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HIROMI SOTOME

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LOUDSPEAKER

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FIG. 1

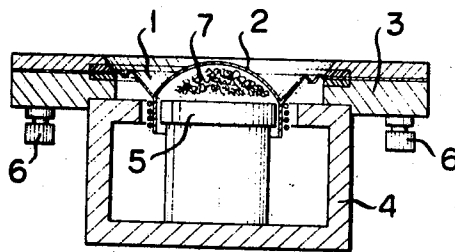
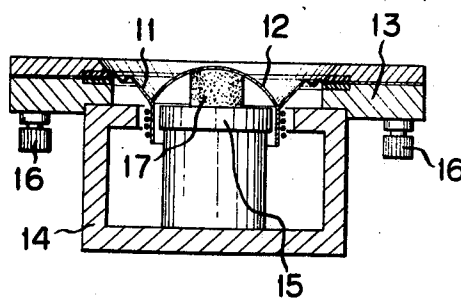


FIG. 2



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LOUDSPEAKER

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1 Claim

ABSTRACT OF THE DISCLOSURE

A loudspeaker for high frequency sounds comprising a diaphragm formed wholly or partly in a dome form, a magnetic circuit having a center pole disposed behind the dome of the diaphragm and an elastic member, such as a formed rubber or foamed plastic member having an adhesive coating previously applied on its one end or both ends, said elastic member having a diameter substantially smaller than that of said dome and being interposed between the central portion of said dome and said center pole so as to elastically connect them together.

BACKGROUND OF THE INVENTION

The present invention relates to a tweeter or a loudspeaker for high frequency sounds and, particularly, a tweeter having a diaphragm formed wholly or partly in a dome form, such as a so-called dome-type speaker, a cone-type speaker having a relatively large center dome or a horn-type speaker having a dome-shaped diaphragm.

Heretofore the loudspeaker of the above type usually employs a filling material such as cotton, felt or the like, which fills up a space between the dome of the diaphragm and the center pole of the magnetic circuit, to apply a suitable damping effect on the diaphragm so as to suppress the occurrence of turbulence in frequency characteristics.

Such filling material serves to prevent the diaphragm from producing excessive vibration at low frequency signals, and it also serves to reduce the effective mass of the diaphragm and expand the reproducible range of high frequency sounds.

The loudspeaker using such filling material, however, has some disadvantages. The cotton or the like used as the filling material tends to enter into a gap of the magnetic circuit in which a voice coil is movably arranged, thereby adversely affecting the performance of the speaker. Although such filling material acts to apply damping effect uniformly on the dome of the diaphragm, it is difficult to selectively apply the damping effect on the central portion of the dome where excessive vibration is likely to occur.

SUMMARY OF THE INVENTION

It is a general object of the present invention to provide a loudspeaker for high frequency sounds having improved characteristics.

It is an object of the present invention to provide a loudspeaker for high frequency sounds in which the diaphragm is prevented from producing the vibration of excessively great amplitude at the low frequency range.

It is another object of the present invention to provide a loudspeaker for high frequency sounds in which improved damping of the diaphragm can be obtained throughout the desired frequency range.

It is another object of the present invention to provide a loudspeaker for high frequency sounds in which reproducible range of high frequency sounds is substantially extended.

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It is a further object of the present invention to provide a loudspeaker of the above type which is simple in construction and can be constructed in low price with uniform quality.

In accordance with the present invention there is provided a loudspeaker for high frequency sounds which comprises a diaphragm formed at least partly in the form of a dome, a magnetic circuit having a center pole disposed behind the dome of the diaphragm and an elastic member having an adhesive coating previously applied on at least one end thereof, said elastic member having a diameter substantially smaller than that of said dome and being interposed between the central portion of said dome and said center pole so as to elastically connect them together.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view showing an example of conventional loudspeaker for high frequency sounds; and

FIG. 2 is a sectional view showing an embodiment according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIG. 1 shows an example of the conventional loudspeaker, which comprises a diaphragm 1 having a center dome 2, a speaker frame 3, a magnetic circuit 4 having a center pole 5 and electric terminals 6. A filling material 7, such as cotton, felt or the like material fills up a space between the center dome 2 and the center pole 5. Such filling material serves to improve the frequency characteristics of the loudspeaker but it has some disadvantages, as explained above.

FIG. 2 shows an embodiment of the loudspeaker according to the present invention, which comprises a diaphragm 11 having a center dome 12 integrally formed therewith, a speaker frame 13, a magnetic circuit 14 having a center pole 15 and terminals 16. An elastic member 17 is interposed between the central portion of the center dome 12 and the central portion of the center pole 15, thereby elastically connecting them together. The elastic member 17 is made of soft elastic material, such as foamed rubber or foamed plastic material, having a diameter substantially smaller than that of said dome 12 and having an adhesive coating previously applied on one end face or both end faces thereof. Preferably the elastic member 17 has a length slightly longer than the distance between the center dome 12 of the diaphragm and the center pole of the magnetic circuit and is made of material which is sufficiently soft to follow the contours of the center dome and the center pole.

When the elastic member has an adhesive coating on one end face, the coating face may be attached to the center pole of the magnetic circuit or to the center dome of the diaphragm. Improved results in frequency characteristics of the loudspeaker can be obtained by selecting suitable elastic member, depending on the particular loudspeaker.

The advantages to be obtained by the present invention will be enumerated as follows:

(1) The frequency characteristics of the loudspeaker for high frequency sounds is improved on the following reasons:

(a) The elastic member serves to apply damping effect on the diaphragm so as to prevent the occurrence of excessive amplitude at low frequency which is lower than the lower limit of frequency range to which the loudspeaker is designed.

Moreover, since the excessive vibration is not produced, there is no danger of the voice coil being broken by the excessive vibration.

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(b) The elastic member serves to suppress the excessive vibration of the dome of the diaphragm particularly at the central portion thereof, thereby obtaining improved damping effect.

(c) The central portion of the dome is maintained in substantially fixed condition and the weight of the diaphragm is supported by the elastic member, so that the effective mass of the diaphragm is reduced and the reproducible range of high frequency sounds is substantially extended.

(2) The loudspeaker is simple in construction and can be manufactured at relatively low cost with uniform quality.

(3) The adhesive elastic member can be easily bonded to the diaphragm or the magnetic circuit by simply stripping a separator paper from the adhesive face thereof, so that it can be easily and effectively handled to connect the diaphragm and the center pole.

What is claimed is:

1. A loudspeaker for high frequency sounds, comprising a diaphragm formed at least partly in the form

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of a dome, a magnetic circuit having a center pole disposed behind the dome of the diaphragm and an elastic member having an adhesive coating previously applied on at least one end thereof, said elastic member having a diameter substantially smaller than that of said dome and being interposed between the central portion of said dome and said center pole so as to elastically connect them together.

References Cited

UNITED STATES PATENTS

2,993,961	7/1961	Blake	179—115.5
3,033,945	5/1962	Villichur	179—115.5
3,059,720	10/1962	Matsuoka	181—31
3,079,471	2/1963	Widener	179—115.5

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