United States Patent

Plice

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[54] MICROPHONE SHOCK-MOUNTING APPARATUS

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[73] Assignee: **Shure Brothers, Inc.**

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[52] **U.S. Cl.** .....**248/358 R,** 248/122, 179/147

[51] **Int. Cl.**.....**F16f 15/04**

[58] **Field of Search** .....248/56, 121–125, 248/105, 309, 314, 358 R, 27, 204; 179/146 R, 147; 267/113; 285/97; 277/34.3

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[57] **ABSTRACT**

Apparatus for shock-mounting a microphone comprising a compact, resilient mounting member defining a socket adapted to receive a microphone body and means for supporting the mounting member in a desired position. The mounting member defines an enclosed space encircling the socket that is preferably filled with a fluid, such as a liquid or pressurized gas. The action of the shock mount can be modified by the selection of different viscosity gases or liquids, or by the addition of foam to affect viscous damping and thereby permit tuning of the apparatus for a particular application.

2 Claims, 6 Drawing Figures

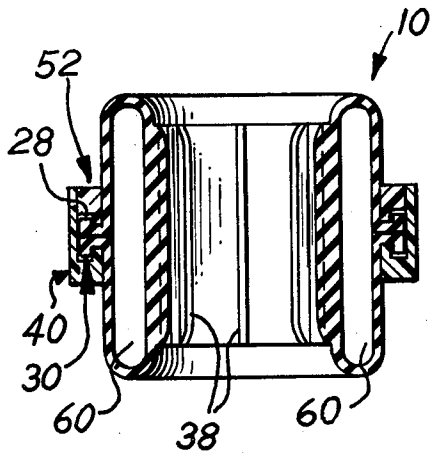


Fig. 1

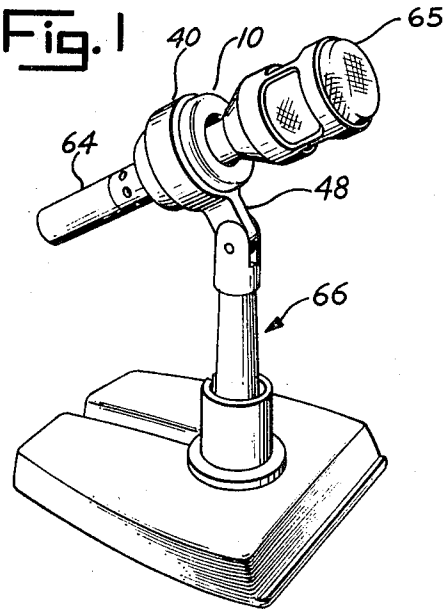


Fig. 2

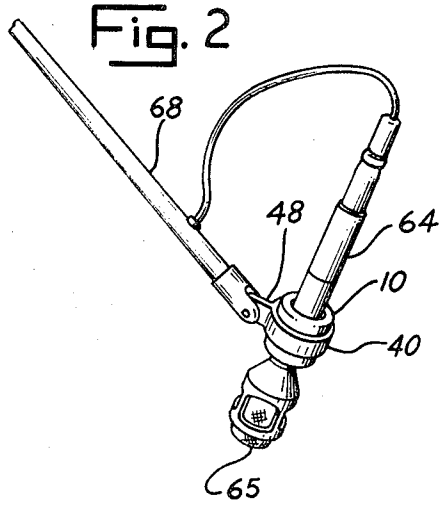


Fig. 3

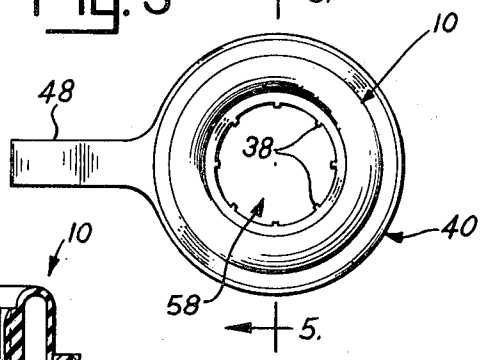


Fig. 5

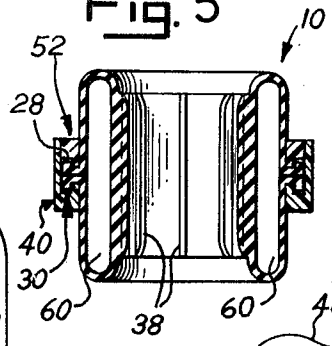


Fig. 4

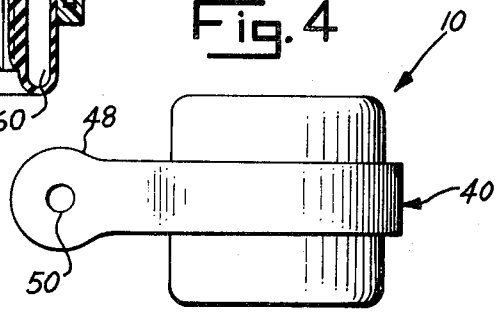
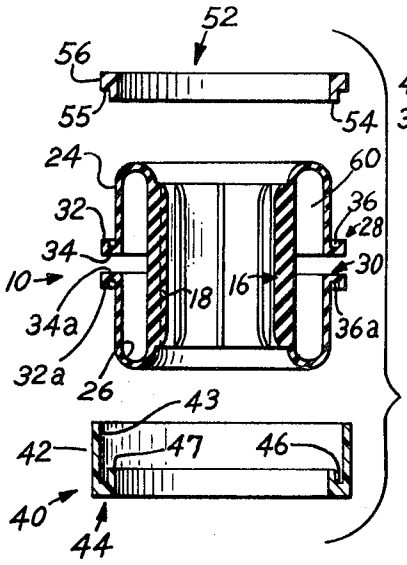


Fig. 6



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MICROPHONE SHOCK-MOUNTING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to shock-mounting apparatus, and is more specifically directed to apparatus for shock-mounting a microphone.

Those skilled in the art will appreciate that microphones with improved sensitivity and response characteristics are continually being developed by the audio industry. However, before these improved microphones can be used to best advantage, they must be thoroughly isolated from the surrounding environment by appropriate mounting apparatus. Failure to properly mount these microphones results in the transmission of structure borne vibrations to the microphone body which, in turn, creates undesired noise signals in the electrical output of the microphone.

Although methods of shock-mounting microphones have been developed in the past, each has exhibited deficiencies that have limited its usefulness. For example, a conventional so called "rubber band" type suspension system fails to provide satisfactory isolation for a microphone connected thereto, and is relatively cumbersome to assemble and use. In addition, this type of suspension system is relatively expensive to manufacture and properly install. Still further, prior mounts characteristically were undesirably large in size, which often resulted in their being within the range of a television camera or in casting shadows in the television picture. The small size of this suspension virtually eliminates any obstructions around the microphone which might interfere with the sound path or might cause unwanted sound diffraction patterns or wind noise in the area of the microphone.

SUMMARY OF THE INVENTION

