March 29, 1955 W. S. MILES 2,704,864

SOUND-ABSORBING WALL TREATMENT

Filed Jan. 12, 1949

3 Sheets-Sheet 1

Fig. 1.

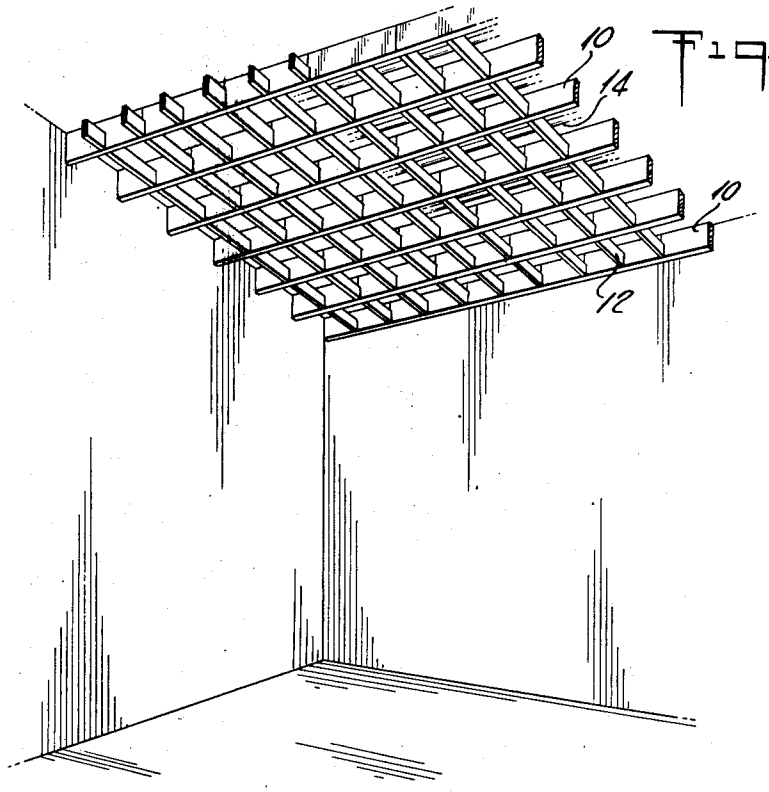
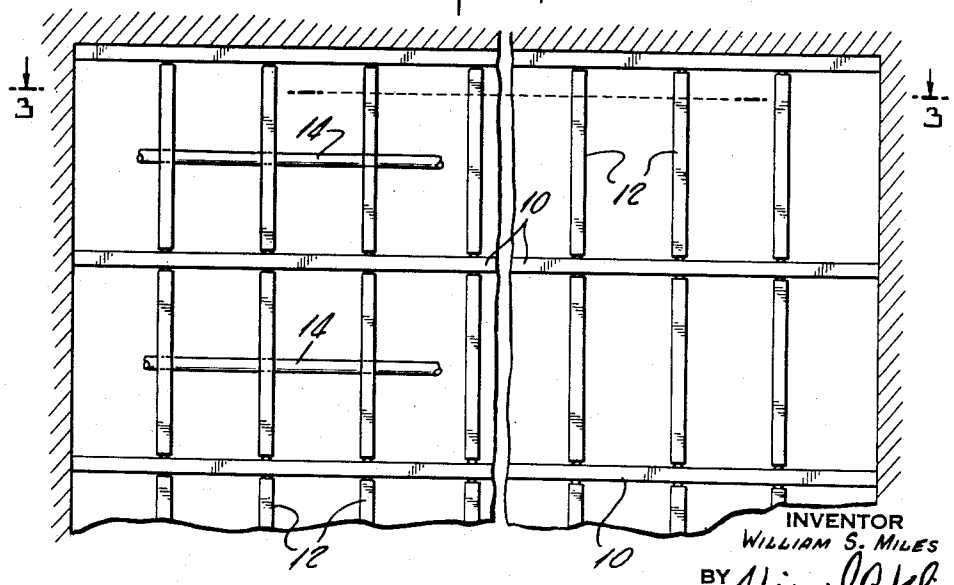


Fig. 2.



