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Kawada et al.

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[54] **MEANS FOR INDICATING A BALANCED LISTENING POSITION FOR 4-CHANNEL STEREOPHONIC SYSTEMS**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** .....**179/1 GQ,** 338/128, 116/124 R

[51] **Int. Cl.** **H03g 3/00**

[58] **Field of Search**.....179/1 G; 178/18; 338/128, 119, 89; 116/124 R, 124.1 R, 124.4, 135

[56] **References Cited**

UNITED STATES PATENTS

3,629,775	12/1971	Kindred	338/128
3,322,094	5/1967	Kelso	116/124.1 R
3,355,692	11/1967	Poland	178/18
3,663,755	5/1972	Lace	179/1 D
2,902,607	9/1959	Hedger et al.	338/89
3,628,497	12/1971	Neu	116/124 R

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[57] **ABSTRACT**

A means for indicating a balanced listening position for four-channel stereophonic systems comprising a position indicating mechanism adapted to be controlled in association with the manipulation of variable resistors for the adjustment of relative output levels between forward and backward speakers and between left and right speakers of a four speaker system to thereby indicate the position of balance of sounds from the four speakers.

3 Claims, 4 Drawing Figures

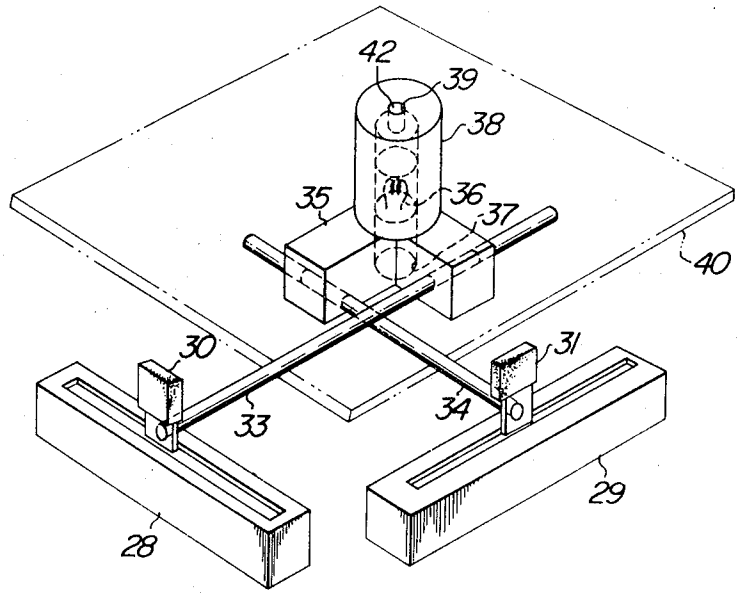
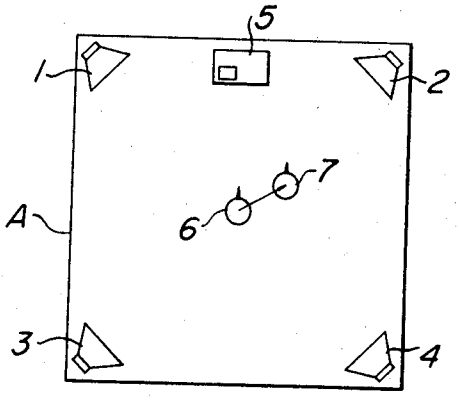


FIG. 1


5
1
2
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A
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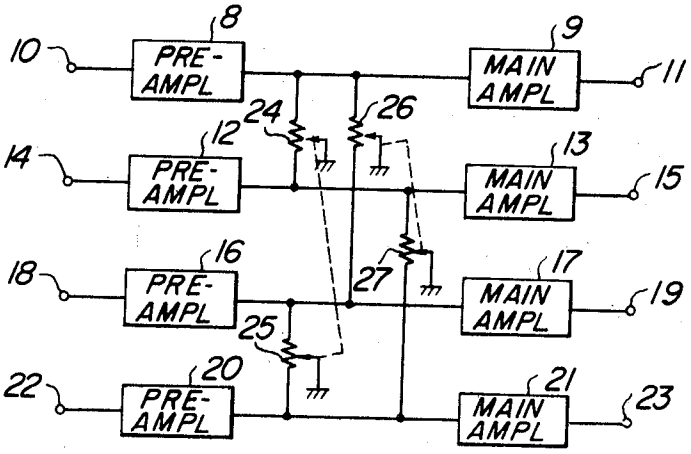
FIG. 2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PRE-AMPL
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MAIN AMPL
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FIG. 3

