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C. S. STROM ET AL

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MEMBRANE UNIT BUILDING CONSTRUCTION

Original Filed May 14, 1932

Fig. 2

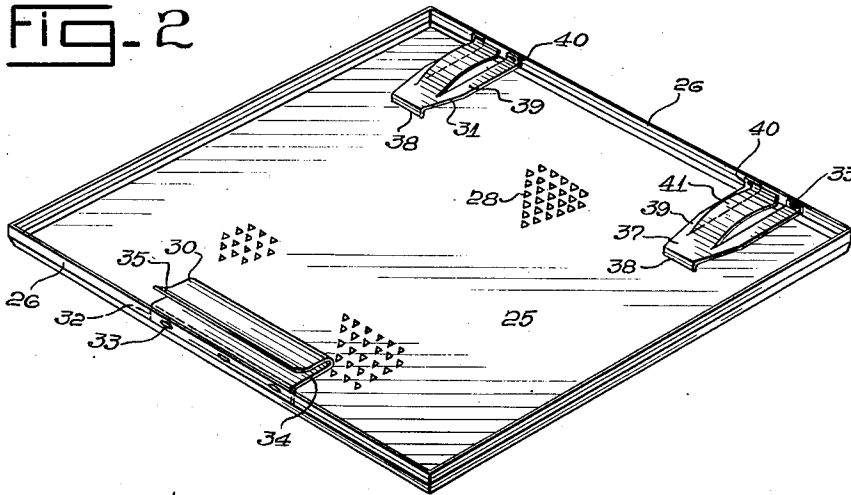


Fig. 1

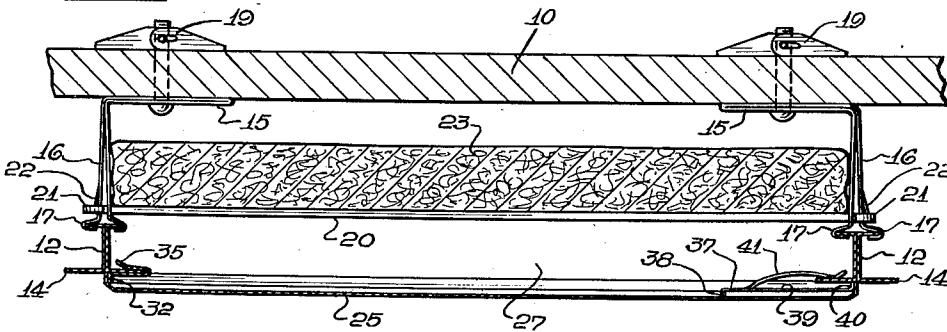


Fig. 3

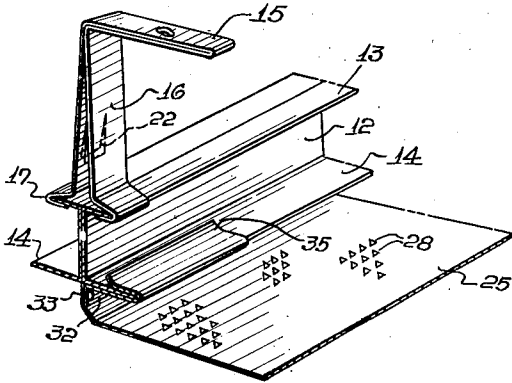
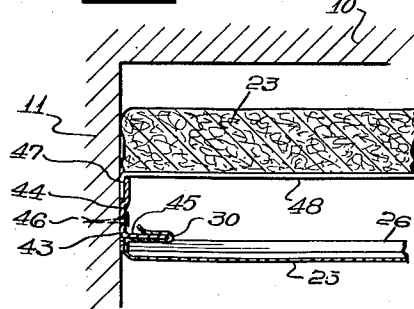


Fig. 4



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MEMBRANE UNIT BUILDING CONSTRUCTION

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12 Claims. (Cl. 189—88)

The present invention relates to building constructions and devices, and chiefly to constructions in which membrane units are secured adjacent a building surface to form the exposed surface of the structure, particularly where sound deadening control is desired.

In the construction of acoustical ceilings of the type employing perforated membranes backed by layers of sound absorbent material, some difficulty has been experienced in erecting the membranes due to high labor cost resulting from faulty attachment of the membranes. Moreover, it has heretofore been difficult to maintain the lower faces of the membranes in a single plane, with the result that uneven light reflection from the membranes caused the finished surface of the ceiling or other surface to have objectionable high lights and poor appearance.

In our copending application Serial No. 574,524, filed November 12, 1931, we have described improvements in acoustical building surfaces, disclosing certain types of means associated with the membranes for securing the same to building supports. Our present invention defines further improvements in means for connecting the membranes to supports in building construction.

It is therefore an object of the present invention to provide improved attaching means for membrane units adapted to form the exposed surface of a building surface.

