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A. McL. NICOLSON

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ACOUSTIC DISSEMINATOR

Filed March 31, 1934

Fig. 1

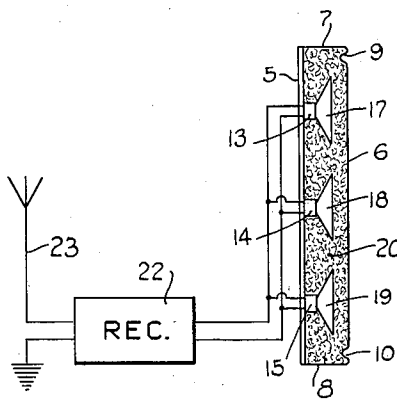


Fig. 2

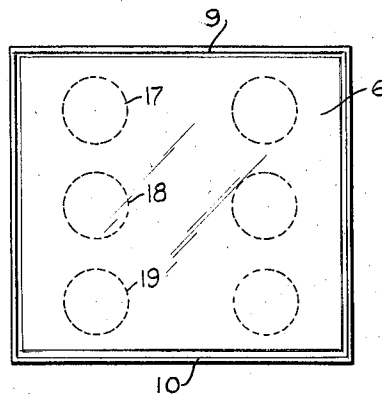


Fig. 3

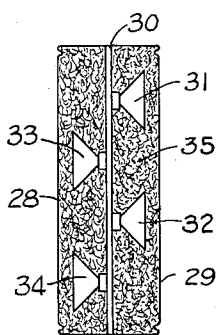


Fig. 4

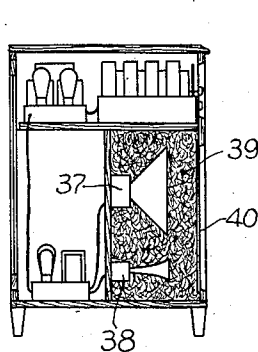


Fig. 5

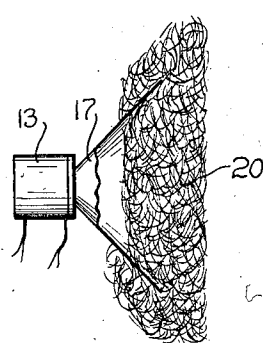


Fig. 6

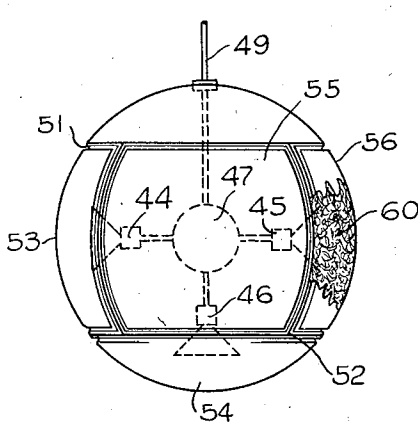
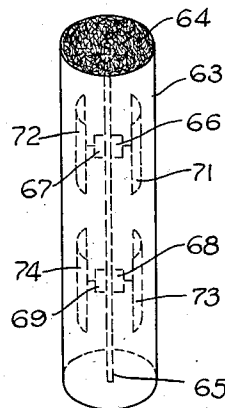


Fig. 7



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ACOUSTIC DISSEMINATOR

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12 Claims. (Cl. 181—31)

This invention relates to the propagation of sound waves and particularly to means for the translation of electrical currents into sound waves whereby a better and more pleasing distribution thereof is obtained.

An object of the invention is to more efficiently distribute sound waves.

Another object of the invention is to obtain ubiquitous radiation of sound.

A further object of the invention is to combine low frequency and high frequency components produced by separate devices into the original sound waves.

The present invention contemplates the better distribution of sound waves produced by loud speakers, and the like, accomplished by their disposition with respect to a vibrating medium and by the use of a sound resonant damper and disturbance eliminator. In the usual talking motion picture equipment for theaters, a plurality of loud speakers are positioned around the borders of a screen or at certain positions behind it. When not using binaural or directional sound systems, there is frequently a lack of coordination between the picture of the sound source and the actual source of the sound. Although the present invention is not a directional sound system, it does permit sound to radiate from the entire surface of the screen, thereby providing the illusion of direction, that is, the sound appears to emanate from the source shown on the screen at any position.

