Jan. 20, 1931. J. F. ENGLE 1,789,700

SOUND REPRODUCING AND AMPLIFYING SYSTEM

Filed May 10, 1927

Fig. 1.

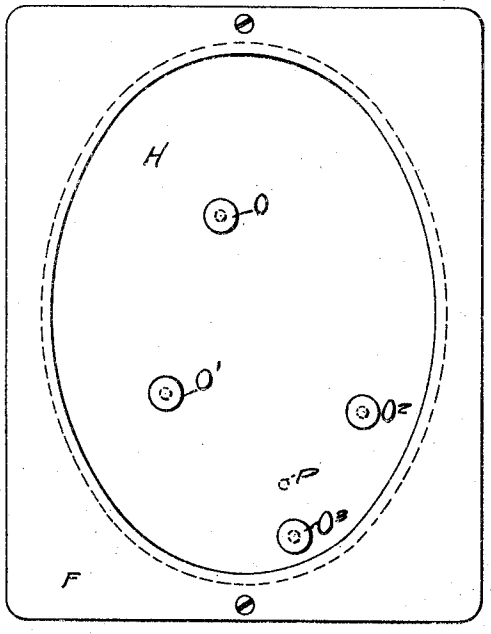
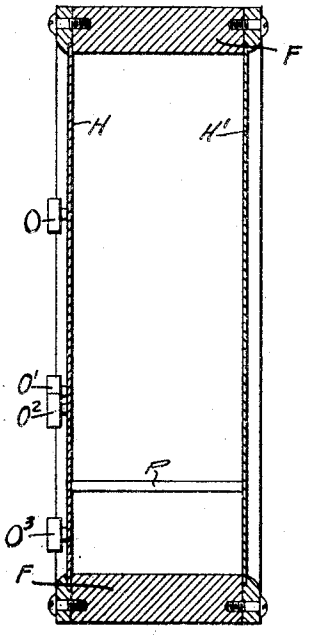


Fig. 2.



INVENTOR
John F. Engle
BY
Hermann F. Cuntz
ATTORNEY

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JOHN F. ENGLE, OF LAKEWOOD, OHIO

SOUND REPRODUCING AND AMPLIFYING SYSTEM

Application filed May 10, 1927. Serial No. 190,153.

My invention relates to apparatus and methods for reproducing clearly and without distortion music, speech and other sounds received by radio, and from phonograph records, from records on films, or in any other manner, and relates more particularly to receiving the sounds on a plurality of receiving and reproducing devices, each adapted to a range or band of audio frequencies, and combining the sounds so received.

Diaphragms, horns, cones and other reproducing devices are, in general, adapted to reproduce best sounds of a particular frequency or of a limited range of frequencies, and sounds falling outside such a range of frequencies are either not reproduced at all or are inadequately reproduced, and received speech and music are therefore distorted.

I have found that by using a plurality of sound reproducing devices, especially in connection with corresponding receiving circuits, I can reproduce speech, music or any other sounds, covering any desired range of frequencies, with entire fidelity.

In the accompanying drawings I have shown an embodiment of one form of apparatus, namely, sound reproducer, the systems and other forms having been divided out of this application to be made the subject-matter of divisonal patent application or patent applications.

Fig. 1 gives a front view, and Fig. 2 gives a side view of a double diaphragm with a plurality of speaker units.

In the practice of my invention with the system or sound reproducers, any suitable form of electric pickup may be employed, and the currents therefrom may be amplified before reaching the transformer or the multiple circuits. When phonographs are used without an electric pickup, the sound waves from the needle diaphragm or other mechanical pickup should be converted into electric currents through microphones or otherwise, unless the sound waves are led directly to a plurality of variously tuned loud speakers. My method and apparatus can also be applied to systems where the sound record is on a film, with or without photographs.

In Figs. 1 and 2, H and H^1 are diaphragms, supported in a frame F, and connected by a sound post P. Speaker units are attached to diaphragm H at O, O^1, O^2 and O^3. With the sound post and the speaker units as shown, the diaphragm H is divided up into unequal areas having different natural frequencies, each area, by means of its corresponding speaker unit, being connected to a corresponding amplifying circuit of approximately the same frequency. The sound post P will then transmit the waves which are the resultant of vibrations of all the areas of H to the second diaphragm H^1, which will further amplify the sounds, and will modify their quality according to its dimensions and the material of which it is composed. These diaphragms can be made of any suitable material and of any appropriate shape, depending upon the circumstances of each case. There can also be attached to one or both of these diaphragms gongs or other shapes of resonant material to modify its, or their, quality further, or weights or mutes can be used for the same purpose. These diaphragms can be employed in my system instead of several separate loud speakers.

In the embodiments of my invention shown in the figures, each of the parallel circuits is broadly tuned to a band of frequencies, or has filters which pass such a band of frequencies, and the corresponding loud speaker is broadly tuned to the same band of frequencies. The loud speakers operate simultaneously, so that their combined output reproduces the whole range of audio frequencies received at a station, or produced on a phonograph, or otherwise, with equal clearness and intensity. They may be made of various materials to impart the desired true quality or color. The number of parallel circuits and loud speakers can be varied to suit circumstances, and the closeness of their tuning can be varied; generally speaking, the tuning bands will be narrower, the greater the number of circuits and loud speakers.

The tuning of the circuits can be accomplished in any suitable manner, by the use of impedances, inductances, capacitances and resistances. Where transformer coupling is

employed, the transformers in each circuit may be so designed as to pass most readily the band of frequencies for which that circuit is tuned, and where other methods of coupling are employed, they should be so designed as to assist in the selectivity of the circuits. As many stages of amplification as desired may be employed, and in some cases it may be preferable to use no amplification.

In arrangements such as shown, as many stages of amplification as desired may be used, and each stage may be tuned, or have filters, and any suitable kind of coupling may be employed. In general I do not confine myself to the exact constructions shown in the drawings and described herein, but what I claim in this case as my invention and desire to secure by United States Letters Patent is:

1. A sound reproducer, comprising two diaphragms connected by a sound post placed eccentrically and a plurality of speaker units attached to one diaphragm at different distances from the sound post.

2. A sound reproducer, comprising two diaphragms connected by a sound post placed eccentrically, and a plurality of speaker units attached to one of said diaphragms at different positions each effective on an area representing different natural frequencies of vibration.

3. A loud speaker comprising a diaphragm, a plurality of loud speaker units connected therewith at different points each effective over a different area of neutral frequencies of vibration, a sound post attached to said diaphragm, and a second diaphragm connected with the first diaphragm by means of said sound post adapted to make effective on the second diaphragm the resultant of vibrations due to the plurality of speaker units.

4. A sound reproducer comprising a diaphragm having a sound post connected therewith so that a plurality of frequency bands may be applied and each effective with respect to one of a plurality of areas of said diaphragm.

5. A sound reproducer comprising a diaphragm having a sound post connected therewith in such a manner that said diaphragm has effective a plurality of areas each respondent to different natural rates of vibration.

In testimony whereof, I have signed my name to this application this 6th day of May, 1927.

JOHN F. ENGLE.