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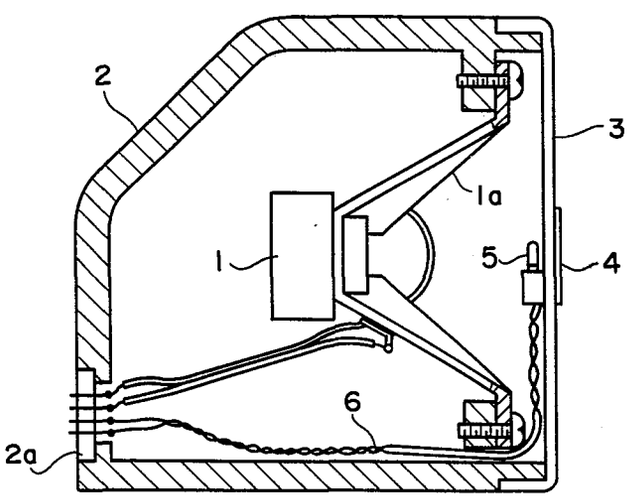
(54) SPEAKER UNIT.

(57) A speaker unit which is used as an output device of audio equipment. To improve the effects of its design, a light source (5) is disposed in front of a speaker body (1) in such a way that it illuminates the front surface of the body (1) and reflected light is shone forward. This speaker unit can be used for audio or video equipment.



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SPECIFICATION

TITLE OF THE INVENTION

Speaker Apparatus

TECHNICAL FIELD

The present invention relates to a speaker apparatus for use in sound equipment.

BACKGROUND ART

Recently, almost all apparatuses of sound equipment, from the input apparatus of such as a tuner and a deck to the output apparatus of a speaker, are systematized, and it is the latest tendency, as it is called, to enjoy sound also visually, by incorporating such video apparatuses as a television receiver and a video tape recorder in the same system. Under these circumstances, the sound speaker has been used only for reproducing sound and has been left behind in terms of synthetic design of the system as a whole.

DISCLOSURE OF THE INVENTION

The present invention aims to provide a speaker apparatus wherein a light source is arranged in front of a speaker body to illuminate the front surface of the speaker body and to allow the reflected light to be radiated forward. According to the present invention, the speaker apparatus emits light and, therefore, the design effect of the speaker apparatus is much improved.

Furthermore, since the intensity of illumination can be varied in response to the intensity of the sound through the control of the light source by the sound signal supplied to the speaker body, the sound is enabled to be visually enjoyed.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a construction drawing showing a speaker apparatus of an embodiment of the present invention; Fig. 2 is an electric system diagram showing an applied example of the speaker apparatus in Fig. 1; Figs. 3 and 4 are an external view and an electric system diagram, respectively, showing another embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Fig. 1 is a construction view showing an embodiment of the present invention. Referring to the drawing, (1) denotes a speaker body, (2) denotes a sound box for securely supporting the speaker body (1), and (3) denotes a protecting member, made of a protecting net or the like which transmits sound and light therethrough, being mounted on the sound box (2) for covering the front of the speaker body (1). (4) denotes a decorative plate adhered to the center of the protecting member (3), and (5) denotes a light source of a lamp or the like disposed at the back of the decorative plate (4) and opposing the

central portion of the diagram (1a) of the speaker body (1), the light source being connected by lead wires (6) to a terminal block (2a) at the back of the sound box (2) so as to be supplied with driving power, together with the input signal for the speaker body (1), from an external apparatus.

Since the apparatus is structured as stated above, while the speaker body (1) is in operation, the light source (5) is lighted and illuminates the front surface of the diaphragm (1a), and its reflected light is radiated through the protecting member (3). The decorative plate (4) serves for shielding the light of the light source (5) from being directly radiated frontward. Thus, if the speaker apparatus is seen from the front of it, it looks emitting a circle of light corresponding to the front shape of the diaphragm (1a).

An example of electric circuit for use in the above described speaker apparatus is shown in Fig. 2. Referring to Fig. 2, (7) denotes a power amplifier for supplying a sound signal to the speaker body (1), and (8) denotes a controller for detecting the output signal from the power amplifier (7) and, in response to the signal, for generating an output which is adapted to drive the light source (5). Thus, the intensity of the light from the light source (5) varies in response to the intensity of

the sound produced by the speaker body (1) and the sound is enabled to be also enjoyed visually. Besides, the apparatus can serve as an indicator apparatus of sound volume level.

