

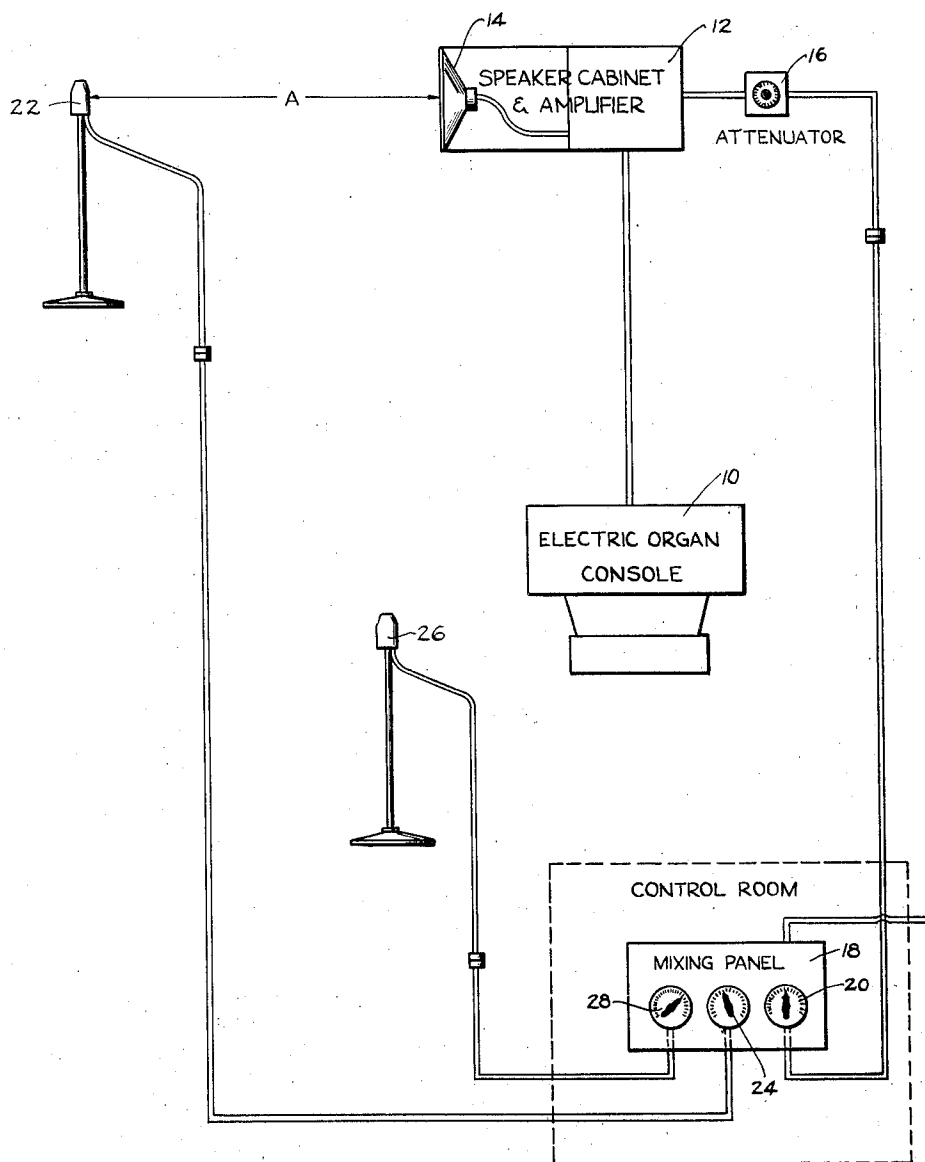
May 7, 1940.

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2,199,702

METHOD OF BROADCASTING

Filed Jan. 29, 1938



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UNITED STATES PATENT OFFICE

2,199,702

METHOD OF BROADCASTING

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Application January 29, 1938, Serial No. 187,588

3 Claims. (Cl. 179—1)

My invention relates generally to methods of broadcasting music produced by electrical musical instruments such as electric organs.

It is well known that the physical characteristics of the room or auditorium in which music is played have a noticeable effect upon the quality of the music. This effect is due principally to the reverberation of the sound, and the time of reverberation is determined by the size of the room and the sound absorptive or reflecting character of the walls, ceiling and floor of the room, as well as these characteristics of the contents of the room. A further effect of the physical characteristics of the room is what is known as the "room pattern" effect. When a complex tone is sounded in a room the walls, ceiling, and floors of the room as well as the objects in the room reflect the sound waves, and in some places in the room, the original and the reflected waves of a particular partial of the tone being sounded reinforce each other, while in other places, the original and the reflected waves may attenuate or partially cancel each other. As a result, the various partials of the tone are heard in different relative amplitudes at different points in the room. Since the quality of a tone is determined by the relative amplitudes of its audible partials, the room pattern may cause a quite perceptible change in tone quality, depending upon the location of the ear of the listener, or, in broadcasting, the position of the microphone.