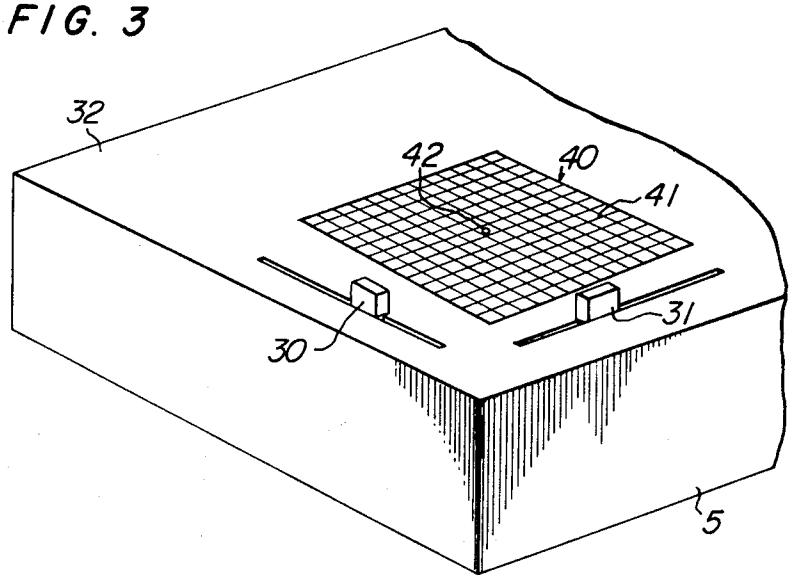
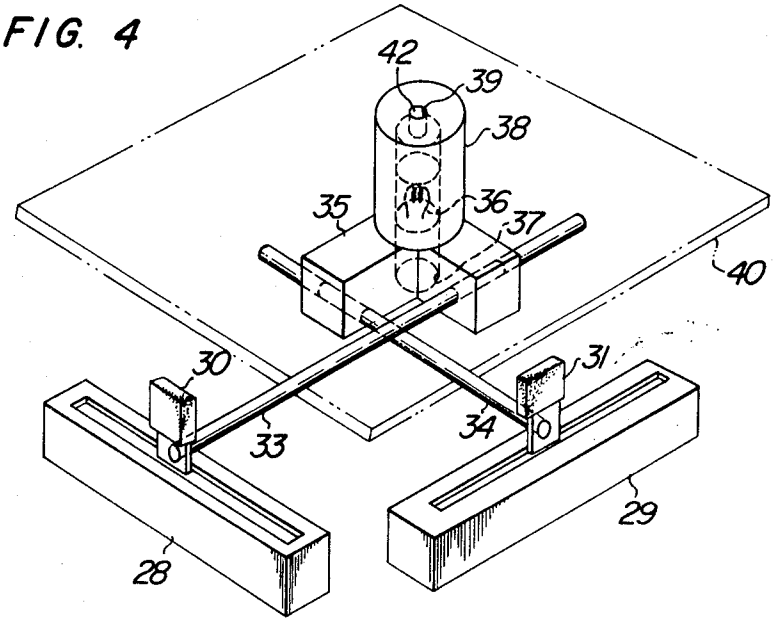


FIG. 4



MEANS FOR INDICATING A BALANCED LISTENING POSITION FOR 4-CHANNEL STEREOPHONIC SYSTEMS

This invention relates to means for indicating a balanced listening position for four-channel stereophonic systems.

