

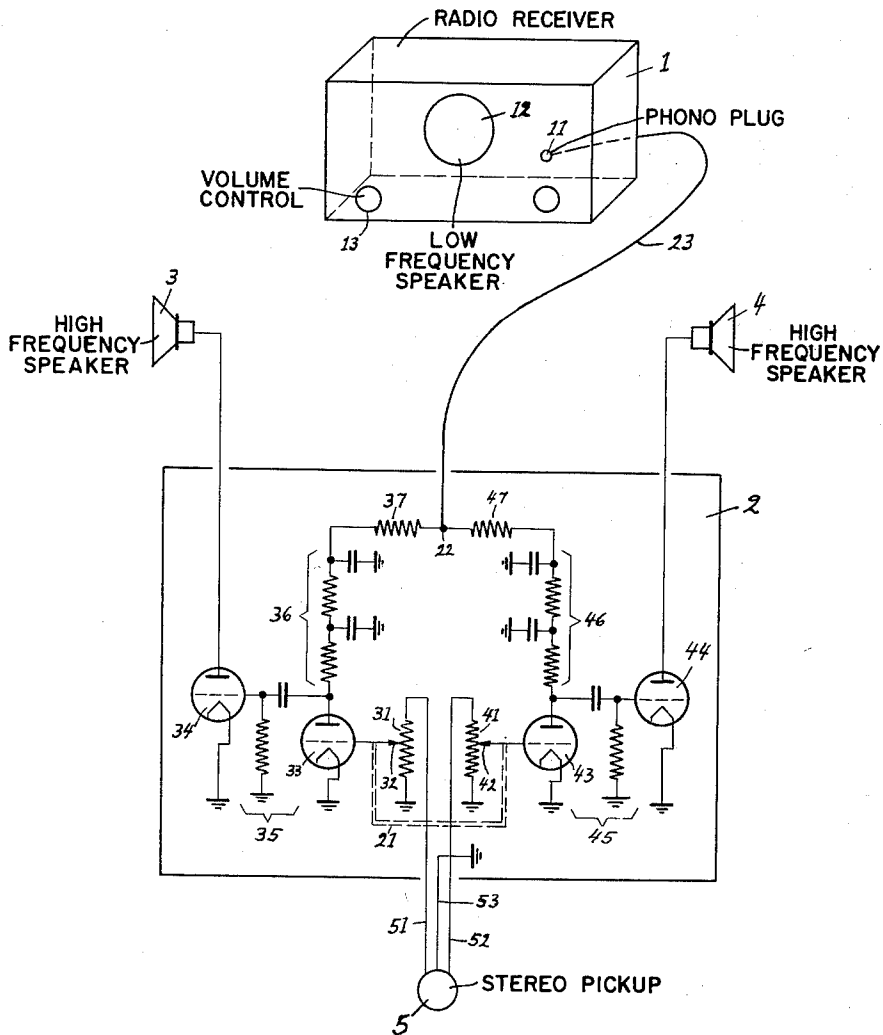
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STEREOPHONIC AMPLIFIER AND LOUDSPEAKER SYSTEM

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**STEREOPHONIC AMPLIFIER AND LOUD-SPEAKER SYSTEM**

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1 Claim. (Cl. 179-100.1)

The present invention relates to a system for reproducing stereo sound recordings, whereby an auxiliary apparatus is used to supplement an ordinary radio set or other music-reproduction device which may also be connected to a turntable or to a tape recorder.

Radio sets usually are designed for monaural reproducing and, therefore, have only a single channel. Such a radio set can only be employed to reproduce a single channel of a known stereo pickup arrangement connected to the phono plug of the radio set to use its amplifier. For stereo reproduction, either a dual speaker system in appropriate cabinet arrangements has to be provided or the amplifiers of two radio sets are separately connected to one of the two stereo recording pickup channels. Obviously, this is unnecessarily expensive, because in the reproduction of records or tapes using two radio sets, only the audio amplifiers thereof are used. Thus, the high frequency tuner portions of at least one of the radio sets is superfluous and unused. Furthermore, when two radio sets are used, there is a separate volume control for each of them and, usually, it is difficult to properly adjust the balance between them so as to obtain precisely the stereo effect actually intended in the particular recording being played back.

It is object of the present invention to provide a stereophonic reproduction system wherein an ordinary radio set or any other single-channel sound amplifying means can be used as the basic component. This system is then supplemented by an auxiliary apparatus used for separating the higher and lower frequencies of the two stereo signals picked up separately, and after such separation to feed the higher frequencies thereof to separate higher-frequency responsive loudspeakers.

It is a further object of the invention to provide a stereophonic reproduction system by driving the lower frequency loudspeaker of a conventional single channel sound reproduction means, for example, an ordinary radio set, and by adding an auxiliary apparatus for reproducing as a second stereo channel merely the high frequencies of the recording, whereby the volume of the stereo reproduction is controlled by a single means.

It is another object of the invention to provide an auxiliary apparatus for stereo sound reproduction which can be used together with any kind of single channel sound reproduction means having a phono input plug.

