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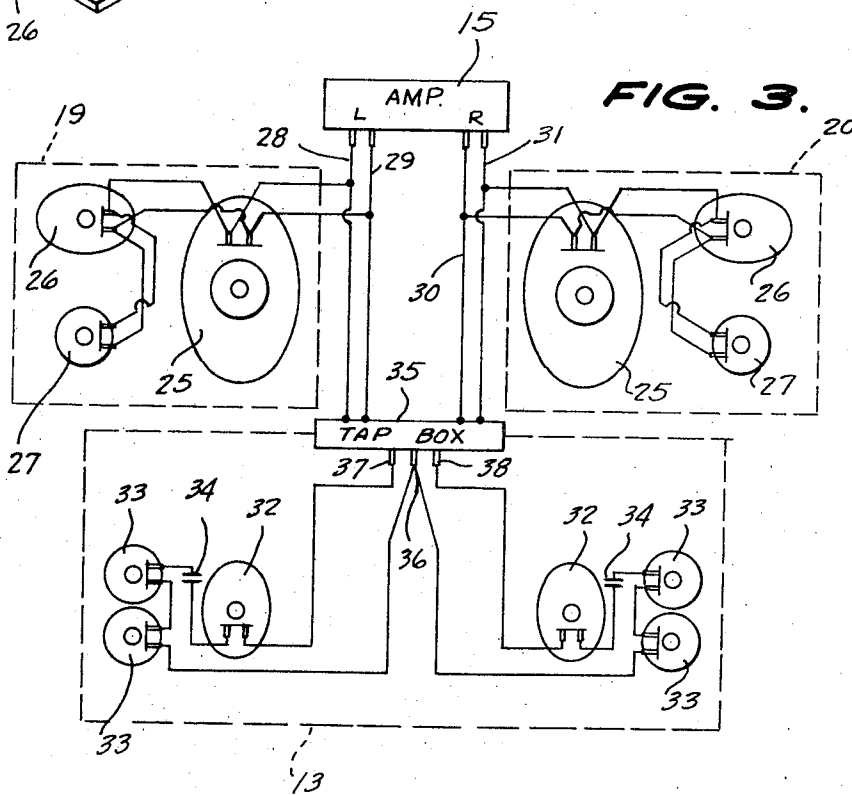
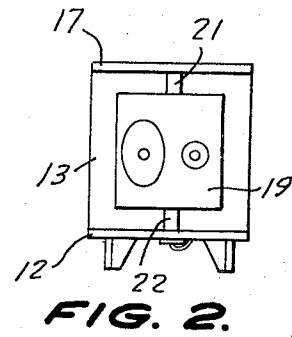
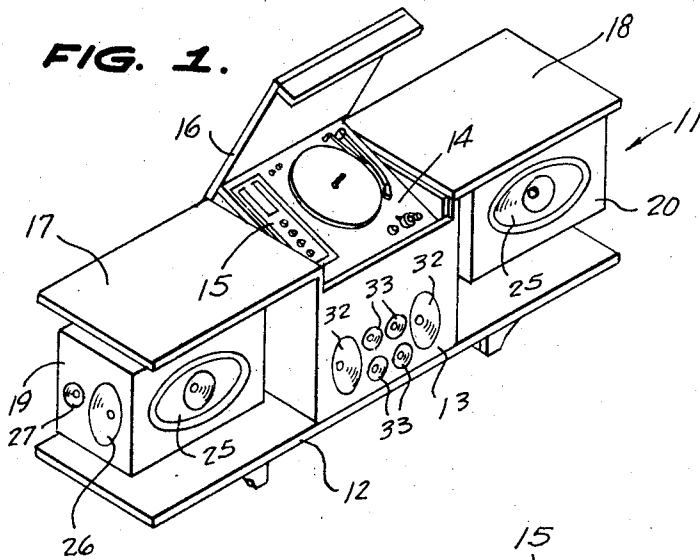
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SOUND SYSTEM CIRCUIT AND CABINET ASSEMBLY