INVENTOR
WILLIAM S. MILES
BY Virgil C. Kline
ATTORNEY

March 29, 1955 W. S. MILES 2,704,864

SOUND-ABSORBING WALL TREATMENT

Filed Jan. 12, 1949

3 Sheets-Sheet 2

Fig. 4.

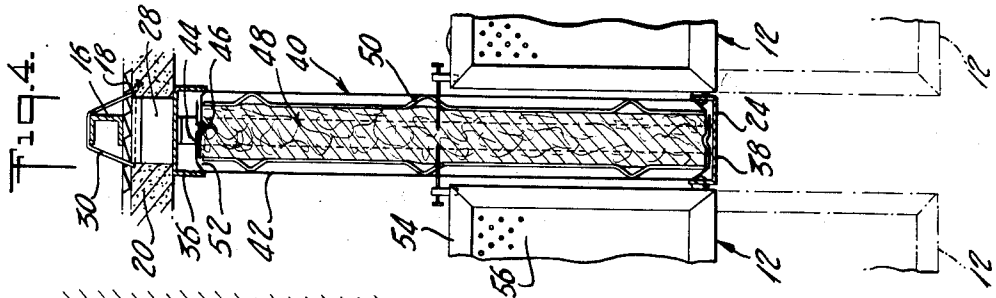
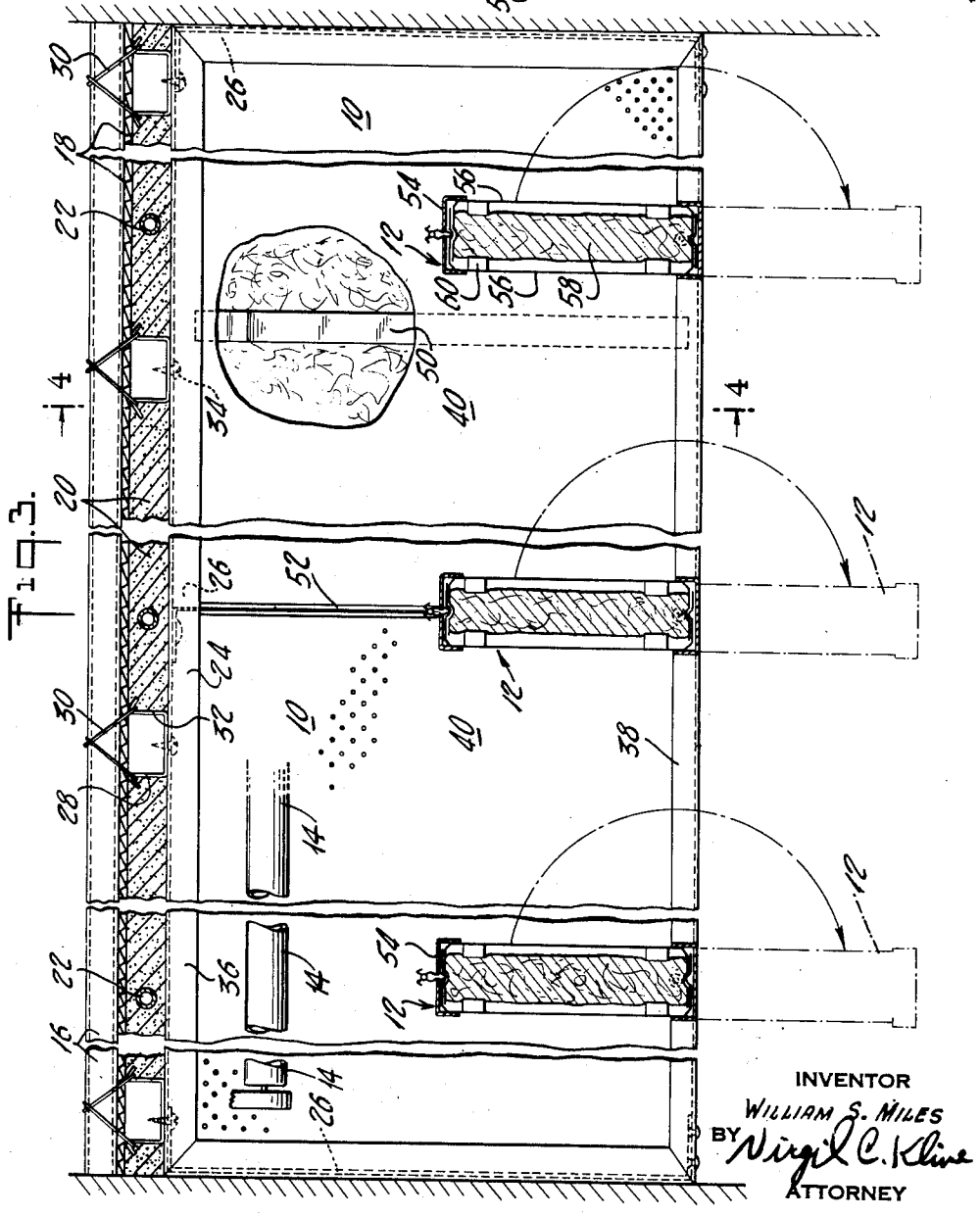