Another object of the invention is to provide an acoustical ceiling construction in which the exposed faces of the membranes lie in a single plane so that light reflection is uniform from all the membranes.

Another object of the invention is to provide means for supporting an acoustical ceiling of the type described at the convergence of vertical and horizontal building surfaces such as at the corner of a room.

A further object of the invention is to provide an acoustical building construction which is economical, which is simple and will reduce the labor of erection to a minimum, and which is effective for the purposes desired; also to improve building constructions in other respects hereinafter specified and claimed.

Reference is to be had to the accompanying drawing forming a part of this specification in which

Figure 1 is a fragmentary, sectional elevation through an acoustical ceiling construction;

Figure 2 is a perspective view of one of our improved membrane units, illustrating the relation of the clips thereto;

Figure 3 is a fragmentary, detail perspective view showing the relationship in combination of certain elements of an improved ceiling structure constructed in accordance with the principles of the invention; and

Figure 4 is a fragmentary, sectional elevation illustrating our improved structure at the corner of a room.

An acoustical ceiling constructed in accordance with our invention may be erected in either old or new buildings. The building surface proper may comprise metal or wood lath and plaster, plasterboard or any other type of ceiling or wall surface that may be encountered in a building; and may be supported in any suitable fashion as form joists or supports not shown. The ceiling may be supported around its edges by walls, which may also be of any desired construction. In a preferred embodiment of the invention, suitable means such as flexible I-shaped rails or runners, provided with flanges, are suspended a substantial distance below the ceiling by means of quick gripping clamping bracket hangers. The hangers are preferably non-continuous and are preferably formed of a piece of cold rolled strap steel, comprising two integral legs, L-shaped in contour and having U-shaped clamps formed in the lower end of each leg for engaging the runner flanges. Toggle bolts may be used to secure the hangers to ceiling.

Means are preferably provided in order to cause clamps to tightly grip the flanges. This means may comprise a bar or rod spanning the distance between adjacent hangers and engaging the downwardly extending parts of legs by suitable means such as hooks on the ends thereof. An integral lug is preferably struck outwardly from one of the legs, so as to engage the top edge of a hook and prevent said hook from being inadvertently raised out of clamping position after erection. The rails will also be fairly accurately spaced apart by the means. In addition, means also preferably serves to sustain a pad of light weight material, preferably of a fibrous nature, such as mineral wool, hair felt or vegetable fiber. The pad may be of a width substantially equal to the distance between the rails and of a substantial length, such, for example, as four or five times the width of the pad. Pad is the active sound absorbing material on whose absorption the acoustical properties of our improved acoustical construction largely depends.

In order to present a washable surface of pleas-

ing architectural appearance in front of the sound absorbing pad 23, we provide membrane blanks 25 having upstanding flanges 26 forming sides around the edges of the membranes. These membranes 25 may be formed of any suitable sheet material, but are preferably of aluminum, sheet iron or other sheet metal. For the purpose of permitting sound waves to travel through membranes 25 into space 27 so that the sound waves will be absorbed by the material 23, perforations 28 are preferably formed in the membrane blanks 25. Perforations 28 may be of any desired shape, but from the view point of presenting a pleasing appearance we have found triangular shaped apertures most advantageous.

Clips 30 or 31 are preferably provided for connecting membranes 25 to rails 12, said clips being connected to flanges 26 of the membranes and extending back therefrom. Clips 30 preferably comprise a leg 32, providing means adapted to be connected to a flange 26, as by spot welding 33 or the like; and a base 34 bent back upon itself to form a lip 35 adapted to engage over a flange 14 of a rail 12. As clearly appears by reference to Fig. 2, the clip 30 forms a laterally facing channel in which flange 14 is adapted to be received in sliding engagement.

Clips 31 preferably comprise a base 37 having a depending flange 38 contacting the inner face of membrane 25 and spacing the clip therefrom. A pair of spaced legs 39 extend from the base 37 and are provided with flanges 40 connected to a flange 26 of the membrane by means of spot welding or the like. A substantially resilient tongue 41 is formed on base 38 intermediate legs 39 and is adapted to slidably engage over flange 14 of rail 12 and bear the same against the upper edge of flange 26 of the membrane 25.

As a matter of convenience we have illustrated, in Fig. 2, a membrane 25 having a clip 30 on one flange 26 and clips 31 on the opposite flange. Obviously, however, either form of clip may be used exclusively, or both forms may be used, as desired. Moreover, while we have shown merely a single clip 30 to a side of a membrane, a plurality of the same may be used. The aim at all times is to have the membranes adequately supported to keep them in alignment and in the same plane so as to present a uniform surface. As is apparent, clips of the type illustrated will serve to keep the upper edges of flanged sides 26 of the membranes in substantially close abutment with the under surface of flanges 14 of runners or rails 12; and small variations in spacing of the rails will not have a deleterious effect since the sliding engagement of the clips allows a certain degree of latitude.

