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A. A. HEEREN ET AL

1,997,581

ACOUSTICAL CEILING CONSTRUCTION

Filed July 30, 1932

Fig. 1

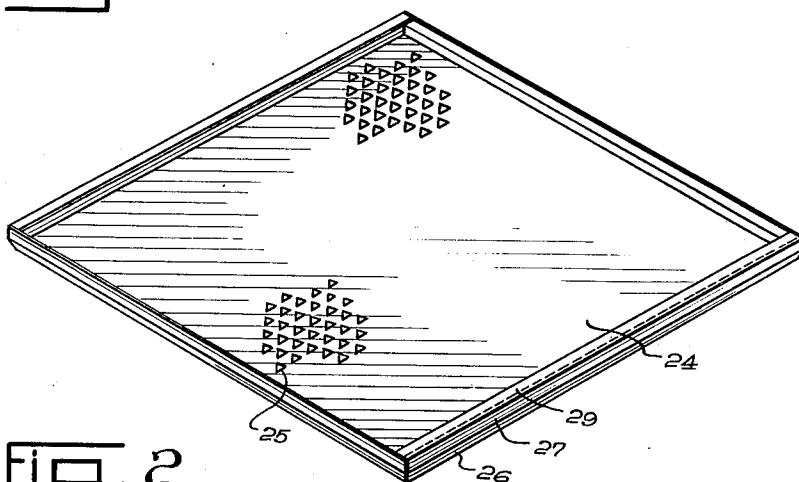


Fig. 2

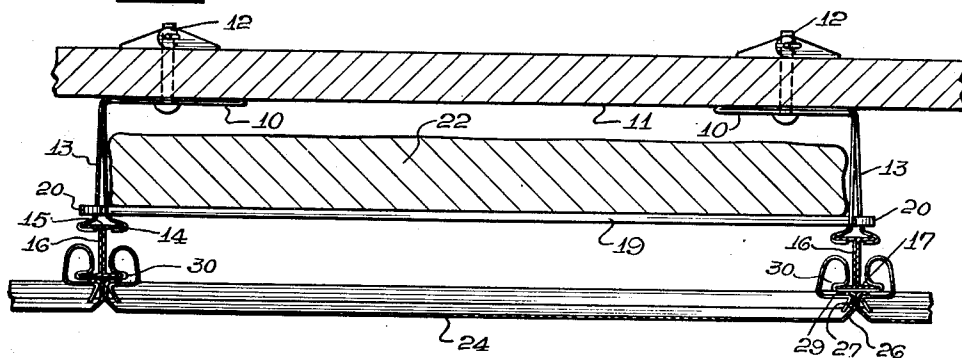


Fig. 3

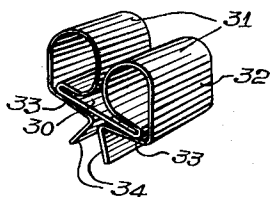


Fig. 4

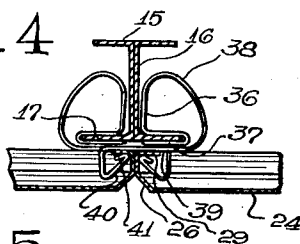
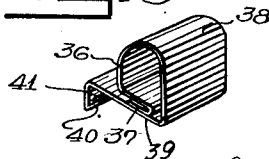


Fig. 5



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ACOUSTICAL CEILING CONSTRUCTION

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14 Claims. (Cl. 189—85)

This invention relates to building constructions, and has reference more particularly to ceiling constructions in which perforated metal membranes are backed by sound-absorbing materials for the purpose of absorbing sound and correcting the acoustics in a room.

In the construction of acoustical ceilings in buildings of the type employing perforated metal membranes backed by sound-absorbing fiber pads, it is desirable to have the perforated membranes so constructed that they can be attached to supporting rails by an upward movement from below. It is also desirable that the clips connecting the perforated membranes with supporting runners be so arranged as to resiliently urge the metal membranes together in close, edge-abutting relation so as to present an attractive tile-like appearance from below.