Fig. 3.



INVENTOR
WILLIAM S. MILES
BY Virgil C. Kline
ATTORNEY

March 29, 1955 W. S. MILES 2,704,864

SOUND-ABSORBING WALL TREATMENT

Filed Jan. 12, 1949 3 Sheets-Sheet 3

Fig. 5.

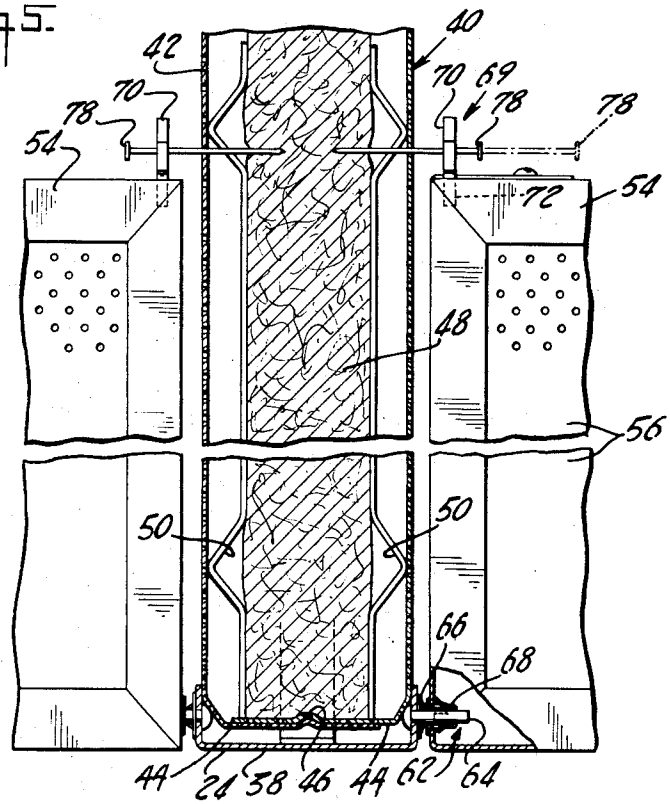


Fig. 6.

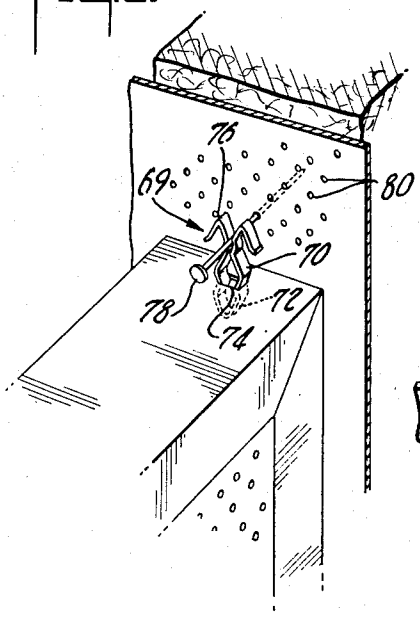
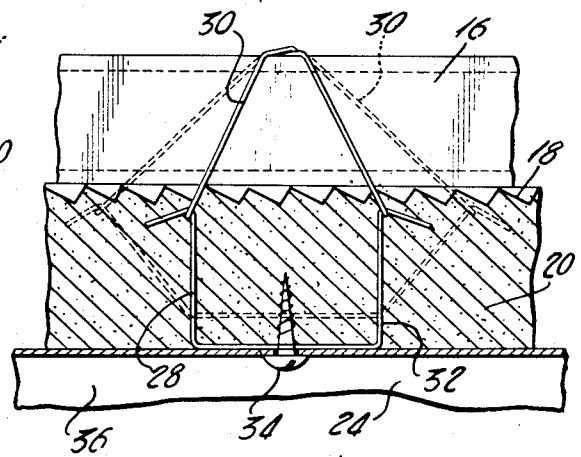


