Oct. 2, 1934. O. B. HANSON 1,975,604

ADJUSTABLE ACOUSTICAL ELEMENT

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Fig. 1

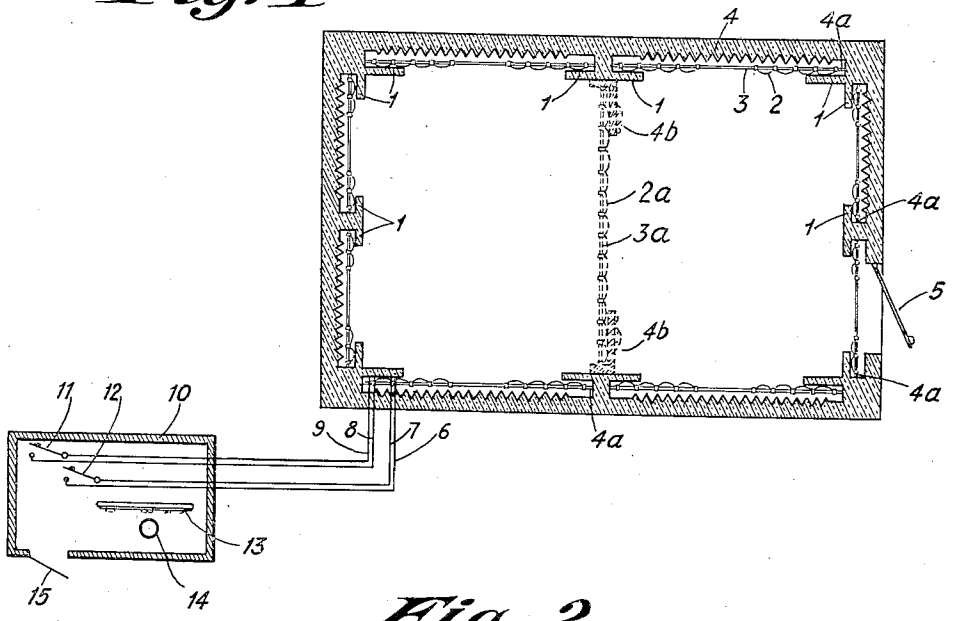


Fig. 2

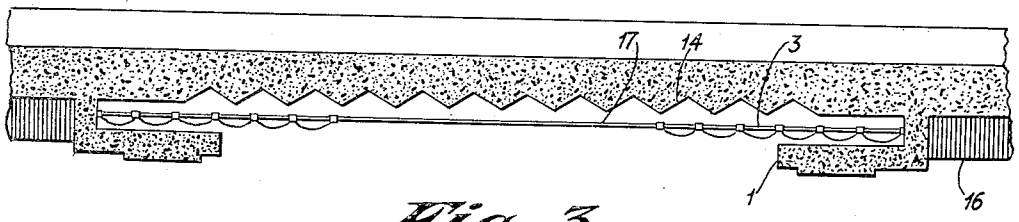
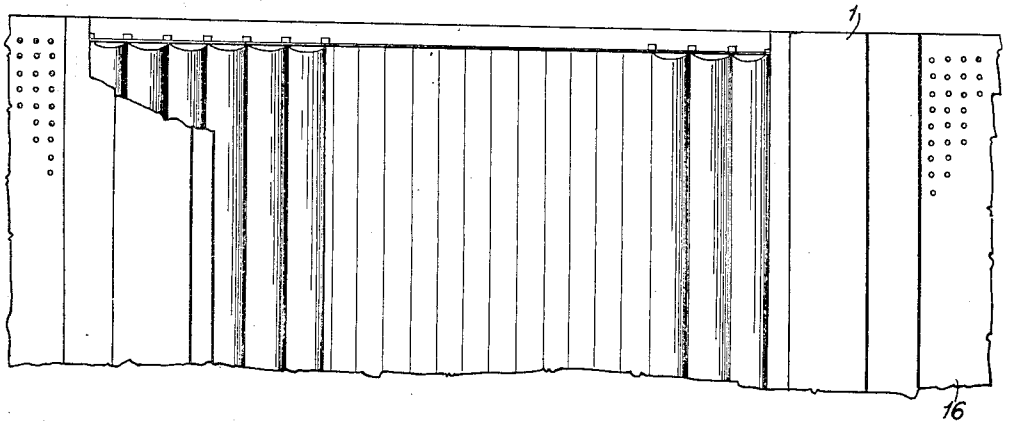


