

July 14, 1964

D. CHAPMAN

3,140,564

SOUND INSULATING APPARATUS HAVING MOVABLE PARTITION

Filed Feb. 20, 1961

2 Sheets-Sheet 1

FIG. 1

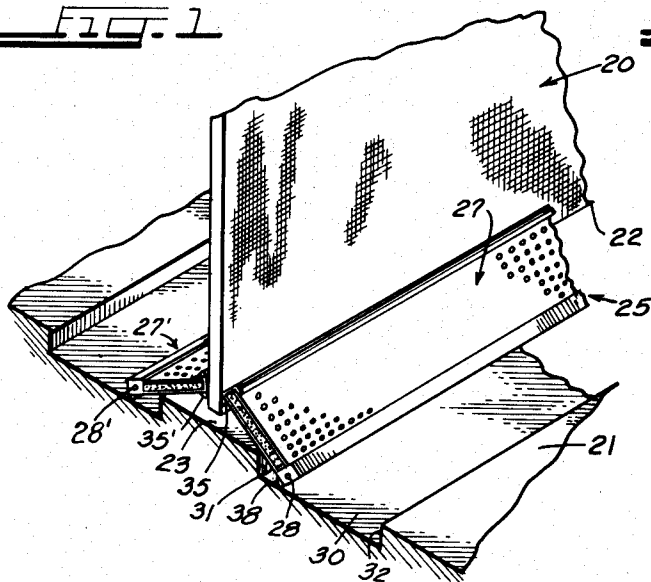


FIG. 3

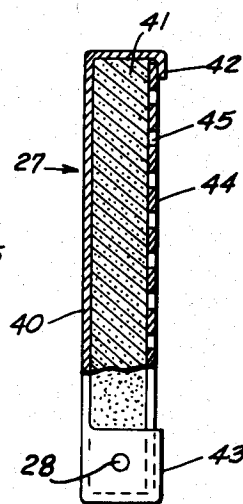


FIG. 2

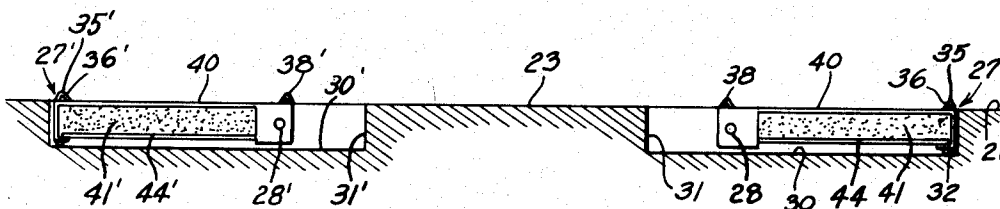
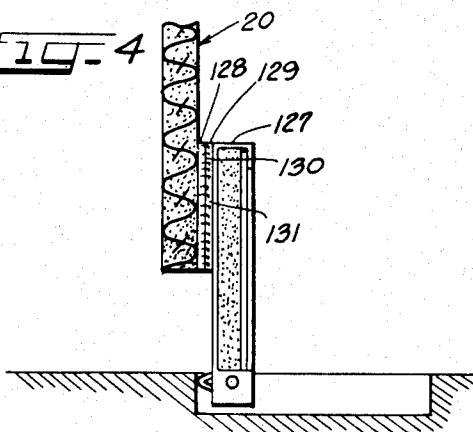