In addition, the design effects can further be improved by coloring the light of the light source (5) or by employing a plurality of the light sources (5).

Figs. 3 and 4 show another embodiment of the present invention, where like parts to those in Figs. 1 and 2 are denoted by like reference characters. Referring to Fig. 3, a woofer (11), a squwarker (12), a tweeter (13), and a supertweeter (14) are housed in a sound box (2) to form a four-way type speaker apparatus. Each of these speakers (11), (12), (13), (14) is arranged in the same way as that in Fig. 1 wherein the light source (5) is disposed in front of and opposing the diaphragm (1a) of the speaker body (1). Referring to Fig. 4, the sound output signal produced by a power amplifier (7) is supplied through filters (9a), (9b), (9c), (9d) having different pass bands to the speakers (11), (12), (13), (14), respectively, each of which is adapted to reproduce sound in response to the respective signal of reproducible band. The output signals from the filters (9a), (9b), (9c), (9d) are supplied to controllers (8a), (8b), (8c), (8d), which are adapted to supply electric currents to the light sources

(5a), (5b), (5c), (5d) in response to intensities of the signals inputted, thereby to cause these light sources to vary their light intensities. Accordingly, the intensities of the lights of the light sources (5a), (5b), (5c), (5d) vary in response to the operating conditions of the speakers (11), (12), (13), (14), and the reflected lights radiated to the front of the speaker apparatus may be utilized as a simple spectrum analyzer. It is possible to improve the reflection efficiency of the light by providing a specular gloss for the surface of the diaphragm (1a) of the speaker body (1), and to enhance the design effects by providing different colors for the light sources (5a), (5b), (5c), (5d). Although the present invention was described in conjunction with a four-way type speaker apparatus, the present invention can be equally applied to any multi-way, two-way or more, speaker apparatus.

INDUSTRIAL APPLICABILITY

The present invention may produce a considerable effect when the same is applied to the speaker apparatus installed inside automobiles. That is, although the interior of an automobile when driven in the nighttime becomes dull and monotonous, the speaker apparatus according to the present invention can break the monotony

inside the car by providing reproduced sound and by varying the light in response to the reproduced sound.

WHAT IS CLAIMED IS:

1. A speaker apparatus comprising a speaker body for reproducing sound from a sound signal, a protecting member mounted in front of said speaker body for protecting said speaker body, and a light source disposed between said speaker body and protecting member for illuminating the front surface of said speaker body, whereby light from the illumination by said light source is adapted to be transmitted through said protecting member.

2. A speaker apparatus according to claim 1, characterized in that a front surface of a diaphragm of said speaker body is provided with a specular gloss.

3. A speaker apparatus according to claim 1, characterized in that a decorative plate is provided in front of said light source for shielding direct radiation of light from said light source.

4. A speaker apparatus according to claim 2, characterized in that a decorative plate is provided in front of said light source for shielding direct radiation of light from said light source.

5. A speaker apparatus, comprising: a speaker body for reproducing sound from a sound signal, a protecting member mounted in front of said speaker body for protecting said speaker body, a light source disposed between said speaker body and protecting member for

illuminating the front surface of said speaker body, and a controller for detecting a sound signal supplied to said speaker body for generating an output in response to the signal, whereby said light source is adapted to be driven by the output from said controller.

6. A speaker apparatus, comprising: a plurality of speaker bodies having different reproducible bands, a plurality of light sources disposed in front of and opposing said speaker bodies, respectively, for illuminating the front surfaces of respective opposing speaker bodies, and a plurality of controllers each for detecting each sound signal supplied to each of said plurality of speaker bodies for generating the output in response to each detected signal and for driving each said light source disposed to oppose each said respective speaker body, whereby the light intensities of said light sources are adapted to be varied in response to reproduced sounds in said respective opposing speaker bodies.

7. A speaker apparatus according to claim 6, characterized in that the colors of the emitted lights from said plurality of light sources are made different.

