United States Patent [19]

Sweany

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[54] **AUDIBLE ALARM UNIT**

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Related U.S. Application Data

[63] Continuation of Ser. No. 236,307, March 20, 1972, abandoned.

[52] **U.S. Cl.**..... **340/384 E;** 310/9.1; 179/110 A; 174/50.52; 174/52 R; 29/25.35; 340/10

[51] **Int. Cl.** **G08b 3/00**

[58] **Field of Search**..... 340/384 E, 10; 310/8, 8.2, 310/8.7, 9.1, 9.2, 9.4, 8.5, 8.8; 179/110 A; 220/2.1 R; 174/50, 50.52, 52 R, 52 S; 29/25.35

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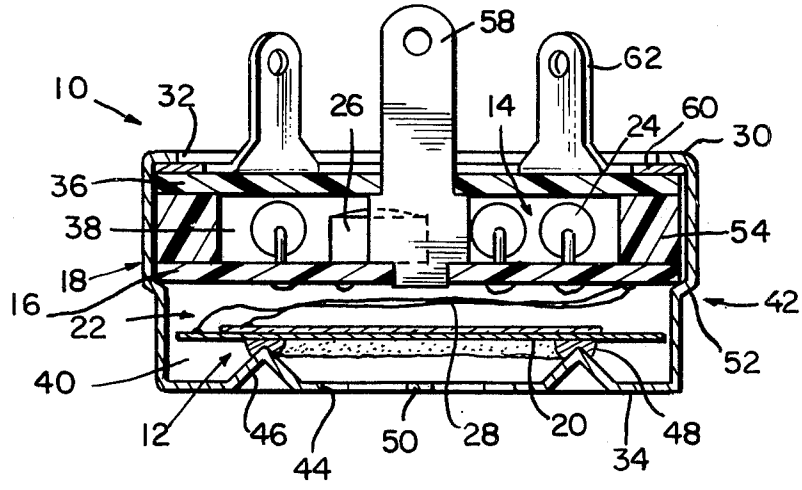
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[57] **ABSTRACT**

A piezoelectric transducer is carried in one of two compartments of a cup-shaped housing member with a printed circuit board assembly having an electrical circuit to energize the piezoelectric transducer carried in the other compartment.

7 Claims, 3 Drawing Figures



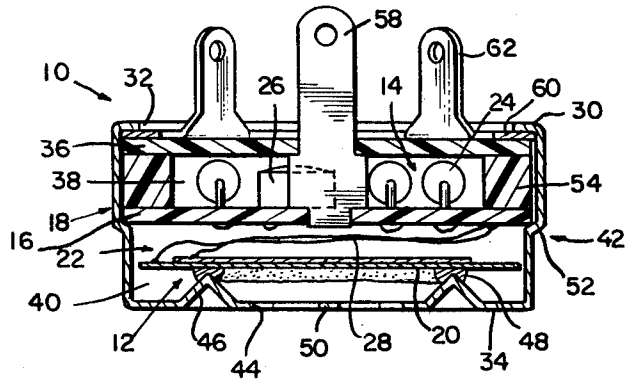


FIG. 1

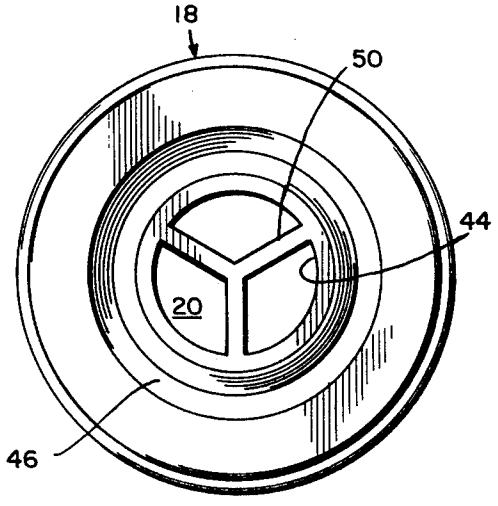


FIG. 2

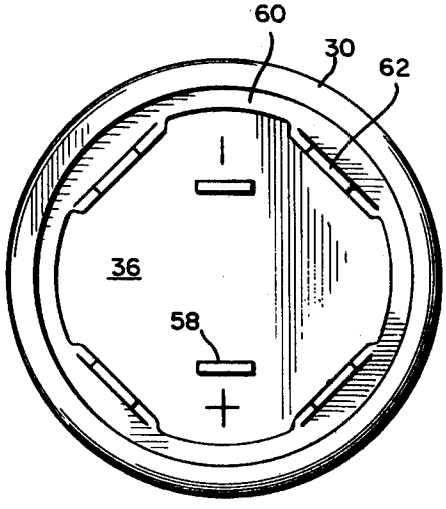


FIG. 3

AUDIBLE ALARM UNIT

This is a continuation of application Ser. No. 236,307, filed Mar. 20, 1972, and now abandoned.

This invention relates to an audible alarm unit; and more particularly to a piezoelectric audible alarm unit which is contained in a low cost housing.

Piezoelectric transducers are being increasingly used in audible alarm units to produce audible signals from small electric currents. The transducer includes a vibrating surface which vibrates in response to electrical currents and produces the audible signal. Usually the means supplying the electrical current is carried on a printed circuit board. The transducer and the printed circuit board are carried in a suitable housing which because of strong competition in the industry should be made as low cost as possible while being neat and compact and still be able to protect the transducer and the printed circuit board from rough handling and abuse. Moreover, the number of parts to be handled in providing the housing with the working elements of the unit should be minimized.