FIG. 4



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FIG. 5

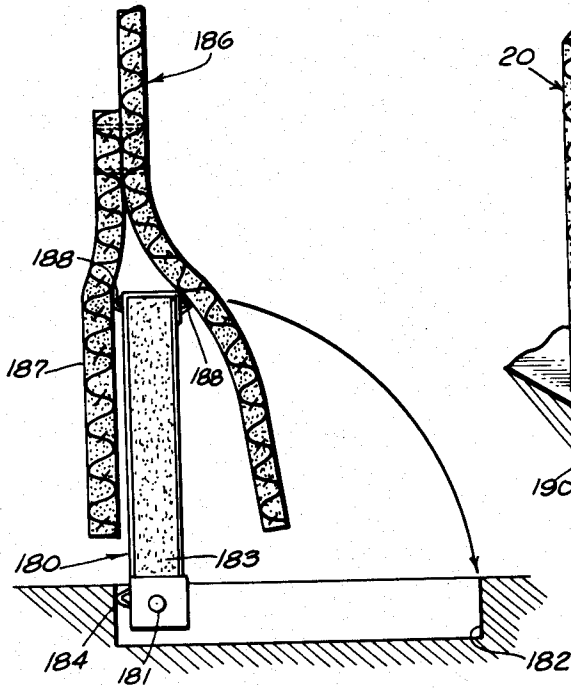


FIG. 6

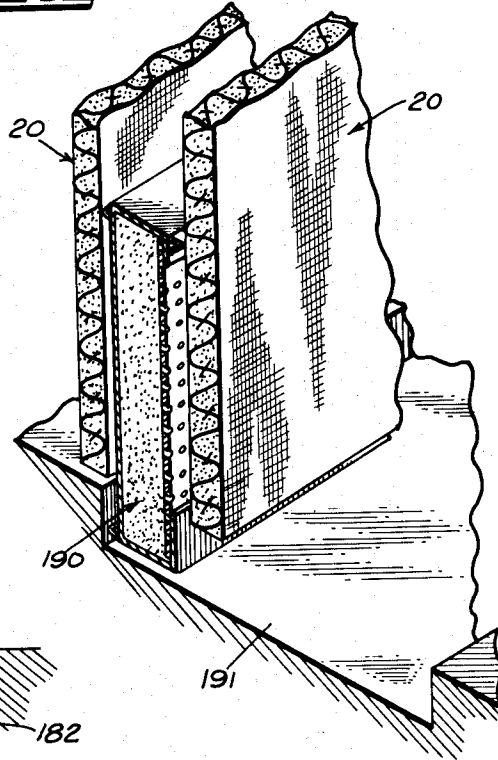
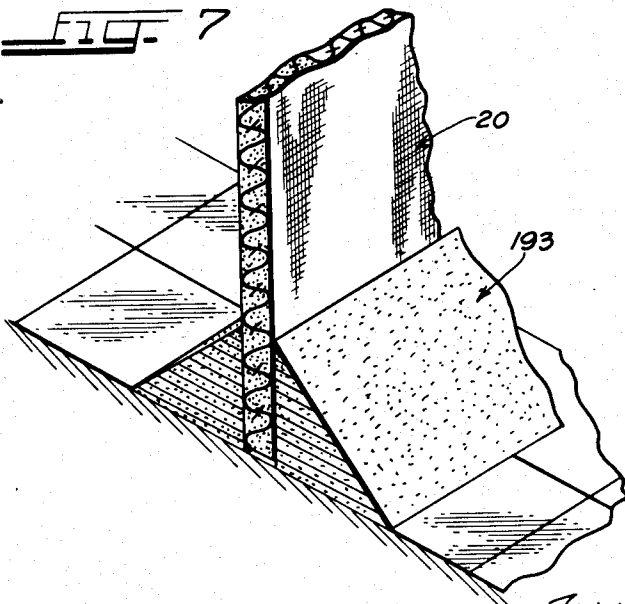


FIG. 7



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## 3,140,564 SOUND INSULATING APPARATUS HAVING MOVABLE PARTITION

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13 Claims. (Cl. 50-101)

The present invention generally relates to apparatus for preventing sound waves in one area or enclosure from passing into an adjacent area or enclosure, and it more particularly relates to such apparatus as is suited for preventing or at least substantially attenuating sound waves passing around a relatively free edge of a sound insulating curtain or panel.