Fig. 7.



INVENTOR
WILLIAM S. MILES
BY Virgil C. Kline
ATTORNEY

United States Patent Office 2,704,864 Patented Mar. 29, 1955

2,704,864

SOUND-ABSORBING WALL TREATMENT

William S. Miles, Hastings on Hudson, N. Y., assignor to Johns-Manville Corporation, New York, N. Y., a corporation of New York

Application January 12, 1949, Serial No. 70,491

13 Claims. (Cl. 20—4)

The instant invention relates to treatments for walls such as ceilings and more particularly to treatments which will provide for acoustical correction, i. e., sound-absorption and, at the same time permit the treated wall to be employed as a radiant heating surface.

Conventional acoustical treatments for rooms such as offices, restaurants, auditoriums and the like, consist of sound-absorbing units or panels which cover all, or the greater portion of, the area of a wall of the room, usually the ceiling. One of the most effective and commercially successful treatments of this type is illustrated in patent to Norris #1,726,500, issued August 27, 1929, and comprises perforated metal pans suspended from the ceiling structure, the pans containing sound-absorbing bodies such as mineral wool pads. In this type of treatment the faces of the metal pans constitute substantially the entire exposed area of the ceiling.

In recent years it has been proposed to control the temperature of rooms by radiant heat, the recommended systems requiring the embedding of the heating elements, whether they be pipes for conducting hot water or steam, or electrical units, in the ceiling plaster. It has, of course, proved impractical to use this system in conjunction with an acoustical treatment of the type referred to above and the principal object of the invention is the provision of a treatment having the advantages and many of the structural features of the known type but which exposes most of the ceiling area.

More specifically, an object of the invention is the provision of a ceiling treatment involving metal or similar pans having sound-transparent surfaces, and containing sound-absorbing pads, supported in a manner to permit the major portion of the ceiling to serve as a radiant heating surface.

Another object of the invention is the provision of a ceiling treatment of the type referred to in which the acoustical units are in the form of partitions suspended from the ceiling and extending a short distance, say, a foot below the ceiling, the partitions leaving intervening spaces where the ceiling is exposed. The construction further includes sound-absorbing units spanning the spaces at intervals to provide an attractive, checkerboard or egg-crate appearance, and to increase the effective sound-absorbing area.

A further object of the invention is the provision of a construction which enables elongated lighting fixtures such as fluorescent tubes to be supported from the ceiling and extend longitudinally of the spaces between the partitions. To attain this object, the units spanning the spaces are of less height than the partitions, or are otherwise constructed to clear the fluorescent tubes, and are mounted in a way that they may be swung or moved downwardly to provide ready access to the fluorescent tubes for re-lamping and the like.

Another object of the invention is the provision of a ceiling treatment of the type referred to having structural features which promote rapid assembly of the partitions and easy mounting of the transverse, acoustical units on the partitions.

A further object of the invention is the provision of mounting devices for the transverse units, the devices including readily assemblable, pivotal connections between the ends of the units and the partitions, and latches for releasably maintaining the units in upright positions between the partitions. When the fluorescent lamps are to be renewed or otherwise serviced, the releasable latches permit the units to be swung on their pivots to

positions where they substantially clear the spaces, making access to the lighting units readily available.

A still further object of the invention is the provision of adjustable partition-suspension means enabling the partitions to be leveled so that their lower edges lie in substantially the same plane.

The invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the more detailed description of a preferred embodiment of the invention which is to follow, and to the accompanying drawings in which:

Fig. 1 is a perspective view of a room interior illustrating the instant invention;

Fig. 2 is an inverted plan view of a fragment of the ceiling treatment of Fig. 1;

Fig. 3 is a sectional view, taken on the line 3—3 of Fig. 2 and on an enlarged scale;

Fig. 4 is a sectional view, taken on the line 4—4 of Fig. 3;

Fig. 5 is a view similar to Fig. 4, but on an enlarged scale and with parts broken away to illustrate details of the construction;

Fig. 6 is a perspective view, on an enlarged scale, illustrating the construction of the latching mechanism; and,

Fig. 7 is a detail view, on an enlarged scale, illustrating an adjustable partition suspension device.

Referring now to the drawings, there is shown a treatment for a suspended lath and plaster ceiling of conventional type, the treatment comprising spaced partitions **10** extending in one direction of the room and in parallel relationship. The partitions are suspended from the ceiling structure in a manner later explained. The spaces between partitions **10** are spanned at intervals by transverse units **12** supported from the partitions. In the preferred embodiment, partitions **10** and panel-like units **12** are both sound-absorbers and, for this purpose have sound-transparent face panels and sound-absorbing fillers. The partitions are of suitable depth, say 12", and the transverse units are preferably of lesser depth, say 6", and are supported with their lower edges in alignment with the lower edges of the partitions to leave room above them for longitudinally extending fluorescent lighting tubes, diagrammatically indicated at **14**.

Referring now particularly to Figs. 3–7 inclusive, the construction features of the partitions **10** and lateral elements **12** will be described. It will be appreciated that the base wall or ceiling, shown for purposes of illustration as a conventional metal lath and plaster ceiling, is not a part of the instant invention and that the treatment may be employed with any conventional ceiling construction. The ceiling includes channels **16** supported in any suitable manner from the base ceiling slab, the channels carrying metal lath **18** which supports plaster **20** (see Figs. 3 and 7). In accordance with recommended practice, the plaster may be used as a radiant heating surface by embedding heating units, such as hot water pipes **22**, at the required intervals therein. The heated fluid conveyed by the pipes, etc. heats up the entire plaster layer which, in turn, radiates heat to the room below.

In accordance with the instant invention, partitions **10** comprise frames **24** consisting of channel members, with the channels opening inwardly. Where the partitions are of substantial length, the top and bottom channels are connected at suitable intervals by straps **26** having flanged ends riveted or otherwise secured to the bases of the channels. It will be appreciated that straps **26** are located to lie between the acoustical units which make up the main body of the partitions and which are later described. The straps are preferably employed at both ends of the frames to reinforce the same, as well as at the intermediate locations referred to. The frames are suspended from channels **16** through the medium of U-shaped clips **28** which are wired or otherwise connected to the channels, as indicated at **30**. The clips are made of bendable metal, whereby, as illustrated in Fig. 7, the legs **32** may be bent from positions at right angles to the base, to lesser angles to adjust the height of the clips so that the bases of the clips will lie in the same plane, irrespective of slight variations in the positions of channels **16**. The clips are placed in position before plastering, and the plaster coat leveled with the bases of the clips.

The clips are in rows at the locations of the partitions and are spaced at suitable intervals to provide the necessary support. Frames **24** are secured to the channels by means of sheet metal screws or the like **34**.

The channel **36** forming the upper element of each frame **24** is substantially deeper than the channel **38** forming the lower element. The sound-absorbing devices, indicated generally at **40**, are carried within the frames. Each of these is suitably composed of pans of the type employed in the conventional acoustical treatment, previously referred to, and a sound-absorbing pad. The pans, preferably of metal, consist of face panels **42** having a multiplicity of closely spaced perforations which make them sound-transparent, and side flanges **44** projecting therefrom. The side flanges have beads **46** which, in the conventional construction, serve to interlock them to a suspension runner. In the instant case, two of the pans are assembled in nested relationship (see particularly Figs. 4 and 5), with the beads **46** interlocking the pans together. The nested pans define a hollow interior space receiving the sound-absorbing pad **48**, such as mineral wool or other known sound-absorbing material. The surfaces of the pad **48** are spaced from the face panels by spacer strips, such as those illustrated at **50**.