An object of this invention, therefore, is to provide an acoustical ceiling in which the membranes can be conveniently attached to the supporting rails by an upward movement of the membranes from below.

Another object of the invention is to provide an acoustical ceiling in which the membranes are attached to supporting runners by resilient clips which also serve to yieldingly urge the membranes together in close, edge-abutting relation; also to improve building construction in other respects hereinafter specified and claimed.

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

Fig. 1 is a perspective view of one of our improved perforated membranes,

Fig. 2 is a sectional elevation through an acoustical ceiling construction employing the improved membranes,

Fig. 3 is a perspective view of one the resilient clips for attaching the membranes to the supporting runners,

Fig. 4 is a sectional elevation through a modified form of construction, and

Fig. 5 is a perspective view of the modified form of clip shown in Fig. 4.

In constructing the acoustical ceiling, return bent, metal hangers 10 are attached to a ceiling surface 11 in any suitable way, such as by toggle bolts 12. The hangers 10 have downwardly extending legs 13 terminating in oppositely disposed hooks 14 which are arranged to embrace oppositely disposed upper flanges 15 of a structural rail or runner 16. The runner 16 is H-shaped in cross section, or is in any other desired shape, and is provided with outstanding lower flanges 17. The

rail 16 is preferably composed of two channel strips with their webs spot welded together in back-to-back position. In order to clamp the two legs 13 of hangers 10 together with hooks 14 embracing the flanges 15, a plurality of bars 19 are provided on their ends with hooks 20 which embrace the legs 13 and clamp them together. An acoustical pad 22 of mineral wool, hair felt, or other suitable sound absorbing material, is supported upon the bars 19. A sheet metal membrane 24 is supported below the rail flanges 17 in a manner to be hereinafter described, and is provided with triangular perforations 25, which, however, may be any other desired shape, such as round, square, elliptical, etc. The membranes 24 are preferably square, but may be any other desired shape, and are formed with bevels 26 which terminate in outwardly extending flanges 27.

Two of the opposite membrane flanges 27 are provided with inwardly extending flanges 29 which are comparatively narrow in width and extend below the runner flanges 17. A resilient clip 30 has return bent resilient loops 31 formed on each edge thereof, said loops extending downwardly to form flanges 32. Inwardly extending opposed flanges 33 are formed on the bottom edges of flanges 32, and the flanges 33 terminate in outwardly inclined flanges 34. As seen in Fig. 2, the upper faces of clip flanges 33 are arranged to engage the lower face of the membrane flanges 29, and the bend at the junction of clip flanges 33 and 34 engages the membrane flanges 27 so as to press the membrane flanges 27 of adjoining membranes into close, edge-abutting position, thus practically eliminating any joint cracks and giving a pleasing, tile-like appearance to the under surface of the membranes. The clip 30 can be slipped onto the end of the runners prior to erection, or subsequent to erection.

In the modified form of construction shown in Figs. 4 and 5, a resilient clip 36 has a return bent U-shaped flange 37, which embraces one of the runner flanges 17. A resilient loop 38 is formed on clip 36 and extends downwardly to include a horizontally extending flange 39 which extends beyond the center of the runner 16 and has a reverse bent flange 40 terminating in a hook 41 which engages under one of the inwardly extending flanges 29 on the membrane 24. The resilient clips 33 are placed alternately on the opposite runner flanges 17 in such a way as to tend to urge the metal membranes into close, edge-abutting relation. These clips may be easily placed on the

runners subsequent to the erection of said runners.

It will thus be apparent that we have provided means whereby the membranes 24 may be snapped into place from below to form a finished sub-surface ceiling after the sound absorbing material 22 has been placed in position. This is accomplished by pushing the membranes 24 upwardly so that the membrane flanges 28 will bear against the clip flanges 34 or 40, as the case may be, which are preferably inclined so as to facilitate sliding of flanges 28 thereagainst; and exerting sufficient pressure to cause the same to spread due to the resiliency of the clips derived chiefly through the resilient loops to which these flanges 34 and 40 are respectively attached. As soon as the flanges 28 of the membranes have passed over the bend formed between flanges 34 and 38, or over hook 41 of the modified form of clip, these portions of the clips will snap into place to retain the membranes in position, as hereinbefore described.