In order to efficiently use the available space in various types of building structures including public buildings, such, for example, as schools, churches, and other institutions, it would be desirable to provide movable sound and light insulating partitions or the like for temporarily dividing large rooms into a number of smaller rooms. For example, such partitions may be used in a school to temporarily divide one large lecture room, study hall or cafeteria into a number of smaller classrooms. By a proper selection of the partitions the individual classrooms can be completely separated from the adjoining rooms for both sound and light. In a similar manner large dining rooms in restaurants and hotels can be temporarily separated into smaller private dining rooms by the use of movable partitions. Of course, the physical characteristics of such partitions should be such that the activities in one room do not interfere with the use of the adjoining room, and therefore, the partitions should be substantially opaque to both sound and light. Preferably, the partitions should also be readily movable between closed and open positions.

The present invention is adapted for use with a movable sound and light insulating partition having the general nature and appearance of a curtain, but which, unlike the ordinary curtain, is sufficiently opaque to sound waves, i.e., it has a sufficiently high sound transmission loss to prevent sound waves having amplitudes normally encountered in present-day living from passing from one area into an adjacent area on the other side of the curtain at a sufficiently high amplitude to be bothersome. An average transmission loss of 35 db between 100 and 5,000 cycles per second has been found to be sufficient for separating classrooms in a school. Moreover, a sound insulating curtain having a sound transmission loss of 35 db ordinarily is as good a sound insulator as the architecture of the building with which it is associated and, therefore, an increase in the insulating efficiency of the curtain is unwarranted, since the sound waves passing through the surrounding structures will prevent any further appreciable reduction in the level of sound transmitted between adjacent rooms. Similarly, means must be employed to prevent sound waves from passing around the edges of the curtain or for all practical purposes the installation will be ineffective as a sound insulator.

Therefore, a principal object of the present invention is to provide new and improved means for preventing sound waves from passing around an edge of a sound insulating curtain or partition.

Another object of the present invention is to provide new and improved means for preventing sound from passing between a movable sound insulating curtain or partition and a floor located in proximity to the bottom edge of the curtain.

Another object of the present invention is to provide new and improved means for preventing sound waves

from passing around the bottom edge of a movable sound insulating curtain or a partition while such curtain or partition is in use, which does not provide an unsightly appearance and does not interfere with the use of the floor when the curtain or partition is not in use.

Briefly, the above and further objects are realized in accordance with the present invention by providing sound insulating means mounted in the floor adjacent to the bottom of an associated sound insulating curtain or partition and, which is movable from an inoperative position of non-use in the floor when the curtain or partition is not in use to an operative position wherein sound waves are substantially intercepted and absorbed or reflected prior to their passing around the bottom edge of the curtain or partition from one side to the other.

Further objects and advantages and a better understanding of the present invention may be had by reference to the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a fragmentary perspective view of one embodiment of the present invention;

FIG. 2 is an enlarged partially sectioned end view of a sound absorbing plate used in the embodiment of the invention shown in FIG. 1;

FIG. 3 is a greatly enlarged end view, partly in section, showing a pivoted sound blocking member, embodying the present invention, for preventing sound from passing around the bottom edge of a sound insulating curtain or partition;

FIG. 4 is a greatly enlarged sectional view showing one manner in which the blocking member of FIG. 3 may be attached to the curtain;

FIG. 5 is a sectional view of another embodiment of the present invention;

FIG. 6 is a sectional view of another embodiment of the present invention wherein a pair of sound insulating curtains or partitions are employed; and

FIG. 7 is a fragmentary perspective view, partly in section, showing another embodiment of the present invention.

Referring now to the drawings and particularly to FIG. 1 thereof, there is shown a portion of a movable sound insulating panel or partition 20 which may be movable either in a direction parallel to the floor 21 and thus in a horizontal direction or in a vertical direction perpendicular to the floor 21. In either case, the bottom edge 22 of the curtain or partition 20 is located a short distance above the adjoining portion 23 of the floor as, for example, the order of one inch. Accordingly, the curtain 20 is completely separated from the floor 21 thereby permitting free movement of the curtain 20 relative to the floor, no track or the like being required.