Where there is convergence of a vertical wall 11 with the ceiling 10, as at the edges of a room, angle strip 43, comprising an upwardly extending leg 44, and an outwardly extending leg 45, is preferably secured by any suitable means, such as nails 46, to the wall 11 at the desired distance below ceiling 10 and parallel thereto. Strip 43 may be continuous or it may comprise suitable length sections as desired. A portion of leg 44 is spaced sufficiently away from wall 11 to receive a depending leg 47 of rod or bar 48 which supports the sound absorbent material 23. Leg 45 is adapted to be engaged by clips 30 or 31 of the membrane units.

We would state in conclusion that while the illustrated examples constitute practical embodiments of our invention, we do not wish to limit

ourselves precisely to these details, since manifestly, the same may be considerably varied without departing from the spirit of the invention as defined in the appended claims.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:

1. A building construction comprising a building surface, flanged runners adjacent said surface, metallic membranes having upstanding sides adjacent said runners, and laterally channeled U-shaped clips connected with said upstanding sides and engaging with the flanges of said runners, said runner flanges extending into said U-shaped clips.

2. A metallic membrane comprising a face portion, the edges of said membrane being turned up to form upstanding flanges, and clips attached to said flanges, said clips comprising a leg abutting one of said flanges, and a return bent portion forming a lateral channel adapted to engage runner means.

3. In a metallic membrane for building construction, a face blank, upstanding flanges on the edges of said blank, and a clip connected to one of said flanges, said clip comprising a base extending out over said blank and being spaced therefrom by depending flange means, a pair of legs provided with attachment means for connecting said clip to said one flange, and resilient means on said base adapted to engage with support means.

4. A membrane unit for building construction comprising a planular blank and upstanding flanges on opposite edges of said blank, a clip comprising a laterally facing channel being secured to one of said flanges, and a clip comprising a resilient engaging tongue being secured to the opposite flange, said clips engaging with building supports to secure said unit in said construction.

5. In an acoustical building construction, vertical and horizontal building surfaces, sound absorbent material below said horizontal surface, an angle strip secured to said vertical surface parallel to said horizontal surface, one leg of said angle strip being adapted to receive means for supporting said sound absorbent material, and the other leg of said angle member being adapted to be engaged by clip means on a perforated membrane extending in a plane below said sound absorbent means.

6. In a ceiling construction, converging vertical and horizontal building surfaces, a metallic strip secured to said vertical surface parallel to said horizontal surface, a portion of said strip being spaced from the adjacent vertical surface and providing a slot for reception of a leg of support means adapted to carry sound absorbent material or the like below said horizontal surface.

7. In a ceiling construction, converging vertical and horizontal building surfaces, membrane units in a plane below said horizontal surface, said units being provided with upstanding flanges and clips for engagement with support means, and an angle strip secured to said vertical wall surface and providing means adapted to be engaged by said clips for supporting said membranes.

8. In an acoustical ceiling construction, converging ceiling and vertical wall surfaces, a plurality of spaced supports attached below said ceiling surface, perforated membrane units having upstanding sides, individual clips associated with said upstanding sides and connecting said

units to said supports, means connected to said vertical wall surface and adapted to be engaged by said clips to support said units adjacent said surface, and sound absorbent material between said ceiling surface and said membrane units adapted to absorb sound waves travelling through said units.

9. In a building construction, a membrane unit building surface comprising a plurality of perforated membrane units extending in a horizontal plane, and a building surface disposed in substantially vertical relationship to said membranes, means provided on said membranes for engaging with supports, and an attaching strip secured to said vertical building surface and substantially parallel to said membrane units, said strip providing a horizontally extending support flange adjacent said first mentioned surface for engagement by said support engaging means on said membranes.

10. In a building construction, a membrane unit surface comprising a plurality of individual units, and a building surface disposed in substantially angular relationship to said membranes, laterally channeled means on an edge of said membranes for engagement with support means, and angle strip means having one leg secured to said building surface in substantially parallel relation to said membranes, the other leg

of said strip providing a support flange adjacent said membranes for engagement by said laterally channeled means on said membranes.

11. In a building construction, a perforated sheet metal acoustical membrane extending in a substantially horizontal plane, upstanding flanges formed at the periphery of said membrane, one of said flanges being provided with a channel-shaped flange, a building surface extending in a substantially vertical plane, and an angle strip having one leg secured to said building surface and the other leg outstanding from said building surface and engaging in said channel flange so as to support one edge of said membrane.

12. In a metallic membrane for building construction, the sides of said membrane forming upstanding flanges, a supporting flanged runner, and means associated with said flanges to adapt said membrane to be secured to said runners, said means comprising a leg for attachment to one of said flanges, and a portion extending at substantially right angles to said leg, said portion being bent back upon itself to form a channel adapted to engage on either side of said flange runner.

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