Fig. 3



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Fig. 4

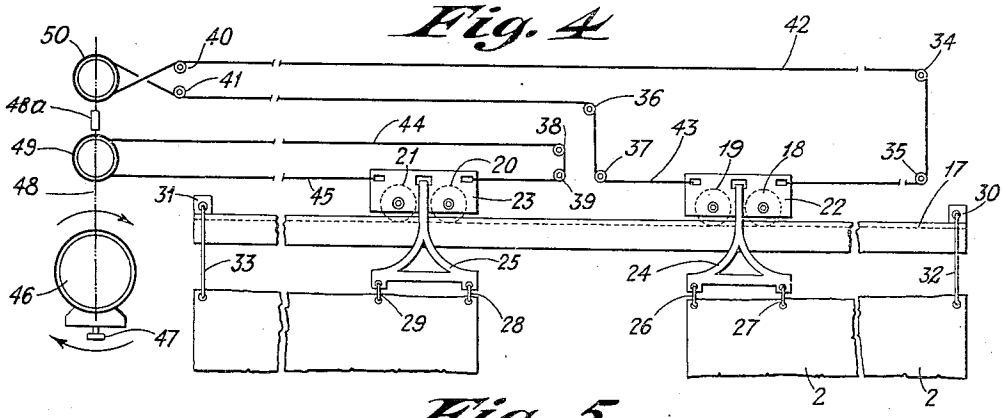


Fig. 5

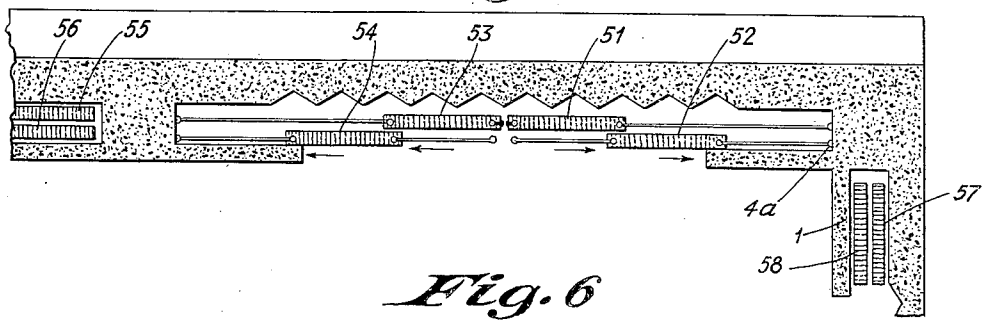


Fig. 6

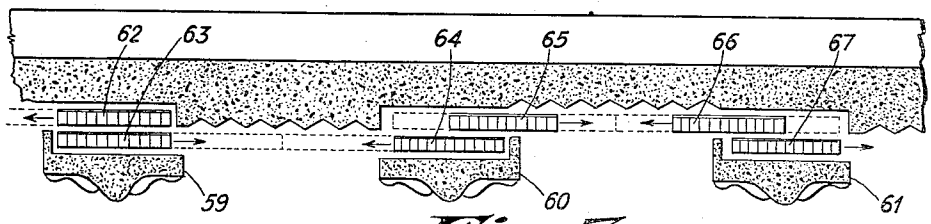
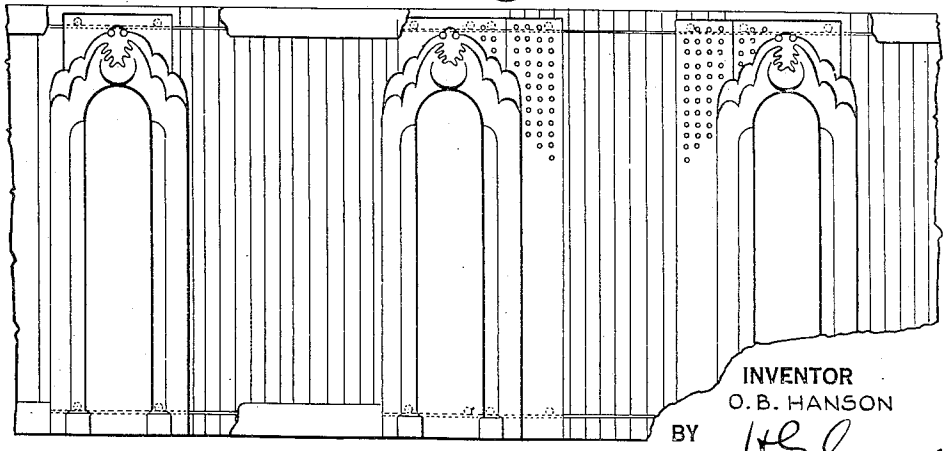


Fig. 7



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UNITED STATES PATENT OFFICE

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ADJUSTABLE ACOUSTICAL ELEMENT

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Application March 14, 1932, Serial No. 598,716

14 Claims. (Cl. 181—30)

This invention relates to improved adjustable acoustic elements, and particularly those relating to sound chambers, radio broadcasting studios, theaters, concert halls and the like.

An object of this invention is to effectively vary and adjust in a simple and convenient manner acoustical elements.

Another object of this invention is to adjust and control a plurality of separate acoustical elements from an adjoining chamber or a remote location containing other studio controls or only an individual control for the adjustable acoustic elements.

Another object of this invention is to provide a new and novel adjustment of acoustical elements which harmonizes and cooperates with an architectural arrangement of wall surfaces within the sound chamber or studio to give satisfactory results in making rapid variations of the acoustic properties of the sound chamber or room. Likewise, the acoustical elements may be arranged to form a partition to divide a large studio into smaller studios.

Another object of this invention is to provide a proper control method whereby the various adjustments of the studio acoustics can be made from a common control point or an operating room containing other studio controls either remotely located or adjoining the studio.