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. In an acoustical ceiling construction, a plurality of spaced runners supported in a plane, a plurality of perforated, metal membranes positioned adjacent said runners, inwardly extending flanges formed on opposite edges of each of said membranes, and separate resilient clips mounted on said runners and detachably engaging said flanges.

2. In an acoustical ceiling construction, a runner secured in place and having opposed flanges, a separate clip slidably supported on said flanges, a perforated metal membrane positioned adjacent said runner, and a resilient latch on said clip adapted to detachably engage a portion of said membrane when said membrane is brought into position adjacent said runner flanges.

3. In an acoustical ceiling construction, a plurality of spaced runners supported in a plane, a plurality of perforated, metal membranes positioned adjacent said runners, clips separate from either said supports or said membranes slidably supported on said runners and detachably supporting said membranes, said clips being arranged to resiliently press said membranes against the bottoms of said runners.

4. In an acoustical ceiling construction, a plurality of spaced runners having outstanding flanges, resilient clips having channel members engaging said flanges, resilient loops formed on said channel members, perforated metal membranes positioned below said runners, and latches on said loops resiliently connecting said membranes to said runners.

5. In an acoustical ceiling construction, a plurality of supporting runners having outstanding flanges, a plurality of perforated metal membranes positioned below said runners and having inwardly extending flanges, separate resilient means for yieldingly connecting said membrane flanges to said runner flanges and

forming the only support for said membranes, and a sound absorbing material supported adjacent said membranes.

6. In an acoustical ceiling construction, a metal runner having a pair of oppositely extending flanges, a pair of perforated metal membranes having upturned edge flanges positioned adjacent said runner flanges, inwardly extending flanges formed on said upturned flanges, and a plurality of separate oppositely disposed resilient clips mounted on said runner flanges and engaging the flanges on said membranes so as to yieldingly urge said membranes into close, edge abutting relation.

7. In membrane surfaced building structures, spaced, parallel supports, membranes adjacent said supports, and clips connecting said membranes to said supports, said clips comprising spring loop means for engaging said supports and spring leg means for engaging the edges of said membranes.

8. In a clip adapted for securing membranes in membrane surfaced building structures, a base, a pair of spring loops along two edges of said base, and means connected with said loops adapted to resiliently urge the edges of membranes inserted therebetween into abutting relationship.

9. A clip as claimed in claim 8 in which said means connected with said loops are adapted to urge said membranes upwardly as well as into abutting relationship.

10. In a membrane surfaced building structure, a pair of membrane units, a support connected to a building surface, and a pair of clips connecting said membranes to said support, said clips comprising means for engaging said support, means for engaging said membranes, and a spring loop connecting said engaging means and rendering said clips substantially resilient.

11. In a clip for securing membranes adjacent a building surface, means for engaging a support connected to said surface, resilient loop means, and means adapted for snapping engagement with the side of a membrane for securing the same to said support.

12. In a clip for securing membranes adjacent a building surface, means for engaging a support connected to said surface, means for engaging the side of a membrane, said last mentioned means being provided with an inclined flanged surface adapted to permit sliding of said membrane side thereagainst, and resilient means connecting said first two mentioned means to permit relative movement of the same when a membrane is pushed into position.

13. In a building construction, a plurality of spaced runners, a plurality of membrane units positioned adjacent said runners, clips separate from either said runners or said membrane units supported on said runners in simple frictional engagement therewith and detachably supporting said membranes, said clips being arranged to resiliently press said membranes into edge abutment.

14. A construction as claimed in claim 13 in which the clips are arranged to press the edges of said membranes into engagement with said runners as well as into edge abutment.

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