The invention is also adaptable to radio reception where two or more speakers are used for the purpose of obtaining the full frequency band received, the invention combining the sound waves to produce the effect of a single loud speaker. In public address systems it is also useful for obtaining an equal distribution of sound in all directions.

The means for accomplishing the above objects is by the use of a sound damping medium intermediate sound reproducing units and a sound vibrator, and the arrangement of the sound reproducers with respect to the type of radio used.

The invention will be more fully understood by reference to the following description read in conjunction with the accompanying drawing in which:

Fig. 1 is a cross sectional view of a wall panel or portable unit in accordance with the invention;

Fig. 2 is an elevational view of the panel of Fig. 1;

Fig. 3 is a cross sectional view of a modification of Figs. 1 and 2;

Fig. 4 is a detailed view of a reproducing unit of the foregoing figures;

Fig. 5 is a cross sectional view of the radio receiver employing high and low frequency speakers embodying the invention; and

Figs. 6 and 7 are modifications of sound reproducing units for use in different types of sound distribution systems.

Referring now to Fig. 1, a section of either a room wall or of a portable unit comprises a back or support 5 and a thin frontal or face panel 6, the panel 6 being connected flexibly to the end walls 7 and 8 by flexible material at 9 and 10, such as leather or a cloth composition. This construction permits the face panel 6 to vibrate in its entirety, thus serving as a large diaphragm. With such a vibrating medium, less input energy is required to generate low frequency waves than with diaphragms of the usual reproducers. Positioned between the walls 5 and 6 are sound reproducing units 13, 14 and 15 with activating diaphragms 17, 18 and 19, respectively, surrounding which, and entirely filling the space within the walls 5, 6, 7 and 8 is wire wool 20 or similar packing more or less compressed. The wire wool may be packed lightly within the cone diaphragm, as shown in Fig. 4 in detail, or the wire wool may be forced into a conical shape and placed within the cone, if the diaphragm is a cone. It is to be understood that flat diaphragms are also feasible for use in transferring the wave motion to the wire wool and that other materials having similar characteristics to wire wool may be used in place thereof. Furthermore, the transfer medium may be packed in various shapes and arranged within the space in a compact manner. The units 13, 14 and 15 are connected with the output of radio receiver 22, which has an antenna 23 for picking up signals, but it is to be realized that these units may be connected to any source of electrical signals to be reproduced thereby.

In the operation of a sound distributor of this type the units are actuated simultaneously and produce in the wire wool 20 sound vibrations which pass therethrough to the diaphragm 6, the latter vibrating to produce the sound waves. In an individual unit so constructed without the flexible mounting it was found that the entire unit vibrated and a very pleasing reproduction was obtained which appeared to be caused by the elimination of certain harsh vibrations and certain undesirable noises. The wall of a room

could be constructed in this manner to obtain ubiquity of sound.

Referring now to Fig. 2, this figure shows six speakers, three of which may be units 17, 18 and 19 of Fig. 1, together with three others to show the spacing thereof behind the panel 6. This panel 6 may be silvered to function as a light reflecting medium for projected pictures while acting as a diaphragm thus making it appear to an observer that the sound emanated from the source pictured on the screen. When such a section is used especially for a room wall, there is no opportunity for the low frequency waves to neutralize each other as they do with smaller loud speakers in small baffles.

In Fig. 3 a double section of Fig. 1 is shown with two frontal diaphragms 28 and 29 and a center support 30. Loud speaker assemblies 31 and 32 are disposed to activate the wire wool 35 on one side of the base 30, while units 33 and 34 operate in the opposite direction. This section could form the walls of two adjoining rooms, the sound being thus produced in both rooms simultaneously. It is also obvious that each of the sections may be individually controlled for reception in either room.

The radio receiver of Fig. 5 shows the usual receiver, power pack and amplifier units disposed in a manner well known in the art and connected to a low frequency reproducing unit 37 and a high frequency reproducing unit 38, both of which project sound into wire wool 39. The front portion of the radio receiver includes a thin panel diaphragm 40 which may be flexibly mounted as shown in Figs. 1, 2 and 3, or more fixedly attached to the receiver cabinet. In either construction, the sound waves produced by units 37 and 38 are intermingled and diffused in the wool and are projected and/or actually conducted to the panel 40. It will be understood that certain of the waves will pass through the wool and although it is not understood exactly how the sound waves actually activate the diaphragm, the results that are obtained are exceedingly pleasing in comparison with the speakers without the intermediate medium therebetween.

