

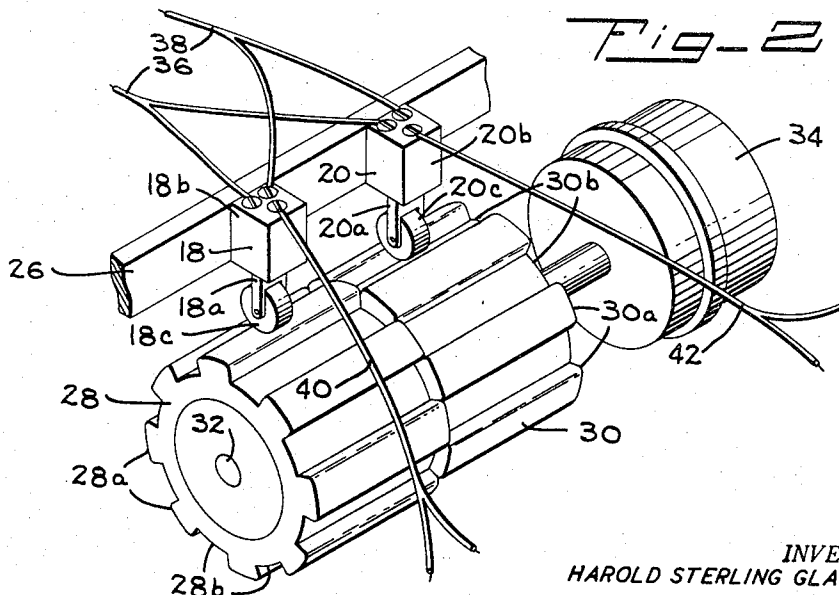
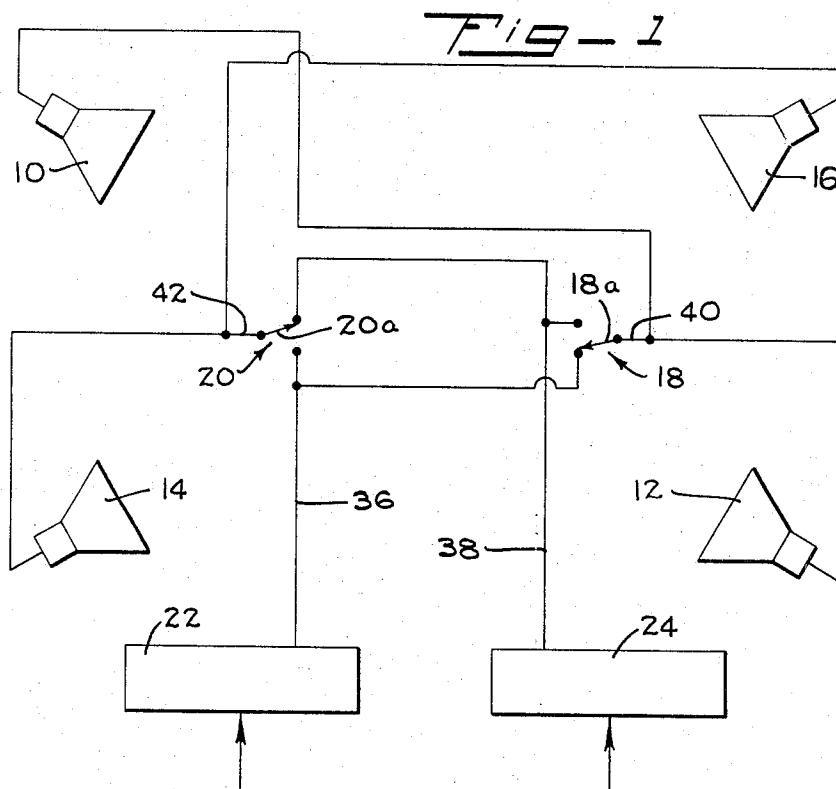
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SOUND REPRODUCTION SYSTEM

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SOUND REPRODUCTION SYSTEM

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Continuation of application Ser. No. 33,181, June 1, 1960.