It is therefore an object of the present invention to provide a low cost piezoelectric audible alarm unit.

Another object of the invention is to provide a low cost piezoelectric alarm unit including a piezoelectric transducer and a printed circuit board assembly having the electrical circuit necessary to energize the transducer, both of which are contained in a compact housing.

A further object of the invention is to provide a piezoelectric audible alarm unit the elements of which are contained in a housing which is relatively inexpensive, neat and compact but yet be able to protect the elements of the unit.

Yet still another object of the invention is to provide a piezoelectric audible alarm unit wherein a piezoelectric transducer is carried in one of two compartments of a housing with a printed circuit board assembly having an electrical circuit for energizing the transducer contained in another compartment of the housing.

These and other objects of the invention will be apparent from the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a cross-section in elevation of the audible alarm unit;

FIG. 2 is a view looking at the outlet end of the unit; and

FIG. 3 is a view looking at the other end of the unit.

Generally speaking, the objects of the invention are accomplished by providing an audible alarm unit which includes a housing including a cup-shaped member having open and closed ends, first and second storage compartments, and a cover closing the open end; shelf means separating the compartments; an aperture in the closed end; a piezoelectric transducer carried in one of the compartments and having a vibrating surface exposed to the aperture; a printed circuit board assembly carried by the shelf in the other of the compartments including an electrical circuit for energizing the piezoelectric transducer; electrical terminals extending from the printed circuit board assembly out through the cover; and alarm unit mounting means carried by the housing.

Referring now to the drawings, an audible alarm unit **10** includes a piezoelectric transducer **12**, an electrical circuit **14** energizing the piezoelectric transducer carried by a printed circuit board **16**, the printed circuit board and the piezoelectric transducer being contained in a housing **18**.

Piezoelectric transducer **12** includes a vibrating surface **20** and electrodes **22** which causes the vibrating surface to vibrate when electrical current is applied to the electrodes. The electrical circuit **14** carried by the printed circuit board **16**, and which is used to supply electrical energy to the transducer, includes a variety of resistors **24**, a transistor **26** and other electrical elements needed to energize the transducer in a predetermined manner. A more complete description of an audible alarm unit employing a piezoelectric transducer and an electric circuit to energize the transducer is described in U.S. Pat. No. 3,277,465 which is incorporated herein by reference. Electrical leads **28** connect the transducer to the elements **14** supplying the current to the transducer.

Housing **18** includes a cup-shaped member **30** having open and closed ends **32** and **34** respectively and a cover **36** substantially closing the open end. The housing may be fabricated from aluminum or soft steel, for example. As shown, the housing is divided into two storage compartments **38** and **40** with a shelf means **42** providing a means for separating the two. The printed circuit board which with its electrical circuit **14** is carried in compartment **38** on shelf means **42**, while the piezoelectric transducer **22** is carried in compartment **40**. An aperture **44** is provided in the closed end **34** of the cup-shaped member so that the vibrating surface **20** may be exposed to the surrounding area. The transducer is carried on a rib **46** which substantially surrounds the aperture **44**, the transducer being bonded to the rib through a suitable adhesive **48** such as resilient silicone rubber. Vibrating surface **20** is protected from damage through a grill **50**.

Shelf means **42** includes a rib **52** provided by the taper resulting from the difference of diameters of the two compartments. Cover **36** is maintained in fixed relation from printed circuit board **16** through a spacer means which includes a ring **54**. A pair of electrical terminals **58** extend from the printed circuit board out through the cover **36** so that electrical power may be supplied to the unit. The alarm unit may be mounted on any suitable frame (not shown) by an alarm unit mounting means which in the present embodiment includes a ring **60** having a plurality of ears **62** extending therefrom.

What is claimed is:

1. An audible alarm unit comprising:

a. a housing including a cup-shaped member having open and closed ends, first and second storage compartments, and a cover closing said open end,

b. shelf means providing a means separating said compartments,

c. an aperture in said closed end providing an opening to one of said compartments, and a rib surrounding said aperture,

d. a piezoelectric transducer bonded to said rib and having a vibrating surface exposed to said aperture,

e. a printed circuit board assembly carried by said shelf in the other of said compartments including an electrical circuit for energizing said piezoelectric transducer,

f. electrical terminals extending from said printed circuit board assembly out through said cover,

g. alarm unit mounting means comprising a ring carried by said cover and a plurality of ears extending from said ring, and

h. spacer means carried by and disposed between said printed circuit board and said cover to maintain said printed circuit board and cover in spaced relation.

2. An audible alarm unit according to claim **1** wherein said shelf means includes a rib extending around the inner periphery of said cup-shaped member.

3. An audible alarm unit according to claim **2** wherein said first and second compartments are of different diameters and said rib is provided by a taper between said compartments.

4. An audible alarm unit according to claim **1** further comprising a protective grill extending across said aperture to protect said vibrating surface.

5. An audible alarm unit according to claim **1** wherein said spacer means comprises a ring disposed about an inner periphery of said cup-shaped member and disposed between said cover and said printed circuit board.

6. An audible alarm unit according to claim **1** wherein said cup-shaped member is soft steel.

7. An audible alarm unit according to claim **1** wherein said cup-shaped member is aluminum.

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