In modern radio broadcasts originating in the studio, theater, and concert halls, due to varied conditions under which the programs must be rendered, it is desirable to change the time period or rate of decay of the sounds emitted when desired, from some common point such as an adjoining control room or one remotely located. Furthermore, at times it is necessary to increase the reverberation time, or decrease the rate of decay, and then again rapidly deaden the room or diminish the reverberation time.

To accomplish the purpose of my invention I provide within the studio a series of recesses or cavities, the number, size, arrangement and location depending somewhat on the architectural treatment of the room. The smooth wall spaces between the cavities are broken up with vertical ridges or V flutings to prevent reflections of sounds from the opposite wall surface by breaking up the wavefront. By such an arrangement I can effectively control or vary approximately 75% of the exposed studio wall area. In the recesses mentioned above, I store the acoustical elements which are arranged to be moved out, or in their effective position when desired, by a remote control means which will be clearly illustrated and understood from the accompanying drawings. In the drawings like references refer to similar parts throughout the several views, in which,

Fig. 1 is a plan view of a typical sound chamber or studio and a detached remote control room;

Fig. 2 is a detailed section of the sound chamber or studio wall;

Fig. 3 is an enlarged elevation of Fig. 2;

Fig. 4 is a detailed view of a form of remote control means;

Fig. 5 is a modification of that of Fig. 2;

Fig. 6 is another modification of that of Fig. 2, and

Fig. 7 is an elevation of the modification shown in Fig. 6.