The transverse dimension of the unit made up of the nested pans is greater than the distance between the edges of the flanges of the top and bottom frame channels but is less than the distance between the base of one of the channels, and the edge of the flange of the opposed channel whereby the upper edges of the units may be slipped upwardly into the upper channel until the lower edges of the pans clear the flange of the lower channel and then dropped into place. The units may be of any selected length but following conventional practice for acoustical units of this type, are preferably 2′ long. The edges of the face panels are beveled, as illustrated at **52**, whereby an attractive joint between the panels is obtained.

Laterally extending units **12** are of similar construction to the partitions and each includes a frame **54** made of channel members, the frame containing acoustical units consisting of nesting pans **56** and an interposed, sound-absorbing body **58** spaced from the face panels of the pans by spacers **60**. Inasmuch as the transverse units do not have to be fabricated on the job, the frames may closely fit the acoustical units which are installed during fabrication of the frames. The panels are supported from the partitions at suitable intervals, say 1′ apart, in which case alternate elements will line up with the joints between units **40**. The elements are of substantially less height than the partitions, and preferably are approximately half the height of the latter, as previously mentioned, to leave a substantial space above them for the reception of fluorescent lighting fixtures or other devices.

The transverse units are supported from the partitions by pivotal connections indicated generally at **62** (see Fig. 5). The pivotal connections may be of any suitable type, but the one illustrated is particularly advantageous as it is simple and may be easily assembled. It consists of a pivot pin **64**, such as a rivet, inserted through a perforation in the flange of the lower channel of frame **24** and extending through a larger perforation in the base of the end channel of the transverse unit. The pivot pin is held in position with respect to the partition by a spring locking clip **66** of conventional type. The end of the rivet extending into the channel of the transverse unit is secured by a tubular clip **68** inserted within the perforation in the channel with its head abutting against the outside of the channel. These clips have not been illustrated in detail as they are of a well known type but include locking tangs engaging the rear of the channel base to prevent their withdrawal, and an indented portion resisting withdrawal of the rivet.

Latches **69** are mounted on, or adjacent the upper edges of the transverse units to lock them in an upright position. The latches may take any suitable form, but the simple construction illustrated has been found to be advantageous. This consists of a strip of spring metal bent to form a spring clip **70** (see particularly Fig. 6) having a base **72** adapted to be forced into an elongated slot **74** in the upper channel adjacent the end of the element and retained therein by the resiliency of the material. Legs **76** extend upwardly from the base, the legs being bent to embrace a pin **78**. Pin **78** may be slid lengthwise to have its pointed forward end enter one of the perforations **80** in the face panel of the adjacent partition, or penetrate the joint between adjacent pans of the partition where the transverse unit is in line therewith, as illustrated by the center element in Fig. 3.

In making the installation, clips **28** are first mounted at the proper locations and the plastering completed, as mentioned above. Frames **24**, previously assembled to the desired dimensions, are then secured to the clips by sheet metal screws **34**. The rivets **64** which form the hinges for the transverse elements are next inserted in the perforations in the lower channel of the frame and the locking clips **66** applied. The transverse units are then placed between the partition frames and the shanks of the rivets pushed into the tubular locking clips **68** previously mounted in the perforations at the ends of the transverse units. The latter are then allowed to hang on their pivots while the assembly of the partitions is being completed.

Completion of the partitions requires the mounting of the sound-absorbing devices **40**, comprising the nested pans and interposed, sound-absorbing pads, in endwise, adjacent relationship in the frames, each unit being first raised upwardly in the upper channel to clear the flanges of the lower channel and then lowered to have its lower edge embraced by the lower channel.

The transverse units may then be swung into upright positions and locked in such positions by sliding the pins **78** through perforations in the face panels of the adjacent partitions, or into the joints between the face panels, as the case may be.

Whenever access to the fluorescent lighting fixtures is desired for re-lamping or the like, the pins **78** may be withdrawn and the units allowed to swing downwardly to clear substantially the entire space between the partitions for manipulation of the tubes. The treatment does not interfere with the effectiveness of the plaster layer as a radiant heating surface, and at the same time, provides an adequate and effective sound-absorbing system.