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1 Claim. (Cl. 179-1)

ABSTRACT OF THE DISCLOSURE

A sound reproduction system including a plurality of electro-acoustic transducers, such as loud-speakers, and a plurality of sources of sound current for energizing such transducers together with switching means for alternatively switching different sources of sound currents to different transducers.

The present invention relates to sound reproduction systems, and more particularly, to systems for reproducing sounds with variable directional effects. The present application constitutes a continuation of my prior patent application Ser. No. 33,181 filed June 1, 1960.

The advent of stereophonic sound reproduction has introduced the possibility of attainment of a high degree of realism for home music listening. However, the human ear is directionally sensitive so that if a listener is improperly positioned relative to the binaural sound sources, loud-speakers or other electro-acoustic transducers, an irritating acoustic unbalance results. Since, as a practical matter, not all individuals in a group home listening situation can be properly placed relative to the sound sources, the possibilities of stereophonic reproduction are not fully realized.

Accordingly, it is a general object of the present invention to provide a novel sound reproduction system which produces variable acoustic directional or perspective effects to enhance listening pleasure from either single or multiple channel sources.

It is a feature of the invention to provide a sound reproduction system including a plurality of sound sources appropriately disposed in a listening area together with means for selectively energizing certain of the sound sources in accordance with the requirement of the specific listening situation.

It is an additional feature of the invention to provide a sound reproduction system including a plurality of sound sources, normally electro-acoustic transducers, which can be selectively and intermittently connected to one or more sources of energizing current to provide a periodic variable directional acoustic effect in the listening area.

Yet another feature of the invention is to provide a sound reproduction system including a plurality of energizing current sources that can be selectively connected to appropriately placed pairs of transducers arranged so that substantially the entire listening area experiences a multi-aural effect.

An additional feature of the invention is to provide a sound reproduction system wherein the listening pleasure derived from either a monaural or binaural source can be enhanced.

These as well as other objects and features of the invention will become more apparent from a perusal of the following description of the invention as embodied illustrated in the accompanying drawings wherein:

FIG. 1 is an electric circuit diagram of a sound reproduction system constituting one exemplary embodiment of the present invention, and

FIG. 2 is a fragmentary detailed perspective view of a preferred form of switching apparatus utilized in the system of FIG. 1.

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Generally, in accordance with the present invention, a plurality of sound sources are selectively energized from one or more energizing channels through a selective connecting means so that a variable directional or perspective sound effect is achieved.

More particularly, with reference to FIG. 1, the sound sources may constitute four loudspeakers 10, 12, 14, 16 that are generally rectangularly oriented in space, as diagrammatically illustrated. Two of the speakers 10, 12, constituting one opposing pair, are connected to the same terminal of one double pole electric switch 18, while the other pair of speakers 14, 16 are similarly connected to one terminal of a second double pole switch 20. The movable arms 18a, 20a of both switches can be thrown between their first and second positions to establish connection between the respective speaker pairs and a respective one of two input channels 22, 24, which are indicated in the drawing as blocks constituting the output audio amplifiers of the respective channels. As illustrated in FIG. 1, the first pair of speakers 10, 12 is connected to channel one 22 while the second pair of speakers 14, 16 is energized from channel two 24.

The inputs to the audio amplifiers of the two channels 22, 24 can obviously be of many types. In most cases, the two channels 22, 24 will correspond to the output of a stereophonic audio source which may constitute a recording, the detected audio signals from amplitude and frequency modulated broadcasts or two frequency modulated broadcasts, as is now becoming of interest. In either case, if the connections are as shown in FIG. 1, the audio output from channel one 22 will be presented from the first pair of speakers 10, 12 while the output from channel two 24 will be presented on the second pair of speakers 14, 16 to provide a more or less conventional stereophonic reproduction system.

In accordance with the present invention, the movable arms 18a, 20a of the switches 18, 20 are selectively known to change the connections to the pairs of speakers 10, 12, 14, 16 and thus effect a variance in the direction or perspective of sound to a listener in the area generally defined by the rectangularly-disposed loudspeakers. Preferably, a correlation is observed between movements of the arms 18a, 20a of the first and second switches 18, 20 so that, for example, when the first switch 18 is thrown to effect the switching of the first speaker pair from channel one to channel two output, the second switch 20 is substantially simultaneously thrown to effect a switching of the second speaker pair from a channel two to a channel one output. A subsequent reversal of such correlated switching will effect a return to the original sound perspective situation and cyclic or periodic throwing of the switch arms 18a, 20a will effect a pleasurable intermittent variation in sound perspective.