In broadcasting music played on the pipe organ, the music is usually picked up in a relatively large auditorium with sound reflecting walls, ceiling and floor and as a result, the reverberation time is relatively long. Listeners are accustomed to hearing pipe organs in large churches and auditoriums and therefore associate the long reverberation time with the music of the pipe organ. On the other hand, in the broadcasting of music from an electric organ, it has been customary to place the electric organ in a relatively small studio which is usually acoustically treated so as to have a very short reverberation time. As a result, music broadcast from an electric organ played in such a room sounds different from the broadcast music of a pipe organ. The differences are mainly in the rates of attack and decay of the notes. There may also be slight differences in the tone quality due to the fact that the microphone is positioned at a point where one or more partials of the tone are either accentuated or attenuated due to the room pattern effect. The latter effect is not very pronounced when broadcasting the music

of a pipe organ because the tones of the pipe organ are somewhat unsteady in pitch and thus cause a more or less constantly changing room pattern.

It is an object of my invention to overcome these difficulties in the broadcasting of music produced by electrical musical instruments, such as electric organs, to make such music resemble more closely that produced by broadcasting pipe organ music, and to improve the quality of the music which is broadcast.

A further object of my invention is to provide an improved method of broadcasting music produced by electrical musical instruments in which the effect of increased reverberation time is obtained.

A further object is to provide an improved method of broadcasting the music produced by electrical musical instruments, in which at least partial compensation is made for undesirable room pattern effects.

Other objects will appear from the following description, reference being had to the accompanying drawing which is a diagrammatic representation of a broadcasting studio.

In the drawing, the electric organ console is indicated at 10 and is representative of any electrical musical instrument in which the tones are electrically originated, one such instrument being disclosed in my prior Patent No. 1,956,350 granted April 24, 1934. The organ console 10 is connected to the usual tone cabinet which includes an amplifier 12 and a loud speaker 14. A portion of the signal output of the amplifier is fed to the loud speaker while another portion is fed through the attenuator 16 and thence to the mixing panel 18 where its volume may be controlled by a suitable control member 20. The sound produced by the loud speaker is picked up by a microphone 22 and the signal transmitted therefrom to the control 24 of the mixing panel 18. Similarly, the announcer's microphone 26 is connected to the mixing panel 18, the volume of the sound received therefrom being regulated by a control 28.

The microphone 22 is preferably located a considerable distance from the loud speaker 14, the distance A of the drawing being preferably in the order of 30 feet or more. The announcer's microphone 26 may be spaced a considerable distance from the loud speaker and from the other microphone 22 if it is to be used to pick up the music, and if it is not used for this purpose it may of course be placed at any convenient position. The signals fed to the mixing panel are

combined in the desired proportions by the operation of controls 20, 24, 28, and the combined signal fed from the mixing panel 18 to the modulator of the broadcasting apparatus.

5 Due to the fact that a portion of the signal broadcast is received directly from the electrical musical instrument, and another portion is received through the microphone 22, there will be a time lag in the signals which will give the same effect as if the mosaic were produced and heard in a reverberative room. If desired, the announcer's microphone or a third microphone may be used to pick up the music produced by the loud speaker 14 and if the third microphone is placed at a different distance from the speaker than is the microphone 22, the reverberative effect may be increased slightly. Furthermore, in the signal transmitted directly from the electrical musical instrument to the mixing panel, all of the partials of the tones will be of the desired relative amplitudes, unaffected by the room pattern. For example, if the microphone 22 happens to be located at a point where a certain partial is greatly attenuated due to the room pattern effect, this partial will, nevertheless, be supplied in full amplitude in the signal transmitted directly from the electrical musical instrument, and partial compensation will thus be made for the effect of the room pattern.

30 By properly adjusting the controls 20, 24, and 28 on the mixing panel, the degree of reverberation effect may be changed to suit the particular type of music being played on the electrical musical instrument. For example, if light, fast, popular music is being played, the major portion of the signal may be transmitted directly from the electrical musical instrument to the mixing panel, while if the music is of a slow, ponderous character such as is commonly played upon pipe organs, the signal which is broadcast may be derived approximately half directly from the electrical musical instrument, and the other half picked up through the microphone 22. In this way the music will sound as if it had been produced in a relatively large auditorium and will more closely simulate the music of a pipe organ played in a large church.

While I have shown but a single form of apparatus and described but one method of carrying out my invention, it will be apparent to those skilled in the art that the method may be performed with slightly different apparatus, and the method itself may be modified in well known ways to suit particular conditions. I therefore desire to include within the scope of the following claims such similar methods as will readily suggest themselves to those skilled in the art.

I claim:

1. The method of broadcasting music produced by an electrical musical instrument in which the music is originated which comprises, producing a sound by means of a loud speaker receiving its signal electrically from the electrical musical instrument, and broadcasting a signal composed in part of the signal produced by a microphone receiving said sound and in part of an electrical signal derived directly from the electrical musical instrument.

2. The method of broadcasting the music produced by an electrical musical instrument in which the music is originated which comprises broadcasting an electrical signal composed in part of one derived electrically directly from the musical instrument, and in part of a signal which is produced in a microphone spaced a substantial distance from the loud speaker of the electrical musical instrument, whereby there will be a time lag between the two signals, and adjusting the relative amplitudes of the two signals.

3. The method of broadcasting the music of electrical musical instruments in which the music is electrically originated which comprises, translating into sound a portion of the electrical musical signal produced by the instrument, picking up the sound by means of a microphone after the sound has traveled through the air for a substantial period of time, mixing the signal received from the microphone with an electrical signal transmitted directly from the instrument, and broadcasting the composite signal thus produced.

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