More particularly, the invention concerns means to simply indicate the position at which sounds from the four sound sources on the side of a reproducing apparatus are in balance.

The invention will be described in conjunction with the accompanying drawings, in which:

FIG. 1 is a view outlining an arrangement of sound sources in a listening room in accordance with the invention;

FIG. 2 is a block diagram of a balance control according to the invention;

FIG. 3 is a fragmentary perspective view of an embodiment of the balanced position indicating means; and

FIG. 4 is a perspective view of the inner mechanism of the position indicating means.

In the four-channel stereophonic system, four speakers 1, 2, 3 and 4 driven from the output of a reproducing apparatus 5 are arranged at the corners of a listening room A, as shown in FIG. 1. With this arrangement, the position at which the sounds from the four speakers are in balance changes depending upon the volume of the individual speakers. For example, the sounds from the speakers 1, 2, 3 and 4 are in balance at a central position 6 in the listening room A when the outputs of the four speakers are at the same level. When the listening position is shifted from the central position 6 to a new position 7, the volume of the speakers has to be adjusted by either increasing the volume of the speakers 1 and 3 or reducing the volume of the speakers 2 and 4 so that the sounds from these speakers will be in balance at the new position 7.

The adjustment can be readily accomplished if the reproducing apparatus 5 is located near the listening position. Usually, however, the reproducing apparatus 5 is located adjacent to one side of the listening room A, so that it is necessary to make a troublesome trial-and-error adjustment depending upon the listening position.

Therefore, there is a need for means to simply indicate a position at which the sounds from the four speakers are in balance. This invention fulfills this need.

The invention will now be described in conjunction with a preferred embodiment thereof shown in FIGS. 2 to 4 while having reference to the layout of FIG. 1.

FIG. 2 shows a balance control in a four-channel stereophonic system. Reference numerals 8 and 9 designate a preamplifier and main amplifier for driving the forward left speaker 1, and numerals 10 and 11 designate input and output terminals thereof. Numerals 12 and 13 designate a preamplifier and main amplifier for driving the forward right speaker 2, and numerals 14 and 15 designate input and output terminals thereof. Numerals 16 and 17 designate a preamplifier and main amplifier for driving the backward left speaker 3, and numerals 18 and 19 designate input and output terminals thereof. Numerals 20 and 21 designate a preamplifier and main amplifier for driving the backward right speaker 4, and numerals 22 and 23 designate input and output terminals thereof. Numeral 24 designates a variable resistor connected between the output terminals of the preamplifiers 8 and 12 for the adjustment of the output level of the speakers 1 and 2 and numeral 25 designates a variable resistor connected between the output terminals of the preamplifiers 16 and 20 for the adjustment of the output level of the speakers 3 and 4. Both the variable resistors 24 and 25 are ganged together. Numeral 26 designates a variable resistor connected between the output terminals of the preamplifiers 8 and 16 for the adjustment of the output level of the forward and backward left speakers 1 and 3, and the numeral 27 designates a variable resistor connected between the output terminals of the preamplifiers 12 and 20 for the adjustment of the output level of the forward and backward right speakers 2 and 4. Both the variable resistors 26 and 27 are ganged together.