In order to achieve such cyclic or periodic variation in sound perspective, a simple switching apparatus, as illustrated in FIG. 2, can be employed. As illustrated, the first and second switches 18, 20 are of like nature, each including a housing 18b, 20b rigidly mounted to a suitable support member 26 so that the switch arm 18a, 20a which depends from such housing and carries a roller 18c, 20c at its lower end maintains such roller in spring-urged contact with a sleeve-cam 28, 30 having a plurality of high points 28a, 30a and low points 28b, 30b at regular circumferential intervals thereon. The sleeve-cam 28, 30 is releasably mounted on the speed-reduced output shaft 32 of an electric motor 34 for rotation therewith. As shown in FIG. 2, the sleeve-cams 28, 30 associated with the respective switches 18, 20 are positioned on the shaft 32 so that their respective high and low points 28a, 28b, 30b are 180° out of phase wherefore when the one switch 18 is in its first or upper position, the other switch 20 will, at that

time, be in its second or lower position. Suitable connections are made to both switches 18, 20 to provide inputs from both amplifiers, as indicated at 36, 38 and outputs 40, 42 to the respective speaker pairs so that motion of the switch arms 18a, 20a in accordance with the cam disposition will effect connection from one or the other of the amplifiers to the appropriate speaker pair. With the switch arrangement illustrated in FIG. 2 and the motor shaft 32 revolving at a speed of approximately 2 revolutions per minute, each pair of speakers 10, 12, 14, 16 will be energized from channel one 22 for a period of two seconds, then from channel two 24 for a period of two seconds, and so on in a repeated, cyclical switching.

It will be apparent that the releasable sleeve-cams 28, 30 may be removed from the shaft 32 and replaced by cams of other configuration which will effect other periodic variations in energization of the speaker pairs. In certain instances, it may be desired to have an overlapping of such energization so that for a period, all four speakers are simultaneously energized from the same channel. In this manner, a wide variation of acoustic effects can be obtained.

Furthermore, it will also be apparent that a single switch, as illustrated, can be associated with each individual speaker so that a cyclical control of individual speakers rather than speaker pairs, as illustrated, can also be achieved. In this fashion, the four speakers 10, 12, 14, 16 illustrated in FIG. 1 can, if desired, be energized in a revolving fashion; that is, each speaker in turn is periodically energized from a single channel and then deenergized, whereupon that same channel can be connected for energization of the speaker adjacent thereto in a clockwise direction, and so on. With experimentation through use of various sleeve-cams, each individual listener can effect a variable sound perspective most pleasurable to his own aural sensibilities.

It may be also mentioned that enhanced effects can be achieved from a single channel or monaural input. If a single channel is periodically connected to respective

speakers or speaker pairs, a variable sound perspective is also achieved from such monaural input so as to achieve something of a stereophonic sound effect.

Various other modifications and/or alterations in the described system can obviously be made without departing from the spirit of the invention; and the foregoing description of an exemplary embodiment thereof is accordingly to be considered as such and not in a limiting sense. The scope of the invention is to be indicated, rather, by reference to the appended claim.

This application constitutes a continuation of my prior copending application, Ser. No. 33,181, filed June 1, 1960, for Sound Reproduction System.

What is claimed is:

1. A sound reproduction system which comprises a plurality of electro-acoustic transducers, first and second sources of sound currents, and switch means cyclically switching between first and second positions, a first section of said switch means connected only to a first portion of said transducers and operable to connect thereto said first sound source in said first position and said second sound source in said second position, a second section of said switch means connected only to a second portion of said transducers and operable to connect thereto said second sound source in said first position and said first sound source in said second position.

References Cited

UNITED STATES PATENTS

2,626,995	1/1953	Hodson et al.	179—1.1
2,832,829	4/1958	Reynolds	179—1.3
2,846,514	8/1958	Byrd	179—1.3

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