Filed May 12, 1967

2 Sheets-Sheet 1



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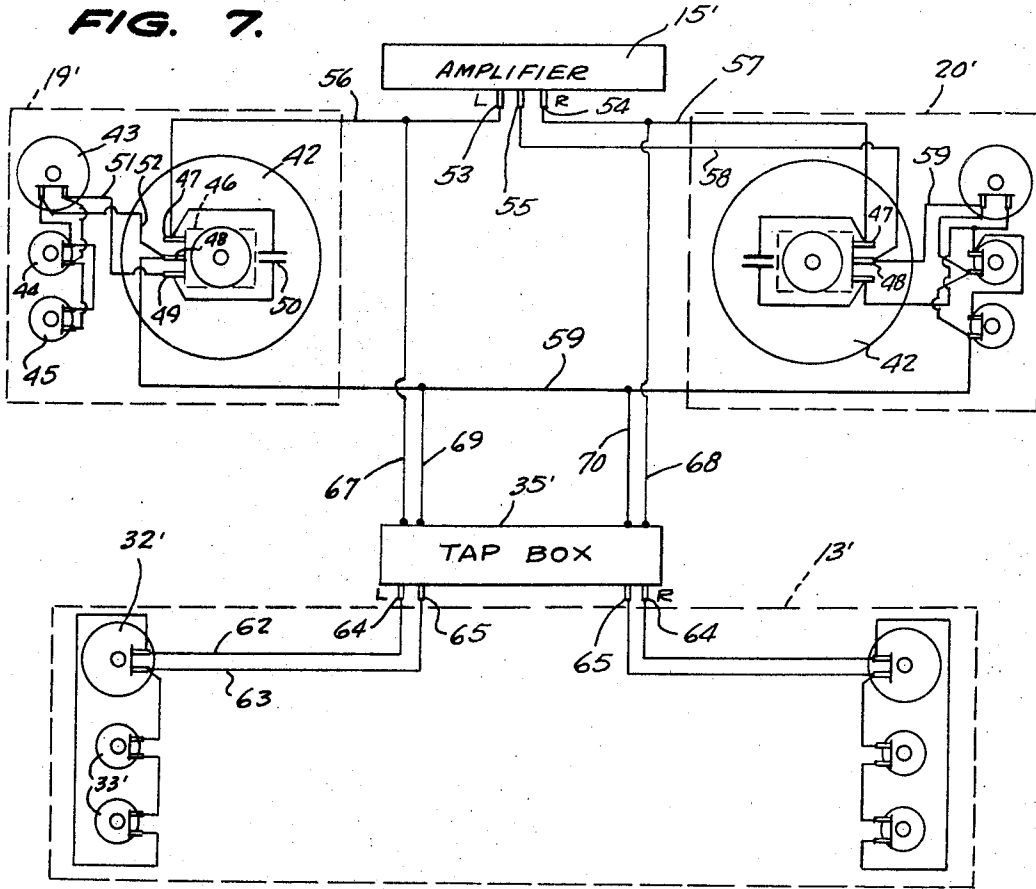
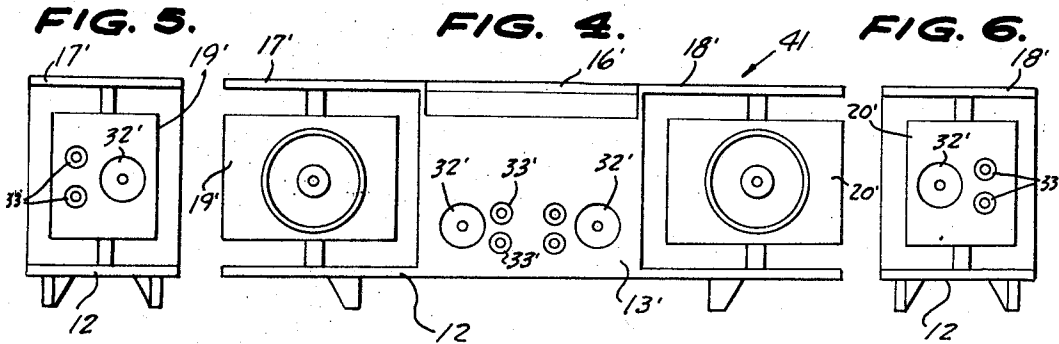
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**SOUND SYSTEM CIRCUIT AND CABINET
 ASSEMBLY**

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Filed May 12, 1967, Ser. No. 638,051

Int. Cl. H04m 1/00; H04r 7/16; G10k 13/00

U.S. Cl. 179—1

10 Claims

ABSTRACT OF THE DISCLOSURE

A multi-channel stereo reproducing system having a center output channel derived from the two stereo channels. The stereo channels each has a plurality of speakers, and the derived center channel likewise has a plurality of speakers. The center channel is derived by feeding the stereo components through an isolation mixing network giving an electrical output which is the composite of the input stereo channel signals. The stereo reproducing speakers are mounted in vertically-pivoted enclosures. The center channel reproducing speakers are mounted in a fixed enclosure located between the vertically-pivoted stereo reproducing enclosures.