Having thus described my invention in rather full detail, it will be understood that these details need not be strictly adhered to but that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What I claim is:

1. In an acoustical treatment for a wall such as a ceiling, panel-like partitions suspended edgewise from the wall, said partitions comprising sound-absorbing materials and arranged to define spaces therebetween, laterally extending panel-like units suspended in the spaces between said partitions in edgewise relation to the wall, and means supporting said panel-like units from said partitions for movement from positions within said spaces to positions in which they extend outside of said spaces.

2. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall and defining spaces therebetween, laterally extending units between said partitions, and means supporting said units from said partitions for movement from positions within said spaces to positions in which they extend outside of said spaces, said partitions and units having sound-transparent surfaces and sound-absorbing fillers.

3. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended edgewise from said ceiling with spaces therebetween, and sound-absorbing units extending laterally across said spaces, said units and partitions having sound-transparent surfaces, and means for supporting said units from said partitions for swinging movement from upright positions to downwardly hanging positions.

4. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended edgewise from said ceiling with spaces therebetween, and sound-absorbing units extending laterally across said spaces, said units and partitions having sound-transparent surfaces and means for supporting said units from said partitions for swinging movement from upright positions in which they lie within said spaces to positions where they extend below said spaces, said units in their upright positions having their lower edges in substantial alignment with the lower edges of the partitions and their upper edges spaced from the upper edges of the partitions.

5. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended edgewise

from the wall to define spaces therebetween, sound-absorbing units spanning said spaces, means supporting said units from said partitions for movement from positions in which they lie within said spaces to positions in which they extend outside of said spaces, said supporting means comprising pivotal connections between the ends of the units and opposed partitions, and latches for releasably holding the units against rotation on said pivots.

6. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended edgewise from the well to define spaces therebetween, sound-absorbing units spanning said spaces, means supporting said units from said partitions for movement from upright positions in which they lie within said spaces to positions in which they extend below said spaces, said supporting means comprising pivotal connections between the ends of the units and the opposed partitions adjacent the lower edges thereof, and latches carried by the units adjacent their upper edges for releasably securing the units against rotation on said pivots.

7. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended edgewise from the wall to define spaces therebetween, sound-absorbing units spanning said spaces, means supporting said units from said partitions for movement from upright positions in which they lie within said spaces to positions in which they extend below said spaces, said supporting means comprising pivot pins connecting faces of opposed partitions to the ends of the units adjacent the lower edges thereof, and retractable latches carried by the units adjacent the upper edges thereof and adapted to cooperate with said partitions to retain the units in an upright position against swinging movement on said pivots.

8. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall at intervals to define spaces therebetween, each of said partitions comprising an enclosing frame and sound-absorbing members within said frame, said sound-absorbing members including sound-pervious face panels and sound-absorbing material between said face panels, and sound-absorbing units spanning the spaces between opposed of the partitions and supported thereby for swinging movement from upright positions in which they lie within said spaces to positions where they extend below said spaces.

9. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall at intervals to define spaces therebetween, each partition comprising an enclosing frame including upper and lower channel members with the open sides of the channels in opposed relationship, the depth of the upper channel being substantially greater than the depth of the lower channel, sound-absorbing members within said frame comprising nesting, pan-like elements having sound-pervious face panels and sound-absorbing fillers therebetween, the width of said panels being greater than the distance between the flanges of the channels but less than the distance between the web of one channel and the flanges of the opposing channel whereby the members may be mounted in said frames by sliding them upwardly until their lower edges clear the flanges of the lower channel and then lowering them into position with their lower edges within the lower channel.

10. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall at intervals to define spaces therebetween, each partition comprising an enclosing frame including upper and lower channel members with the open sides of the channels in opposed relationship, the depth of the upper channel being substantially greater than the depth of the lower channel, sound-absorbing members within said frame comprising nesting, pan-like elements having sound-pervious face panels and sound-absorbing fillers therebetween, the width of said panels being greater than the distance between the flanges of the channels but less than the distance between the web of one channel and the flanges of the opposing channel whereby the members may be mounted in said frames by sliding them upwardly until their lower edges clear the flanges of the lower channel and then lowering them into position with their lower edges within the lower channels, and sound-absorbing units spanning the spaces between opposed of the partition walls and carried thereby.

11. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the

wall at intervals to define spaces therebetween, each partition comprising an enclosing frame including upper and lower channel members with the open sides of the channels in opposed relationship, the depth of the upper channel being substantially greater than the depth of the lower channel, sound-absorbing members within said frame comprising nesting, pan-like elements having sound-pervious face panels and a sound-absorbing filler therebetween, the width of said panels being greater than the distance between the flanges of the channels but less than the distance between the web of one channel and the flanges of the opposing channel whereby the members may be mounted in said frames by sliding them upwardly until their lower edges clear the flanges of the lower channel, and then lowering them into position with their lower edges within the lower channel, and sound-absorbing units spanning the spaces between opposed of the partitions and carried thereby, said units comprising enclosing frames and sound-absorbing members including nesting, pan-like elements having sound-pervious faces and a sound-absorbing filler therebetween, within the frame.

12. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall at intervals to define spaces therebetween, each partition comprising an enclosing frame including upper and lower channel members with the open sides of the channels in opposed relationship, the depth of the upper channel being substantially greater than the depth of the lower channel, sound-absorbing members within said frame comprising nesting, pan-like elements having sound-pervious face panels and a sound-absorbing filler therebetween, the width of said members being greater than the distance between the flanges of the channels but less than the distance between the web of one channel and the flanges of the opposing channel whereby the members may be mounted in said frames by sliding them upwardly until their lower edges clear the flanges of the lower channel and then lowering them into position with their lower edges within the lower channels, and sound-absorbing units spanning the spaces between opposed of the partitions, means supporting said units from the opposed partitions for movement from positions within said spaces to positions in which they extend below said spaces, said units comprising enclosing frames, nesting pan-like members having sound-pervious face panels within said frames, and a sound-absorbing filler between said face panels.

13. In an acoustical treatment for a wall such as a ceiling, sound-absorbing partitions suspended from the wall at intervals to define spaces therebetween, each partition comprising an enclosing frame including upper and lower channel members with the open sides of the channels in opposed relationship, the depth of the upper channel being substantially greater than the depth of the lower channel, sound-absorbing members within said frame comprising nesting pan-like elements having sound-pervious face panels and a sound-absorbing filler therebetween, the width of said members being greater than the distance between the flanges of the channels but less than the distance between the web of either channel and the flanges of the opposing channel whereby the members may be mounted in said frames by sliding them upwardly until their lower edges clear the flanges of the lower channel, and then lowering them into position with their lower edges within the lower channel, and sound-absorbing units spanning the spaces between opposed of the partitions, means supporting said units from the opposed partitions for movement from positions within said spaces to positions in which they extend below said spaces, said units comprising enclosing frames, nesting pan-like members having sound-pervious face panels within said frames, and a sound-absorbing filler between said face elements, said units having their lower edges substantially in alignment with the lower edges of the partitions and their upper edges spaced from the upper edges of the partitions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,462,208	Mayo	July 17, 1923
1,666,311	Rosenzweig	Apr. 17, 1928

(Other references on following page)

7

UNITED STATES PATENTS

1,984,190	Huffine	Dec. 11, 1934
1,986,953	Wendel	Jan. 8, 1935
2,028,453	Hoffman	Jan. 21, 1936
2,160,638	Bedell et al.	May 30, 1939
2,227,570	Burson	Jan. 7, 1941
2,230,349	Eaton et al.	Feb. 4, 1941
2,390,262	Mazer	Dec. 4, 1945
2,423,199	Milnor	July 1, 1947
2,434,108	Handler	Jan. 6, 1948

8

2,447,272	Parkes	Aug. 17, 1948
2,448,413	Borghesi	Aug. 31, 1948
2,475,708	Lichaczewski	July 12, 1949
2,519,161	Tucker	Aug. 15, 1950
2,527,031	Rambusch	Oct. 24, 1950

OTHER REFERENCES

Electrical Construction and Maintenance, Aug. 1947, page 59.