FIG. 1

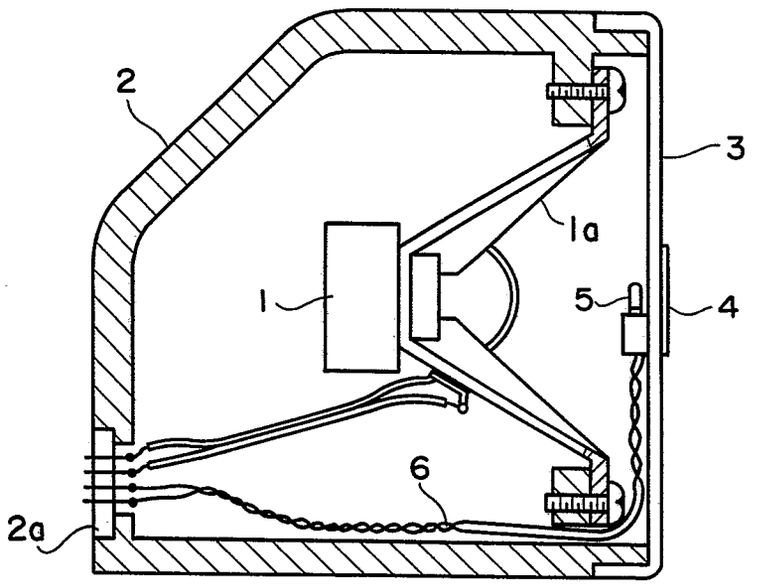


FIG. 2

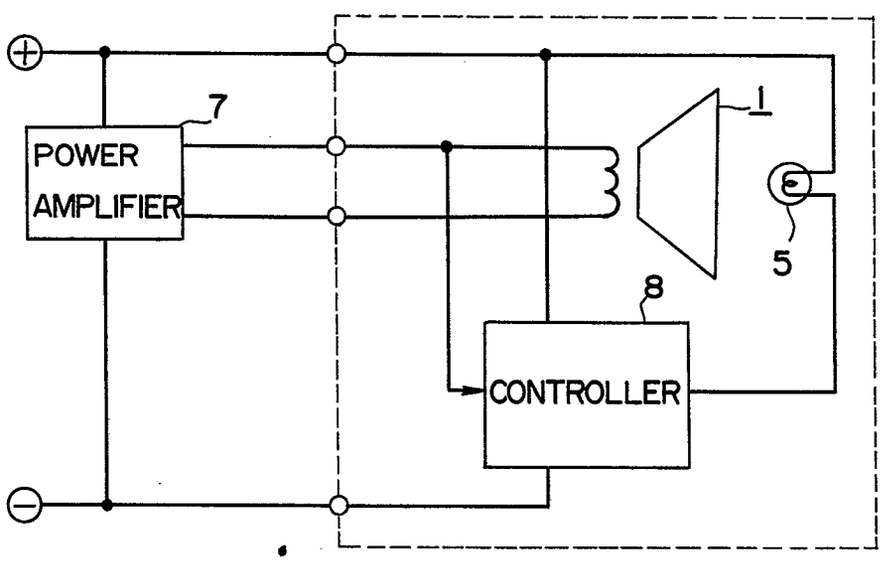


FIG. 3

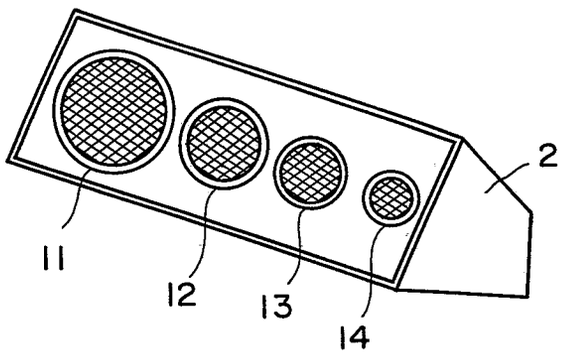
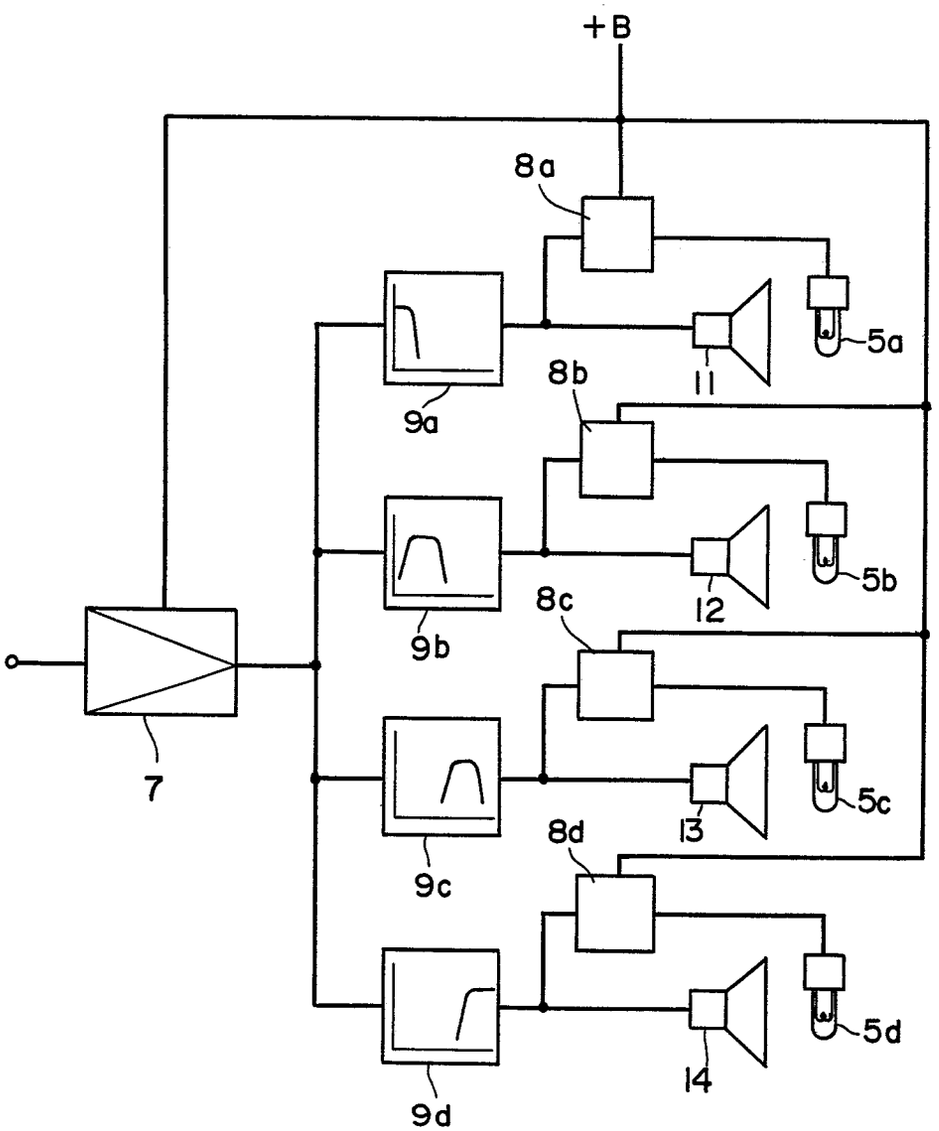


FIG. 4



INTERNATIONAL SEARCH REPORT

International Application No. PCT/JP83/00023

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3] 0099932

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[3] H04R 1/00, 3/00

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
I P C	H04R 1/00, 3/00, G09F 9/00

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

Jitsuyo Shinan Koho 1926 - 1982
Kokai Jitsuyo Shinan Koho 1971 - 1982

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	JP,B2, 52-23257 (Oshima Takakazu), 23.June. 1977 (23.06.77)	1-2, 5
Y	JP,B2, 52-23257 (Oshima Takakazu), 23.June. 1977 (23.06.77)	3-4, 6-7
Y	JP,Y2, 56-52700 (Matsumoto Masao), 8. December.1981 (08.12.81) Column 3, line 29 to column 4, line 5, Fig. 2	3-4
Y	JP,A, 50-77031 (Hitachi, Ltd.) 24. June. 1975 (24.06.75) Page 2, upper part, left column, line 8 to page 2, lower part, right column, line 2, Fig. 4	6-7

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
April 12, 1983 (12.04.83)	April 25, 1983 (25.04.83)
International Searching Authority [1]	**Signature of Authorized Officer** [20]
Japanese Patent Office	