In order to overcome the deficiencies of the prior art, the present invention, in principal aspect, basically comprises a resilient mounting member that defines a socket adapted to receive the body of a microphone. The mounting member is constructed in such a way that an enclosed, shock-absorbing space encircles the socket. Means for supporting the mounting member in a desired position are also provided.

By fabricating the mounting member from an appropriate resilient material, such as rubber, and by filling the enclosed space with an appropriate material, such as pressurized gas, or shock-absorbing material, the present invention provides better shock isolation than more conventional known types of microphone suspension systems. Moreover, the invention is easy to install and use, and may be employed by inexperienced personnel in connection with a microphone mounted on a boom, a floor stand, or a desk stand. When mounted in the foregoing manner, the microphone is extremely maneuverable, and may be readily relocated to provide optimum pick-up of a mobile sound source. Mounting apparatus embodying the invention is extremely economical to fabricate, and may be manufactured from resilient material that may take the form of an annulus and is sealed in an appropriate fashion in order to form an enclosed cavity which may be filled with vibration damping material.

DESCRIPTION OF THE DRAWING

These and additional advantages and features of the present invention will hereinafter appear for purposes of illustration, but not of limitation, in connection with the accompanying drawing in which like numbers refer to like parts throughout, and in which:

FIG. 1 is a perspective view of a preferred embodiment of the present invention used to mount a microphone on a desk stand;

FIG. 2 is a perspective view of a preferred embodiment of the present invention used to mount a microphone on a boom;

FIG. 3 is a top plan view of a preferred form of microphone shock-mounting apparatus made in accordance with the present invention;

FIG. 4 is a side elevational view of the apparatus shown in FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3; and

FIG. 6 is a cross-sectional view of the apparatus in its disassembled form.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing and particularly to FIG. 6, a preferred form of microphone shock-mounting apparatus made in accordance with the present invention includes a mounting member **10** comprising a hollow, resilient, rubber tube in the form of an annulus. In one illustrative embodiment of the invention, the tube comprises a mid-section **16** having a 3/32 inch thick side wall **18**. Side Wall **18** defines a socket **58** having a longitudinal axis A, a width W, and a length L. The tube also comprises side wall sections **24** and **26** each 0.025 inches thick. Sections **24, 25** form a side wall parallel to and displaced from side wall **18** by a distance D about seven times less than length L. Side wall sections **24, 26** and side wall **18** are joined by side wall sections **29*a*, 29*b*** to form a gas-filled toroidal space **60**. Side wall sections **24** and **26** define identical lips **28** and **30** at opposing ends thereof. Lip **28** comprises a rim **32**, an outer mating surface **34**, and an inner mating surface **36** arranged as shown. Likewise, lip **30** comprises a rim **32*a***, an outer mating surface **34*a***, and an inner mating surface **36a** that are identical to the like-numbered parts of lip **28**.