Referring now to Fig. 1, the recesses in the studio are indicated by 1. These recesses are identical in size, but the arrangement and number depend on the size and architectural arrangement of the studio. The variable acoustic elements are shown as 2, which in this modification, while they are not of the ordinary curtain material, are in the general shape and nature of a curtain but are composed of mineral wool, acousti-celotex, acoustone, hairfelt, or any other good sound absorbing material. These adjustable acoustical curtains are arranged to be movable on a track 3. Within the spaces between the recesses 1 the wall surface is broken by means of a series of vertical ridges or flutes 4 of hard plaster, which are proportioned and arranged according to the size and architectural treatment of the room. An entrance to the studio or sound chamber is indicated at 5. When desired, the studio may be divided to make smaller ones as indicated by the dotted lines. 4*b* is a removable pilaster, 3*a* is a removable track, and 2*a* are the acoustic elements, all of which form a suitable partition. Remote control leads 6, 7, 8 and 9 connect the studio with the remote control room 10 which comprises remote control switches 11, 12, and operating switchboard 13, together with operator's seat 14. 15 indicates the entrance to the remote control room.

Referring to Figs. 2 and 3, the general arrangement of the wall treatment 4 intermediate recesses 1 are shown more in detail. It is to be noted that adjacent these recesses the wall is provided with an absorbing acoustical treatment 16 such as acousti-celotex, or other good sound absorbing material.

Fig. 4 shows in more detail a track 17 fastened in any convenient manner to the wall surfaces

4a, and is provided with a plurality of rollers 18, 19, 20 and 21. The rollers are fastened to suitable carriages 22 and 23 which carry supporting brackets 24 and 25. The variable acoustic elements are fastened to the support by hooks 26, 27, 28 and 29, or any other suitable fastening means. The end variable acoustic elements are fastened to the ends of the track by supports 30 and 31, to which they are fastened by straps 32 and 33. A suitable number of pulleys such as 34, 35, 36, 37, 38, 39, 40 and 41 are conveniently arranged throughout the studio to assist in the smooth running and operation of control cables 42, 43, 44 and 45. A prime mover or motor suitably located is indicated at 46, and is provided with control means 47 which determines the speed and direction of rotation. Such control is not as shown, but is generally located on the operator's switchboard or panel 13. Coupled mechanically to the prime mover, 46, by a shaft, 48, are suitable drums 49 and 50, for the control cables. A clutch 48a is provided to move one or both of the drums at the same time.

Fig. 5 shows another modification of this invention wherein the variable acoustical elements 51, 52, 53, 54, 55, 56, 57 and 58 are in the form of rigid movable panels which may be of celotex, acoustone, hairfelt, or any other good sound absorbent material, and while controlled in the same general manner as that described in Fig. 4 above, are arranged to move on the track and are operated like sliding doors to provide the proper rate of decay of sound within the room. In this modification there are indicated panels 55, 56, 57 completely nested within the recess 1, whereas the other variable acoustic elements 51, 52, 53 and 54 are shown fully out of the recesses, thus providing a change in sound absorption. The sliding panels may take the form of a hard reflecting surface such as solid wood or veneered wooden panels, or they might be made of transite board (a hard asbestos product); likewise sheet steel with a suitable backing may be employed. In such a modification the stationary recessed wall would be covered with suitable acoustical absorbing material.

Figs. 6 and 7 show a further modification wherein the recesses are in the form of architectural pilasters 59, 60 and 61 which can be fastened either temporary or permanently to the studio floor and ceiling, thus providing for the arrangement of a removable partition as indicated by 3a, Fig. 1. The variable acoustical elements 62, 63, 64, 65, 66 and 67 are here shown built up of a number of separate parts for further providing a different degree of sound absorption.

While this invention discloses a general form and arrangement of variable acoustical elements remotely controlled, it is to be distinctly understood that it is not limited thereto, but that it may be used in other embodiments and modifications within the spirit and scope thereof.

What I claim is:

1. A variable acoustic chamber wherein sounds are produced or reproduced, comprising a plurality of variable acoustic elements and shallow recesses located in said chamber and adapted for said elements, with mechanical means for moving said elements in or out of said shallow recesses, to change the rate of sound decay or time period within the said acoustic chamber.