FIG. 1 illustrates an installation with the curtain 20 in place and where a sound insulating or blocking mechanism 25 operates to prevent sound from passing between the bottom edge 22 and the portion of the floor 23 adjacent thereto. FIG. 2, on the other hand, shows an installation of the structure of FIG. 1 with the curtain 20 withdrawn.

In order to prevent sound from passing around the bottom edge of the curtain 20, there is provided in accordance with the present invention a sound insulating and absorbing unit 27 comprising a sound barrier which is pivotally mounted at 28 along a longitudinal axis disposed a short distance beneath the upper surface of a floor 21. The floor 21 is provided with a generally rectangular recess forming structure or framing structure having a bottom 30 and vertical sides 31 and 32. As shown in FIG. 1, the sound barrier unit 27 is provided with a resilient sealing gasket 35 which is fastened thereto along the upper longitudinal edge thereof for engage-

ment with the curtain or partition 20 when the unit 27 is tilted into the position shown in FIG. 1. The pivotal axis of the unit 27 is sufficiently displaced from the plane of the curtain or partition 20 so that when the unit is in the position shown in FIG. 1 gravity exerts a sufficient downward force or counterclockwise torque thereon to insure a substantially air tight joint between the seal 35 and the curtain or partition 20. Accordingly, it has been found that a gasket 35 formed of rubber and having a longitudinal aperture 36 extending therethrough as best shown in FIG. 2 provides the necessary resiliency to assure a good fit between the unit 27 and the curtain 20.

In order to prevent sound from passing around the bottom edge of the unit 27, a resilient gasket 38 extending the full length of the unit 27 is attached thereto near the bottom thereof and engages the vertical wall 31 in the floor channel when the unit 27 is in operative position against the curtain 20. It will, of course, be understood that in practical installation some sound waves, although appreciably reduced in amplitude, will pass either between the unit 27 and the curtain 20 or around the bottom of the unit 27 between the unit and the floor and, therefore, it is preferable that the curtain 20 or partition 22 extend in proximity to the floor or at least extend a substantial distance beneath the upper sealing gasket 35. Where a solid type partition 22 is used, as contrasted to a fabric type curtain, it is desirable that the bottom portion of the panel 22 be provided with a sound absorbing material such, for example, as velvet.

In accordance with another feature of the present invention a second unit 27', which is identical in construction to the unit 27 is provided on the other side of the curtain 20. Not only does the second unit 27' provide further means for stopping any sound from passing around the bottom edge of the curtain or partition 22 but further serves to insure a tight, sealed fit between the gasket 25 and the curtain 20 as well as between its gasket 35' and the curtain 20. It may be seen that the force of gravity exerts opposite torques on the units 27 and 27' thereby urging them together and thus into tight engagement with the curtain 20. The parts 28', 30', 31', 41' and 44' are identical to the parts 28, 30, 31, 41 and 44 described above and serve identical purposes.

Referring now to FIG. 3, the sound blocking unit 27 comprises a generally channel-shaped longitudinal member 40 which is filled with any suitable sound absorbing material 41, such, for example, as spun glass, and is provided with in-turned lips 42 and 43 at the respective top and bottom thereof for supporting a cover plate 44 against the adjoining face of the sound insulating material 41. The plate 44 is provided with a plurality of apertures 45 therein occupying at least 15% of the total surface area of the plate 44 thereby to provide substantially maximum transmission of sound to the absorbing material 41. Accordingly, most of the sound waves which impinge upon the unit 27 and which would thus, normally, pass into the area beneath the curtain 20 are absorbed by the unit 27.

When the curtain 20 is removed from a closing position and stored either in an adjoining wall or in a suitable pocket in the ceiling directly above the floor, the units 27 may be pivoted into the associated channels in the floor so that the then upper surfaces of the units 27 and 27' lie substantially flush with the floor 21. The gaskets 36 extend a short distance of, for example, one-quarter of an inch above the floor but they are suitably rounded so that they will not be tripped over by persons walking past the installation. Moreover, the bottom sealing gasket 38 may, if troublesome in a position extending above the floor, be located on the edge of the unit 27 as shown in phantom in FIG. 2 for engagement with the bottom 30 of the floor channel or the gasket 38 may be fastened to the floor channel for sealing engagement with the unit 27 when the unit 27 is in an operative position.