Eight ribs shown generally by the number **38** are equally spaced 45° apart, and are formed as an integral part of the inner surface of midsection **16**. These ribs are sufficiently high so that if the shock mount happens to be positioned over the sound entry of the microphone, free entry to the sound entry would still be guaranteed.

Means for supporting the mounting member in its mounted position are provided by a ring member **40** and a cylindrical collar **52**, both made from a rigid plastic material such as Cycolac. As shown in FIG. 6, ring member **40** comprises a cylindrical body **42** having an inner surface **43**. Attached to one end of body **42** is an L-shaped flange **44** that defines a circular notch **46** and a clamping surface **47**. Ring member **40** also comprises a tab **48** that defines a mounting hole **50**. The tab may be used to connect the apparatus to a fixture, such as a stand or boom. As also shown in FIG. 6, collar **52** comprises a clamping surface **54**, a mating surface **55**, and an outer surface **56** that fits snugly inside inner surface **43** of ring member **40**.

In order to assemble the mounting member into the form shown in FIG. 5, one end of the tube is fitted through the center opening in ring member **40** (i.e., the tube is lowered into the ring member as viewed in FIG. 6). When the tube is in the proper position, inner mating surface **36*a*** has a flush fit against clamping surface **47**, and rim **32*a*** fits into notch **46** as shown in FIG. 5. Collar **52** is then fitted between ring member **40** and side wall **24** of member **10** until it attains the position shown in FIG. 5. When the collar is properly installed, rim **32** fits against mating surface **55**, and inner mating surface **36** fits against clamping surface **54**.

If a permanent connection is desired, an appropriate rubber cement or adhesive may be applied to the co-mating surfaces of member **10**, ring member **40**, and collar **52** before the parts are assembled. The unique shape of member **10**, ring member **40**, and collar **52** insures a positive seal between the parts and facilitates assembly. Moreover, the location of ring member **40** adjacent the periphery of member **10** and along its midsection helps to eliminate shock occurring along any axis.

When the apparatus is properly assembled, as shown in FIGS. **3, 4** and **5**, member **10** defines a socket **58** that is adapted to receive the body of a microphone. Socket **58** has a width W that is over four times as great as the distance D between sections **24, 26** and side wall **18**.

Member **10** also defines enclosed annular space **60** that encircles socket **58** and which is filled with an appropriate shock-absorbing material, such as a liquid or a pressurized gas. Gas may be admitted to the enclosed space by means of a hypodermic needle, and the hole left by the needle (after it is

withdrawn) may be sealed by any appropriate rubber cement or adhesive. Applicant has found in one illustrative embodiment that best results are achieved when the space is inflated to a pressure of about ¼ to ½ pounds per square inch, although it will readily be appreciated that these exemplary pressure ranges may vary to best suit a particular environment. Liquid may be placed in the enclosed space by the same means.

As shown in FIG. **1**, the apparatus of the preferred embodiment may be used to shock mount a microphone **65** by placing its body **64** through socket **58**, and by connecting tab portion **48** to a desk mount **66**.

Likewise, according to FIG. **2**, the microphone may be mounted in a similar manner by attaching tab portion **48** to a boom fitting **68**.

When a microphone is used in connection with the apparatus described herein, it is thoroughly insulated from structure borne vibrations and may be assembled and maneuvered in more than one degree of freedom with a convenience and reliability heretofore unattainable. It further will be appreciated that the action of the shock mount may be modified, as desired, by the choice of different viscosity gases or liquids, or by the addition of another vibration damping material, such as foam, to affect the viscous damping. This allows the apparatus to effectively be tuned for a particular application.

Those skilled in the art will recognize that the apparatus shown herein may be altered and changed without departing from the true spirit and scope of the invention.

What is claimed is:

1. Apparatus for shock-mounting a microphone having a body, said apparatus comprising:

a resilient cylindrical first side wall defining a socket adapted to receive said microphone body;

a resilient cylindrical second side wall parallel to and displaced from the first side wall, said second side wall comprising a first section terminating in a first L-shaped lip portion and a second section terminating in a second L-shaped lip portion that abuts the first L-shaped lip portion;

a third side wall connecting one end of the first and second side walls;

a fourth side wall connecting an opposite end of the first and second side walls so that the first, second, third and fourth side walls define an enclosed, toroidal, fluid-filled space; and

means for holding together the first and second L-shaped lip portions in abutting relationship, whereby the gas-filled space is sealed and said side walls are supported in a desired position.

2. Apparatus, as claimed in claim **1**, wherein said means comprises a ring-shaped member adapted to comate with the L-shaped lip portions of the first and second sections.

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