2. A variable acoustic chamber wherein sounds are produced or reproduced, comprising a plurality of variable acoustic elements and shallow recesses located in said chamber and adapted for said elements, with electromechanical means for moving said elements in or out of said shallow recesses, to change the rate of sound decay or time period within the said acoustic chamber.

3. An acoustic chamber comprising a plurality of shallow recesses arranged about the walls of said chamber, said walls intermediate said shallow recesses being fluted to break up reflecting sound waves coming from the diametrically opposite wall space, a plurality of variable absorbing acoustic elements, and means for moving said elements out of the shallow recesses to effectively absorb a portion of the sound which would othwise impinge on said wall space.

4. An acoustic chamber comprising a plurality of shallow recesses arranged about the walls of said chamber, said walls intermediate said shallow recesses being fluted to break up reflecting sound waves coming from the similar diametrically opposite wall space, a plurality of adjustable acoustic elements and remote control means for moving said elements in and out of the shallow recesses to absorb a portion of the sound which would otherwise impinge on said wall space.

5. Adjustable acoustical elements comprising a plurality of acoustic absorbing and reflecting elements arranged on a track, and means for changing the exposed area of said absorbing and reflecting elements from a remote control room.

6. A variable acoustic chamber comprising a track and a plurality of architectural pilasters arranged within said chamber, said pilasters being removable within said chamber, and arranged to shield a plurality of acoustic absorbing and reflecting elements arranged on said track, and means for changing the exposed area of said absorbing and reflecting elements from a common control point.

7. In a variable acoustic chamber comprising a track and a plurality of removable architectural pilasters arranged within said chamber to form supports for a plurality of acoustic absorbing and reflecting elements forming a partition arranged on said track and supported on said pilasters to form a smaller chamber, to obtain the effective acoustic properties of a small chamber, and means for changing the exposed area of said absorbing and reflecting elements from a remote control room.

8. A variable acoustic chamber comprising a track and a plurality of architectural pilasters arranged within said chamber, said pilasters being fixed within said chamber, and arranged to shield a plurality of acoustic absorbing and reflecting elements arranged on said track, and means for changing the exposed area of said absorbing and reflecting elements from a common control point.

9. In a variable acoustic chamber comprising a track and a plurality of removable architectural pilasters arranged within said chamber to form supports for a plurality of variable acoustic absorbing elements forming a partition arranged on said track and supported on said pilasters to form a smaller chamber to obtain the effective acoustic properties of a small chamber, and means for changing the exposed area of said absorbing elements from a remote control room.

10. A variable acoustic chamber wherein sounds are produced or reproduced comprising a plurality of variable acoustic elements and shallow recesses located in the walls of said chamber and adapted for said elements with electrical switching means for moving said elements in or

out of said shallow recesses to change the rate of sound decay or time period within the said acoustic chamber.

11. A variable acoustic chamber wherein sounds are produced or reproduced, comprising a plurality of variable acoustic elements and shallow recesses located in the walls of said chamber and adapted to said elements, with mechanical drums, tracks, rollers and clutches for moving said elements in and out of said shallow recesses to change the rate of sound decay or time period within said acoustic chamber.

12. A variable acoustic chamber wherein sounds are produced or reproduced, comprising a plurality of variable acoustic elements and shallow recesses located in the walls of said chamber and adapted for said elements with an electrical control panel for controlling and operating a plurality of switches for moving said elements in and out of said shallow recesses to change the rate of sound decay or time period within said acoustic chamber.

13. A variable acoustic chamber wherein sounds are produced or reproduced, comprising a plurality of variable acoustic elements in the form of sliding doors and shallow recesses arranged within said chamber and adapted to said elements, with electro-mechanical means comprising a plurality of control cables operated from an electrical switchboard remotely located.

14. A variable acoustic chamber wherein sounds are produced or reproduced comprising a plurality of variable acoustic draperies and shallow recesses located in the walls of said chamber and adapted for said draperies with electro-mechanical means for moving said draperies in and out of said shallow recesses to change the rate of sound decay or time period within the said acoustic chamber.

OSCAR B. HANSON.