This invention relates to sound reproducing systems, and more particularly to improvements in stereo sound systems of the type having a derived center channel.

A main object of the invention is to provide a novel and improved stereo reproducing system of the type including a center channel derived by forming a composite of the signal components employed in the respective stereo channels, the system being relatively simple in construction, being very compact in size, providing a high degree of realism in its performance, and being adaptable for use in locations having a wide range of acoustic characteristics.

A further object of the invention is to provide an improved multi-channel stereo reproducing system having a center output channel derived from the two normal stereo channels, the system including respective enclosures for the channels thereof, said enclosures being mounted to provide a wide range of adjustability to take care of different acoustic conditions in which the system is to be employed, the electrical components of the system being relatively easy to install, and the system being housed in a cabinet structure which is neat in appearance, and easily accessible for operation of the system, and the system being easy to maintain in working condition.

A still further object of the invention is to provide an improved multi-channel stereo reproducing system of the type having a center output channel derived from the two normal stereo channels thereof, the system being physically mounted in enclosures which are adjustable relative to each other, and which can be easily adjusted to compensate for acoustic deficiencies or abnormalities in the surrounding environment, and the system providing relatively realistic reproduction, approximating the effects obtained by live musicians in an actual music hall or by live renditions or performances.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of one form of multi-channel stereo reproducing system constructed in accordance with the present invention.

FIGURE 2 is an end elevational view of the reproducing system shown in FIGURE 1 with the top cover closed.

FIGURE 3 is a block diagram showing the electrical components and their connections, as employed in the multi-channel stereo reproducing system of FIGURES 1 and 2.

FIGURE 4 is a front elevational view of a modified form of multi-channel stereo channel reproducing system according to the present invention.

FIGURE 5 is a left-end elevational view of the multi-channel stereo reproducing system embodied in FIGURE 4.

FIGURE 6 is a right-end elevational view of the multi-channel stereo reproducing system of FIGURE 4.

FIGURE 7 is a wiring diagram, similar to FIGURE 3, showing the electrical connections and the electrical components employed in the modified version of stereo reproducing system illustrated in FIGURES 4, 5 and 6.

Referring to the drawings, and more particularly to FIGURES 1, 2 and 3, 11 generally designates one form of multi-channel stereo reproducing system constructed in accordance with the present invention. The system 11 comprises a rigid main housing having a bottom horizontal board 12, a central speaker enclosure 13 rigidly-mounted on the central portion of bottom board 12, and a built-in phonograph record changer 14 having associated therewith the conventional amplifier 15 which may be of the type which includes a built-in radio tuner. The unit 15 is provided with the usual controls commonly employed in conjunction with sound-reproducing equipment of this type. The phonograph assembly 14 is provided with the hinged top cover 16 which may be lowered to close substantially in a horizontal position, whereby the cabinet of the assembly has a flush top surface, the cover 16 being then substantially flush with a pair of horizontal top boards 17 and 18 rigidly-secured to the top margins of the sidewalls of the center housing 13 and overlying the side portions of the bottom board 12.

Designated respectively at 19 and 20 are left and right stereo speaker enclosures which are respectively vertically-pivoted between top board 17 and bottom board 12 and top board 18 and said bottom board 12, as by the provision of top and bottom pivot posts 21 and 22 for each of the stereo speaker enclosures 19 and 20.

The stereo speaker enclosures 19 and 20 are rotatable on vertical axes defined by their aligned top and bottom post elements 21 and 22, whereby the enclosures 19 and 20 may be suitably-adjusted to provide desired sound radiation characteristics, for example, to compensate for specific acoustical short-comings or deficiencies of a room in which the system is employed. The desirability of pivotally-adjusting the enclosures 19 and 20 is especially evident because of the utilization of relatively small tweeter elements as part of the speaker network employed in the enclosures 19 and 20, the small speaker elements having relatively narrow dispersion patterns, as is well-known to those skilled in the art.

As shown schematically in FIGURE 3, each of the stereo speaker enclosures 19 and 20 contains three different speakers, namely, a low-frequency reproducer 25, a medium-range reproducer 26, and a relatively small high-range reproducer or tweeter 27. As shown in FIGURE 3, the three speakers employed in each enclosure 19 and 20 are connected in parallel, and the parallel networks are respectively connected to the stereo output wires 28, 29 and 30, 31, leading from the outputs of the left and right stereo channels of the amplifier unit 15.