In accordance with one aspect of the invention, a stereophonic reproduction system may be designed as follows: An ordinary radio set having a phono input plug, two higher-frequency responsive loudspeakers, a stereo pickup, two mechanically ganged potentiometers, each one inserted in a different output channel of the stereo pickup, a high-pass and a low-pass filter for each of said channels, separate amplifiers from each high-pass filter to each higher-frequency loudspeaker, and a common connection from the two low-pass filters to the phono plug of the radio.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and

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scope of the invention will become apparent to those skilled in the art from this detailed description.

In the drawing, an embodiment of the present invention is schematically illustrated.

5 Numeral 1 designates an ordinary radio set having an amplifier capable of monaural sound production. 2 is an auxiliary apparatus according to the invention. 3 and 4 are two high-frequency-responsive loudspeakers and 5 is a stereo sound pickup for record disks, tapes, or the like. The stereo sound pickup 5 may be of any known kind, and includes two output wires 51 and 52 and a common ground connection 53. Output wires 51 and 52 are connected to impedances, such as potentiometers 31 and 41, respectively. A wiper 32 of a potentiometer 31 is ganged with a wiper 42 of a potentiometer 41 and the two wipers may be operated by a common knob (not shown), said knob rotating a mechanical shaft 21 ganging the two wipers together. The wiper 32 is connected to the control electrode of an electronic amplifier tube 33, while the wiper 42 is connected to the control electrode of an electronic amplifier tube 43. The outputs of the tubes 33 and 43 are fed to amplifier tubes 34 and 44, respectively, via R-C high-pass filters 35 and 45, respectively. The output of the amplifier tube 34 drives loudspeaker 3, while the output of the amplifier tube 44 drives the loudspeaker 4.

The outputs of the tubes 33 and 43 are also fed to a common connection point 22 via low-pass filters 36 and 46, respectively, and via decoupling resistors 37 and 47, respectively. A conductor 23 from point 22 is plugged into the usual sound input connector or phono plug 11 of the radio set 1. The loudspeakers 3 and 4 are preferably mounted in separate baffles or cabinets (not shown) which may be placed in mutually spaced relation.

55 These higher-frequency loudspeakers may now be used to produce the desired stereo effect. The low frequencies are fed into the radio set 1 and are reproduced by the lower-frequency speaker 12 thereof. Since, as is shown in the drawing, the common connection point 22 constituting the output of the low-pass filters 36 and 46 is connected directly to the sound input connector 11 of the radio set 1, it is the amplifier of the radio set which is relied upon to amplify the lower frequencies, there being no amplifier between the output of the low-pass filters 36, 46, and the connector 11, i.e., while the higher frequencies are amplified by components incorporated in the auxiliary apparatus, the amplification of the lower frequencies is left to a component pertaining to the radio receiver. The volume control 13 of the radio set 1 regulates the volume of the lower frequencies, while the two ganged wipers 32 and 42 regulate the volume of the higher frequencies. Thus, there is a separate volume control for high and low frequencies, thus, automatically providing separate treble and bass controls. Even though the radio set 1 may have separate higher- and lower-frequency loudspeakers, only the latter are driven, due to the filters 36 and 46.

60 From this description, it can be seen that the invention makes use of the known fact that stereo reproduction is not defeated when the lower sound frequencies are initially picked up separately, but are combined and reproduced in a single loudspeaker, and only higher frequencies are reproduced in stereo. The lower-frequency loudspeaker of a single radio set is used for this purpose and supplemented by auxiliary apparatus, as outlined above. The lower-frequency loudspeaker reproduces substantially no higher sound frequencies. This approach to the problem of stereo conversion has the advantage that the auxiliary apparatus does not need to be specially adapted to the particular radio set used, but can cooperate with any radio or music reproduction amplifier and cabinet, because the radio set does not affect

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the quality and the frequency response of the two higher audio frequency channels.

Another advantage, as stated above, is that the two volume controls associated respectively with the radio set and the auxiliary apparatus are independent of each other as far as the stereo effect is concerned.

Finally, there is the advantage that one needs only a small power supply for the higher audio frequency reproduction apparatus, which means that only a small rectifier network and a small power output transformer are needed.

I claim:

For use with a monaural radio receiver means having a speaker capable of reproducing at least the lower audio frequencies, a sound input connector, and an amplifier between said speaker and said connector, an auxiliary apparatus for enabling said monaural radio receiver means to be used as a part of a stereo sound reproduction system, said auxiliary apparatus comprising circuit means forming two channels connectable, respectively, to two outputs of a stereo scanning device, said circuit means including, for each channel, a first amplifier, a high-pass filter connected to the output of the corresponding first amplifier, and a second amplifier connected to the output of the corresponding high-pass filter, the output of said

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second amplifiers being connectable to reproduction means for reproducing the higher audio frequencies, said circuit means further including two low-pass filters branching from said channels and connected to a common output which itself is connectable directly to the sound input connector of the monaural radio receiver means with which the auxiliary apparatus is used, and said circuit means further including two volume controlling means in said two channels, respectively, said two volume controlling means being mechanically coupled to each other, whereby the higher frequencies are amplified by components incorporated in the auxiliary apparatus whereas the amplification of the lower frequencies is left to a component pertaining to the radio receiver means.

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