Referring now to Fig. 6, a sound distributor, particularly desirable for large audiences and adapted to be suspended from the ceiling of an auditorium or from an outdoor tower, is disclosed in a spherical shape comprising five actuating units, four of which are shown as 44, 45, 46 and 47. The fifth unit is behind unit 47. In this construction a suspension rod 49 extends into the sphere and supports the units. The radiating diaphragms comprise five sections flexibly connected together along their edges as shown at 51 and 52, similarly to the constructions 9 and 10 in Figs. 1, 2 and 3. That is, these mountings may be of a composition of leather or the like so as to permit the radiating sections 53, 54, 55 and 56 to vibrate more readily as a single unit, and to prevent phase opposition from neutralizing certain frequencies produced. Section 56 has been cut away to show the wire wool 60 therein which may be positioned between an inner partition and the outer diaphragm or completely surrounding the units thus filling the sphere.

In Fig. 7 a portable column reproducer is shown. This unit is especially adapted for churches, etc. in which loud sounds are out of place. That is, these units may be positioned among the listeners at convenient points producing sound which can be heard only in the immediate vicinity thereof, thus eliminating the

loudness required of a single unit to reach the listeners at extreme points. Fig. 7 shows a cylindrical vibratory shell 63 which may be filled with wire wool or like material 64. Positioned within the shell is a supporting brace 65 upon which are mounted loud speaker units 66, 67, 68 and 69 with cylindrical shaped diaphragms 71, 72, 73 and 74, respectively. It is to be understood, of course, that additional units may be fastened to support 65 if so desired. As stated above, this unit is portable and could be moved about according to the size of the audience. Its exterior may be decorated to blend with its surroundings.

It is to be understood that other modifications of any of these units are contemplated and are within the scope of the appended claims.

What is claimed is:

1. In a sound distribution system, means for translating electrical currents into mechanical motion, means for generating sound waves, and a discontinuous medium intermediate said translating means and said generating means for transmitting said mechanical motion to said sound producing means.

2. In a sound distribution system, means for translating electrical currents into corresponding mechanical motion, a discontinuous medium adapted to transmit and diffuse said mechanical motion, and means for utilizing said mechanical motion for generating sound waves.

3. In a sound distribution system, an electrical current to mechanical motion translator, a medium adapted to vibrate in accordance with said mechanical motion, and wire wool intermediate said translator and said vibrator.

4. A sound distributor, a support, means mounted on said support for translating electrical energy into mechanical vibrations, means anterior of said support flexibly mounted, and a discontinuous intermediate medium for transmitting said mechanical motion to said anterior vibrator, said medium diffusing sound in equal energy ratios within an angle of 180 degrees.

5. In a sound distributor, a support, a plurality of current to mechanical translators mounted on said support, a sound generator positioned anteriorly of said translators, and wire wool interposed between said translator and said vibrator.

6. In a sound reproduction system, means for translating low frequency currents into low frequency sound waves, means for translating high frequency currents into high frequency sound waves, a vibrator adapted to vibrate at all of said frequencies, and means between and common to all of said translators and said vibrator for intermingling and diffusing waves from both of said translators.

7. In a sound receiving system, means for producing low frequency mechanical waves and sound waves, means for producing high frequency mechanical waves and sound waves, means adapted to vibrate at all of said frequencies, and a discontinuous medium interposed between said sound translators and said vibrating means.

8. In a sound propagator, the combination of a support, a plurality of current to mechanical motion translators positioned on said support, a plurality of vibrators positioned anteriorly of each of said translators, said vibrators forming portions of a sphere, and a transmission medium intermediate said translators and said vibrators for diffusing the energy therefrom.

9. In a sound propagator, a support, means mounted on said support for translating electrical

cal currents into mechanical wave motion, a plurality of vibrating diaphragms forming portions of a sphere, means for flexibly connecting said diaphragms, and an intermediate discontinuous medium for translating the energy from said translators to said diaphragm.

10. In a sound disseminator, a vibratory medium, a medium composed of discontinuous thread-like elements, said elements adapted to transmit mechanical vibrations, and means for actuating said elements with said vibrations.

11. The method of propagating vibrations originating at substantially a point source comprising diffusing said vibrations in a heterogeneously arranged mass of discontinuous vibratory elements.

12. The method of propagating vibrations in different directions from substantially a point source comprising diffusing said vibrations through a discontinuous medium and recombining said mechanical vibrations acoustically.

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