The fixed center enclosure 13 contains two sets of speaker networks, each set comprising a low-frequency reproducer 32 and a pair of medium-frequency reproducers 33, 33, the speakers 32, 33, 33 being connected in series and the series connection including a suitable capacitor 34 of a value such as to essentially pass frequencies above a given limit and acting as a high impedance for audio frequencies below said limit. Thus, the center speakers 32, 33, 33 at each side of the center speaker enclosure 13 acts to emphasize medium and high-audio

frequencies, whereby to provide increased "audio presence" in the total output of the system.

The stereo channel outputs from amplifier 15 are connected to the sound-reproducing elements in the center enclosure 13 through a conventional mixing network 35, which may be similar to the Philco Multiplex Unit, Model No. R1877WA (6187435), manufactured by Philco Corporation, Philadelphia, Pa. The unit 35 is commonly known in the art as a "tap box," and basically consists of respective input networks coupled to an output network which is electrically isolated from the input elements, namely, from the windings to which the respective pairs of wires 28, 29 and 30, 31 are connected. The output circuit of the device 35 has a common output terminal 36 and respective side output terminals 37 and 38. The respective sets of series-connected speaker arrays 32, 33, 33, are connected between terminal 37 and terminal 36 for one set of speakers and between terminal 38 and terminal 36 for the other set. The larger speakers 32, 32 are respectively located at the opposite end portions of the front baffle board of enclosure 13, with respective pairs of associated smaller speakers 33, 33 inwardly adjacent the larger speakers, as shown in FIGURE 1, forming a pattern consisting of the larger speakers and their associated vertically-aligned smaller speakers symmetrically located at opposite sides of the vertical center line of the front baffle board of enclosure 13, as shown in FIGURE 1. Because of the location of the four smaller speakers 33 at the central portion of the baffle board, an improved dispersion pattern is obtained for the higher-frequency components of the derived center channel audio output, thereby improving the "audio presence" of the performance of the system.

It will be noted from FIGURE 1 that in the normal stereo channel enclosures 19 and 20, the smaller speaker units 27 and 26 are preferably mounted in the outer sidewalls of the enclosure as at 19 and 20, facing laterally, whereas the larger speaker units 25 are mounted in the front walls of the enclosures, facing forwardly. The sound dispersion effects produced by the illustrated arrangement can be varied, as required, as abovementioned, by rotatably-adjusting the respective stereo speaker enclosures 19 and 20 around their respective vertical axes of rotation.

Referring now to the modification illustrated in FIGURES 4, 5, 6 and 7, the modified system of these figures is designated generally at 41. The system 41 is provided with cabinet structure generally similar to that of the system 11 previously-described, and comprises a cabinet having a horizontal bottom board 12, a fixed center speaker enclosure 13', left and right rotatable speaker enclosures 19' and 20', fixed horizontal top boards 17' and 18' overlying the rotatable enclosures, and a top compartment containing the record changer, amplifier, and other electrical components, as in the previously-described form of the invention, the compartment having the hinged top cover shown at 16'.

Each of the rotatable enclosures 19' and 20' contains a relatively large "woofer" or low-audio range-reproducing speaker 42, a medium range-reproducing speaker 43, and a pair of high-range reproducers or "tweeters" 44 and 45. As shown, the speakers 43, 44 and 45 are connected in parallel. The speakers 42 illustrated in FIGURE 7 are of the conventional coaxial dual-unit type provided with built-in dividing networks, shown in diagrammatic block form at 46, these networks being of conventional construction, and being well-known to those skilled in the art. The coaxial main speakers 42 are provided with the main input terminals 47 and 48 and are provided with additional terminals 49 employed for making the proper connections for supplying the auxiliary speakers 43, 44 and 45. Thus, terminal 47 is connected through a suitable capacitor 50, which may be of the order of 4 microfarads, to the terminal 49. Terminal 49 is connected to one of the conductors 51 feeding the parallel-connected auxiliary speakers 43, 44 and 45, and terminal

48 is connected by a wire 52 feeding the other side of the parallel-connected auxiliary speakers 43, 44 and 45.

The system includes an amplifier 15', similar to the amplifier 15 shown in FIGURE 3, the amplifier having the left channel output terminal 53, the right channel output terminal 54, and the common or "ground" output terminal 55. Left terminal 53 is connected by a wire 56 to the input terminal 47 of the left speaker group contained in the enclosure 19', and terminal 54 is connected by a wire 57 to the corresponding terminal 47 of the right speaker group contained in the enclosure 20'. The common terminal 55 is connected by a wire 58 to the terminal 48 associated with the main speaker unit 42 of the right speaker group. The common terminal 55 is connected to the terminal 48 of the left speaker group by a wire 59 connecting the "ground" terminals of the auxiliary speakers. The large speaker units 42 are baffled in the front walls of the rotatable enclosures 19' and 20' and the auxiliary speakers 43, 44 and 45 are baffled in sidewalls of said rotatable enclosures in the manner illustrated in FIGURES 4, 5 and 6.

