Dec. 10, 1929. R. W. JAMES 1,738,654

ACOUSTIC CONTROL WALL

Filed Oct. 10, 1925

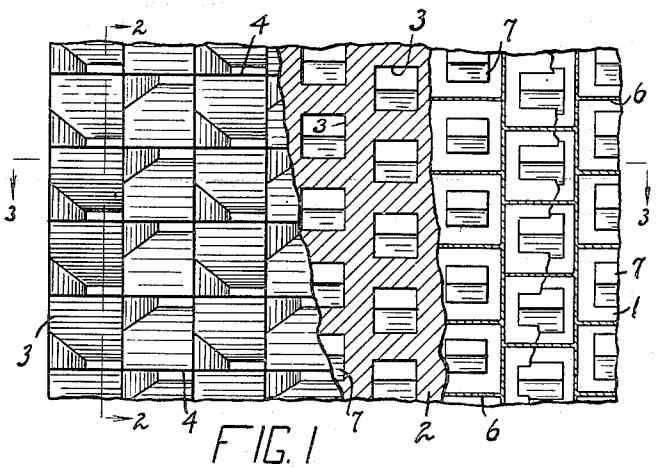


FIG. 1

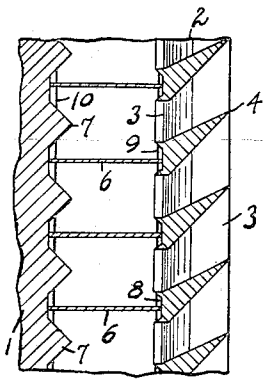


FIG. 2

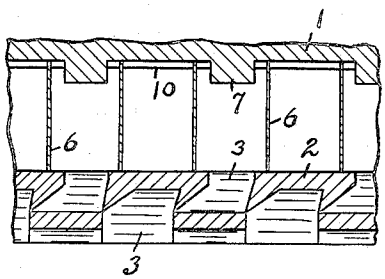


FIG. 3

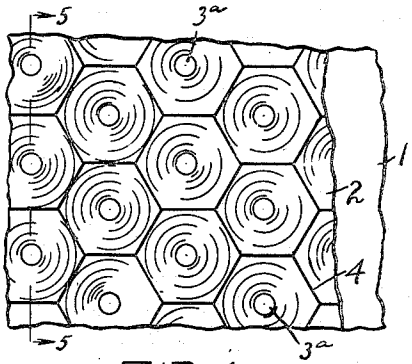
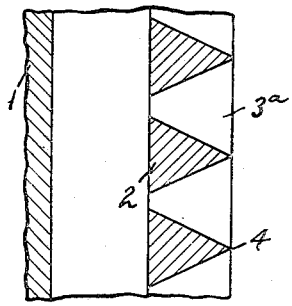


FIG. 4

FIG. 5



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UNITED STATES PATENT OFFICE

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ACOUSTIC CONTROL WALL

Application filed October 10, 1925. Serial No. 61,764.

This invention is a wall construction adapted to control acoustics; and it is the object of the invention to provide a hollow wall construction arranged for unobstructed passage of sound waves to the interior thereof without rebound from the outer face of the wall, and adapted to trap and prevent escape of the sound waves from the hollow interior of the wall.

The invention will be readily understood from the following description of the accompanying drawings, in which:

Fig. 1 is a front elevation of the wall, partly broken away.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

Fig. 4 is a view similar to Fig. 1 but showing a modified form of the invention.

Fig. 5 is a vertical section on the line 5—5 of Fig. 4.

The improved acoustic control wall may be used in the construction of any room, auditorium, or other chamber where it is desired to eliminate echoes and prevent rebound of sound; and the construction is adaptable to either side walls or ceilings, as herein referred to by the general term of "wall".

The construction includes a usual solid wall 1, and an auxiliary wall 2 spaced slightly in front thereof so as to form a hollow interior. Openings 3 extend through the wall 2 and convergently taper toward the hollow space between walls 1 and 2, thereby forming funnel openings having their mouths at the outer surface of wall 2 and their restricted inner ends opening into the hollow interior of the construction. The mouths of next adjacent funnels meet at relatively sharp angles 4 so that the outer face of wall 2 forms no surface perpendicular to the plane of the wall.

It will thus be seen that all sound waves directed against the outer surface of wall 2, will strike the inclined surfaces of the funnels, which will condense the sound and direct the same through the inner ends of the funnels, without rebound of the sound waves from the outer face of the wall.