Referring to FIG. 4, there is shown an installation

wherein a single sound absorbing and insulating unit 127 comprising a movable sound barrier is provided. In order to seal the upper portion of the unit 127 to a curtain or partition 20 there is provided interlocking layers 128 and 129, the layer 128 being located on the curtain 20 and the layer 129 being located on the unit 127. The fabric 128 is provided with hooks 130 and the fabric 129 is provided with loops 131. When the members 128 and 129 are pressed together the hooks 130 interlock with the loops 131.

Referring to FIG. 5 there is shown an embodiment of the present invention employing a single sound blocking member or sound barrier 180 pivoted on one or more pintles 181 and which is adapted to be received in a rectangular channel 182 provided in the floor. It will be understood that in this embodiment of the invention, as in the embodiments of the invention shown in FIGS. 1-4, channel 182 need not be cut into the floor itself, but may be provided by eliminating the floor covering at the location of the channel whereby the vertical sides of the channel are constituted by the sides of the floor covering. The member 180 is similar in construction to the members 27 and 27' of FIGS. 1-3 and includes a suitable sound insulating material 183 and a gasket 184 for preventing sound from passing around the bottom of the sound blocking member 180. In order to prevent sound from passing between the blocking member 180 and an associated curtain 186, the curtain is provided with a flap 187 which is fastened thereto near the bottom of the curtain. Accordingly, the inherent characteristic of the two portions of the curtain to hang straight down, causes them to tend to move towards one another whereby with the sound blocking member 180 between the flap 187 and the main body of the curtain 186, a sufficient pressure is exerted on both sides of the blocking member 181 to compress resilient sealing gaskets 188 mounted on the upper edges of the faces thereof to provide a satisfactory seal for preventing sound waves from passing between the blocking member 180 and the curtain 186.

Where the sound insulating curtain 186 has satisfactory sound absorbing qualities, the gaskets 188 may be eliminated for some purposes thereby facilitating the movement of the curtain 186 relative to the sound blocking member 180. Moreover, where the curtain 186 is movable in a vertical direction, it is desirable that the upper end of the blocking member 180 be wedge-shaped, or at least provided with a relatively small radius to fit between the flap 187 and the main body of the curtain 186 as the curtain 186 is lowered thereby automatically to separate the flap and curtain.

Referring to FIG. 6 there is shown an embodiment of the invention for use where a pair of curtains 20 are employed. In this embodiment of the invention, a sound blocking member or sound barrier 190, similar in construction to the blocking members 27 and 27', is pivotally mounted in a suitable channel 181 in the floor for movement from an inconspicuous position substantially flush with the floor to an operative position between the curtains 20.

Referring to FIG. 7 there is shown another solution to the problem of preventing sound from passing beneath a sound insulating curtain or panel 20. This solution comprises the use of a plurality of bolsters 193 comprising sound barriers which are generally triangular in cross-section and formed of a good sound insulating material. A number of such bolsters are required for each side of the curtain and preferably they should be arranged with the intersection between the bolsters on one side of the curtain at a distance from the similar intersections between bolsters on the other side of the curtain.

While the present invention has been described in connection with particular embodiments thereof, it will be understood that those skilled in the art may make many changes and modifications falling within the true spirit

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and scope of the present invention as set forth in the appended claims.

I claim:

1. Apparatus for attenuating the passage of sound waves comprising, fixedly disposed framing structure forming a recess, a movable sound insulating partition, an edge on said partition, said partition being operatively associated with said structure for moving said edge adjacent to said recess, a rigid sound insulating barrier member, and means for supporting said barrier member on said framing structure in said recess, said barrier member being operatively associated with said framing structure and said edge for attenuating the passage of sound waves around said edge.

