectangular front framework and a rear rectangular framework joined to the front framework by struts with the receptacles being mounted in the front framework and the sound reflector in the rear framework.

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