The sound waves passing through the funnels are discharged across the hollow interior of the construction for rebound from the wall 1, but the inner ends of the funnels being materially restricted, practically none of the rebounding sound will escape through the funnels, but will strike the relatively large area of the inner face of wall 2 between the restricted funnel openings, thereby causing continued rebound of the sound waves in the hollow space between walls 1 and 2.

In the form of the invention illustrated in Figs. 1 to 3, the funnels 3 are square in cross-section, with their larger ends or mouths fitting snugly against one another on all sides and thus positioning the funnels in parallel rows as shown in Fig. 1. The axes of the funnels are inclined relative to the plane of the wall both longitudinally and transversely of the rows, with the axes of the funnels of the next adjacent rows preferably inclined in opposite directions longitudinally of the rows; and opposite sides of the funnels converge at different angles to the axes of the funnels as shown in Figs. 2 and 3. By this arrangement the angle of rebound of sound waves striking a side of a funnel, will be such that further rebound from the opposite wall of the funnel will direct the sound waves inwardly through the funnel and into the hollow interior of the construction, instead of outwardly through the mouth of the funnel and beyond the wall construction.

Means may be provided for causing the sound waves passing through the funnels to the hollow interior of the wall construction, to rebound only in the various restricted portions of the hollow interior which surround the respective funnel openings. For this purpose partitions 6 extend between walls 1 and 2 and divide the hollow interior into a plurality of relatively small compartments communicating with the respective funnels.

If the restriction of the inner ends of funnels 3, does not prevent escape of the rebounding sound waves to the desired degree, additional means may be provided in the hollow interior of the wall for deflecting the sound from the funnel openings. As an instance

of this arrangement, wedges 7 may project from the inner surface of wall 1 with the bases of the wedges of approximately the same size and in alinement with the restricted funnel openings. The sound waves entering the hollow interior of the construction through the funnels will thus strike the inclined sides of the wedges instead of the flat surface of wall 1, and will therefore rebound at such angles as to cause all of the sound waves to strike the inner surface of wall 2 between the funnel openings instead of escaping through the funnels.

In order to retard and quickly eliminate rebounding of the sound waves which are trapped between walls 1 and 2, concavities 8 may be formed in the inner face of wall 2 between the restricted openings of the funnels. By this arrangement the sound waves strike the sides of the concavities which are angularly disposed, thereby reducing rebound and providing additional means for preventing escape of the sound through the funnels.

Layers of relatively soft and flexible sound-deadening material such as felt or velvet, may be provided on the inner faces of walls 1 and 2 for further reducing rebound of the sound waves. This material preferably extends across the concavities 8 in spaced relation from the bottoms thereof as shown at 9; and the material is also positioned in spaced relation from the inner face of wall 1 as shown at 10, with the wedges 7 projecting through said material. The material 9 and 10 thus provides means for reducing rebound of sound waves and trapping the sound in the hollow spaces formed in back of the material by the spacing thereof from the bottoms of concavities 8 and the wall 1.

A simplified modification of the invention is shown in Figs. 4 and 5. In this construction the axes of the funnels 3^a are perpendicular to the plane of the wall and the funnels taper symmetrically on all sides. The mouths of the funnels are preferably hexagonal and nest snugly in a usual honeycomb construction as shown in Fig. 4; and the inner ends of the funnels are so restricted as to present a relatively small area compared to the area of the inner face of wall 2 between the funnel openings, in order to prevent escape of practically all the sound waves which rebound from wall 1.

I claim:

1. A hollow wall having openings extending through one side thereof and convergently tapering toward the hollow interior of the wall, with all sides of the larger ends of next adjacent openings meeting at angular edges at the outer surface of said side of the wall, and the restricted inner ends of said openings spaced apart an appreciable distance at the inner surface of said side of the wall.

2. A hollow wall having openings extending through one side thereof and convergently tapering toward the hollow interior of the wall, and members within said hollow interior of the wall in alinement with and convergently tapering toward said openings.

3. A hollow wall having openings extending through one side thereof and convergently tapering toward the hollow interior of the wall, the inner surface of said side of the wall having concavities therein between said openings.

4. A hollow wall having openings extending through one side thereof and convergently tapering toward the hollow interior of the wall with opposite sides of said tapering openings having different angular relation to the axes of said openings.

In testimony whereof I have affixed my signature to this specification.

ROY WALTER JAMES.