2. The apparatus of claim 1 wherein the support means for said barrier member pivotably secures said barrier member to said framing structure for pivotal movement about an axis lying parallel to said edge, said axis being displaced from said edge by a distance less than the greatest dimension of said barrier member between said axis and said partition.

3. The apparatus set forth in claim 1, wherein said framing structure includes a substantially flat surface adjacent said recess, said recess being shaped for reception of said barrier substantially flush with said surface when said barrier is in an inoperative position out of engagement with said partition.

4. The apparatus set forth in claim 1 wherein resilient sealing means is provided between said barrier member and said structure for substantially preventing the passage of sound waves between said structure and said barrier.

5. The apparatus set forth in claim 1 wherein said barrier member comprises an elongated channel member, a filler of sound absorbent material located within said channel member and a second elongated member secured to said channel member over said sound absorbing material to provide a sound barrier having a central core of sound absorbent material, and at least one of said members being perforated throughout wherein the total area of the perforations is at least 15 percent of the over-all perforated area.

6. Apparatus of the type described, comprising a fixedly mounted frame structure, a movable sound insulating partition operatively associated with said structure for providing a closing position and a non-closing position, and edge on said partition lying adjacent said structure when said partition is in said closing position, said edge being remote from said structure when said partition is in said non-closing position, said edge being provided with a channel opening towards said frame structure, and sound insulating barrier means comprising a member movably mounted on said frame structure for movement between an operative position within said channel to an inoperative position out of said channel.

7. Apparatus as set forth in claim 6 wherein said partition comprises a relatively flexible curtain and said channel is formed by a flap attached to said curtain along said edge.

8. Apparatus as set forth in claim 6 wherein said partition comprises at least two generally planar sound insulating members in spaced apart relationship to provide said channel.

9. Apparatus for inhibiting the passage of sound waves from one location to another location in proximity therewith, comprising a floor common to both locations, a movable vertically disposed sound insulating partition operatively associated with said floor for providing a first position between said locations and a second position,

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a bottom edge on said partition lying adjacent to said floor when said partition is in said first position, said floor having an elongated recessed channel extending parallel to said bottom edge of said partition, a sound insulating barrier member movably mounted in said channel between a first position wherein it lies flush with the upper surface of said floor and a second position wherein it is in engagement with said partition to inhibit the passage of sound waves between said edge and said floor from one said location to the other.

10. Apparatus of the type described, comprising a fixed structure formed of sound insulating material, a movable sound insulating partition operatively associated with said structure, an edge on said partition, said edge being moved by said partition to a position wherein said edge is proximate to said structure, said structure defining a recess extending along said edge, a substantially rigid elongated sound insulating barrier member disposed in said recess, and a pivot mount for said barrier member in said channel for providing rotary barrier movement out of said recess into engagement with said edge.

11. Apparatus according to claim 10 further comprising means mounted on said structure on the side of said partition opposite to said barrier member for holding said partition in a fixed position against the force exerted thereon by said barrier member.

12. Apparatus of the type described comprising a framing structure, a movable sound insulating partition operatively associated with said framing structure, a sound insulating barrier movably mounted on said framing structure and being operatively associated with said partition, said framing structure including a recess for receiving said barrier when said barrier is in one position, and means for temporarily securing said barrier to said partition when said barrier is in another position.

13. The combination set forth in claim 12, a first abutting face on said partition, a second abutting face on said barrier, said barrier being pivotable out of said recess into engagement with the face of said partition, and said securing means being interposed between said abutting faces of said partition and said barrier.

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**UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION**

Patent No. 3,140,564

July 14, 1964

Dave Chapman

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 57, for "181" read -- 191 --; column 6, lines 19 and 20, for "channel" read -- recess --.

Signed and sealed this 19th day of January 1965.

(SEAL)

Attest:

ERNEST W. SWIDER  
Attesting Officer

EDWARD J. BRENNER  
Commissioner of Patents

UNITED STATES PATENT OFFICE  
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