The center speakers are energized from the right and left stereo channels through a tap box 35' generally similar to that employed in the previously-described form of the invention. The center speakers consist of two groups, each comprising a medium-range speaker 32' and a pair of high-range speakers 33', the respective left and right stereo channels being supplied to these speakers in a manner wherein they are effectively isolated from the normal stereo channels which drive the speakers in the rotatable enclosures 19' and 20'. The tweeter units 23' are connected in series, as shown, and are connected across the input leads 62 and 63 connecting the output terminals 64, 65 of the tap box 35' to the terminals of the medium-range speakers 32', as shown, whereby, the series-connected tweeters are connected in parallel with the medium-range speakers. The input to the tap box 35' comprises respective connections from the stereo channel output wires 56 and 57 to the corresponding input terminals of the tap box by wires shown at 67 and 68. Similar connections are provided from the common or "ground" wire 59 to the corresponding input terminals of the tap box 35', as by wires shown respectively at 69 and 70.

The speaker arrangement in the central fixed enclosure 13' is generally similar to that employed in the previously-described form of the invention, with the medium-range speakers 32', 32' being located adjacent the respective ends of the enclosure 13', and the pairs of tweeters 33', 33' being located inwardly of the medium-range speakers and in vertical pairs, as illustrated.

It will be understood that the tap box 35' is generally similar in design to the tap box 35, and that the "ground" terminals 65, 65 may be internally-connected together inside the tap box 35'.

While certain specific embodiments of an improved multi-channel stereo reproducing system having a derived center output channel have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A multi-channel sound-reproducing system comprising a cabinet having a central main speaker enclosure and respective right stereo and left stereo speaker enclosures pivotally-pivoted adjacent the opposite sides of the main enclosure, said main enclosure being provided with a front baffle wall, two groupings of speakers mounted in said main enclosure on said front baffle wall, each grouping comprising at least one middle-range speaker and at least one high-range speaker, said stereo speaker enclosures being provided with front and outer side baffle walls, each stereo enclosure containing a low-range speaker mounted on its front baffle wall and at least one higher-range speak-

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er mounted on its outer side baffle wall, a stereo amplifier having respective stereo outputs connected to the speakers in the stereo speaker enclosures, signal-mixing means, circuit means connecting the stereo outputs to said signal-mixing means, and circuit means connecting the output of said signal-mixing means to the two groupings of speakers in the central main enclosure.

2. The multi-channel sound-reproducing system of claim 1, and wherein the two groupings of speakers in the central main enclosure each comprises one middle-range speaker and a pair of relatively high-range speakers, said high-range speakers being connected in series.

3. The multi-channel sound-reproducing system of claim 2, and wherein a capacitor is connected in series with said high-range speakers.

4. The multi-channel sound-reproducing system of claim 1, and wherein the two groupings of speakers in the central main enclosure each comprises at least one middle-range speaker and at least one relatively high-range speaker connected in series.

5. The multi-channel sound-reproducing system of claim 2, and wherein the two groupings of speakers in the central main enclosure are respectively mounted on the front baffle walls substantially symmetrically with respect to the vertical central line of said front baffle wall.

6. The multi-channel sound-reproducing system of claim 5, and wherein the relatively high-range speakers of said two groupings are mounted substantially in the center portion of said front baffle wall of the main enclosure.

7. The multi-channel sound-reproducing system of claim 6, and wherein the high-range speakers are mounted in vertical pairs spaced substantially symmetrically on

opposite sides of the vertical central line of the front baffle wall of the main enclosure.

8. The multi-channel sound-reproducing system of claim 7, and wherein the speakers in the stereo enclosures respectively comprise a low-range speaker, a middle-range speaker and a relatively high-range speaker connected in parallel.

9. The multi-channel sound-reproducing system of claim 8, and wherein the middle and high-range speakers are both mounted on the outer sidewall of the associated stereo speaker enclosure.

10. The multi-channel sound-reproducing system of claim 9, and wherein said cabinet comprises a common horizontal bottom board extending laterally on opposite sides of the central main speaker enclosure and respective horizontal top board segments rigidly-connected to the central main enclosure and overlying the respective laterally-extending portions of the bottom board, said stereo speaker enclosures being vertically-pivoted between said horizontal top board segments and said laterally-extending portions of the bottom board.

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U.S. Cl. X.R.

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