FIG. 4 shows the mechanical construction of the balanced position indicating means. The pair of ganged variable resistors 26 and 27 and the pair of ganged variable resistors 24 and 25 take the form of respective slides 28 and 29 provided with respective adjusting knobs 30 and 31. The adjustment of the output level of the forward speakers relative to the output level of the backward speakers is made by manipulating the adjusting knob 30, while the adjustment of the output level of the left speakers relative to the output level of the right speakers is done by manipulating the adjusting knob 31. As shown in FIG. 3, the adjusting knob 30 is capable of sliding movement along one side of a panel 32 of the reproducing apparatus 5, and the adjusting knob 31 is capable of sliding movement along another side of the panel in a direction perpendicular to the direction of movement of the knob 30. Integrally tied to the knobs 30 and 31 are guide rods 33 and 34 extending at right angles to each other and crossing each other. The guide rods 33 and 34 penetrate through respective holes formed in an L-shaped slide member 35. When the adjusting knob 30 is moved, the slide member 35 moves in unison with the knob 30 along the guide rod 34. On the other hand, when the adjusting knob 31 is moved, the slide member 35 moves in unison with the knob 31 along the guide rod 33. The slide member 35 carries a lamp 36 provided in a central hole formed in the slide member. The slide member 35 also carries an opaque lamp cover 38 surrounding the lamp 36 and having a hole formed in a top wall. Thus, light from the lamp 36 is rendered into a light spot through the hole 39 of the lamp cover 38. Numeral 40 designates a transparent or opaque indicating board provided on the panel 32 of the reproducing apparatus 5. The indicating board 40 may be provided with a grid-like or net-like pattern, as indicated at 41. The spot light from the lamp 36 through the hole 39 of the lamp cover 38 is projected on the underside of the indicating board 40, as indicated at 42. The light spot 42 is adapted to assume a central position in the indicating board when the adjusting knobs 30 and 31 are at their central positions.

With the construction described above, while moving the adjusting knob 30 results in changing relative output levels between the left speakers 1 and 3 and right speakers 2 and 4, it is also accompanied by the movement of the slide member 35 and hence the lamp 36 in unison with the knob 30 to move the light spot 42 on the indicating board 40 correspondingly. Also, moving the adjusting knob 31 causes the corresponding move-

ment of the light spot **42** while changing relative output levels between the forward and backward speakers.

Thus, the light spot **42** can assume positions corresponding to the position of balance between the output levels of the left and right speakers and between the output levels of the forward and backward speakers. In other words, balanced stereophonic effect can be obtained at a position corresponding to the position of the light spot **42.** The balanced listening position may be known by reference to the pattern **41** on the indicating board.

As has been described in the foregoing, according to the invention the position indicating means is controlled in association with the manipulation of the variable resistors for adjusting the relative output levels between the right and left speakers and between the forward and backward speakers of the four speaker system, so that the balanced position can be reliably indicated by the indicating means, which is very convenient compared to a four speaker system without any position indicating means where it is difficult to find the balanced listening position. Also, the indicating means which is interlocked to the variable resistors for the adjustment of the relative output levels can have a simple construction and can be achieved very inexpensively.

What we claim is:

1. In a four-channel stereophonic system having first, second, third and fourth amplifying means for driving first, second, third and fourth speaker systems respectively; an indicating device comprising:

first, second, third and fourth variable resistors each having first and second stationary terminals and one movable terminal, the first and second stationary terminals of said first variable resistor being connected to the respective signal transmitting lines in said first and second amplifying means, the first and second stationary terminals of said second variable resistor being connected to the respective signal transmitting lines in said third and fourth amplifying means, the first and second stationary terminals of said third variable resistor being connected to the respective signal transmitting lines in said first and third amplifying means, the first and second stationary terminals of said fourth variable resistor being connected to the signal transmitting lines in said second and fourth amplifying means, the respective moving terminals of said first, second, third and fourth variable resistors being connected to ground;

first and second operating members for operating said four variable resistors, said first operating member being capable of moving the movable terminals of said first and second variable resistors at the same time, said second operating member being capable of moving the movable terminals of said third and fourth variable resistors; and

means for visibly indicating the balanced listening position of sounds from said four speaker systems, said means being movably controlled by said first and second operating members in association with respective operation of said operating members so as to indicate said balanced listening position.

2. An indicating device according to claim **1,** wherein said first and second variable resistors and said third and fourth resistors are in the form of first and second pairs of variable resistors of the slide type respectively and mounted on a reproducing apparatus of said four-channel stereophonic system in a manner so that said first and second operating members are slidably movable in perpendicular directions along a panel of said reproducing apparatus.

3. An indicating device according to claim **1,** wherein said means for visibly indicating the balanced listening position includes a lamp movable in association with the respective operation of said first and second operating members and an indicating board provided with a grid-like pattern, light from said lamp being projected on said indicating board.

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