April 16. 1935. L. A. PALEY 1,997,596

SOUND ABSORBING STRUCTURE

Filed July 30, 1932

Fig. 1

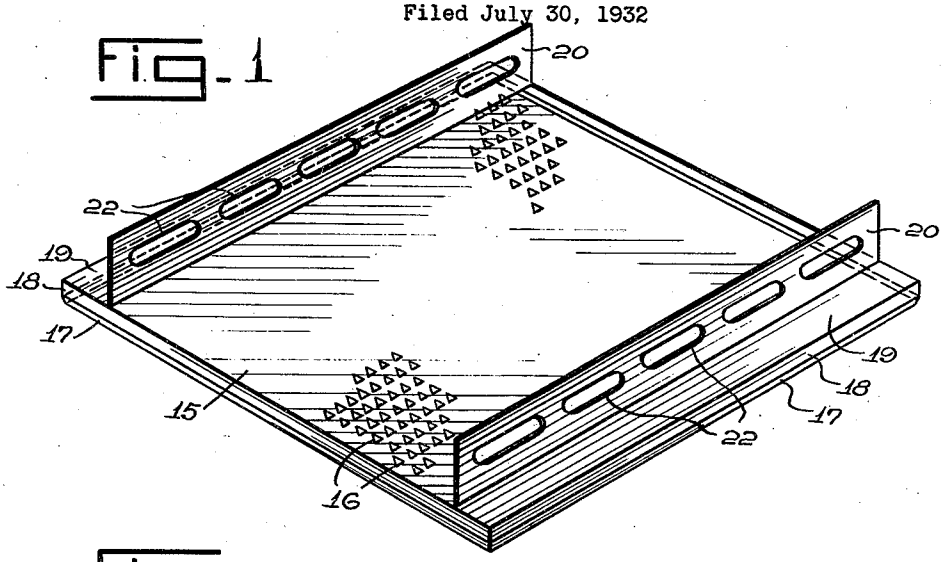


Fig. 2

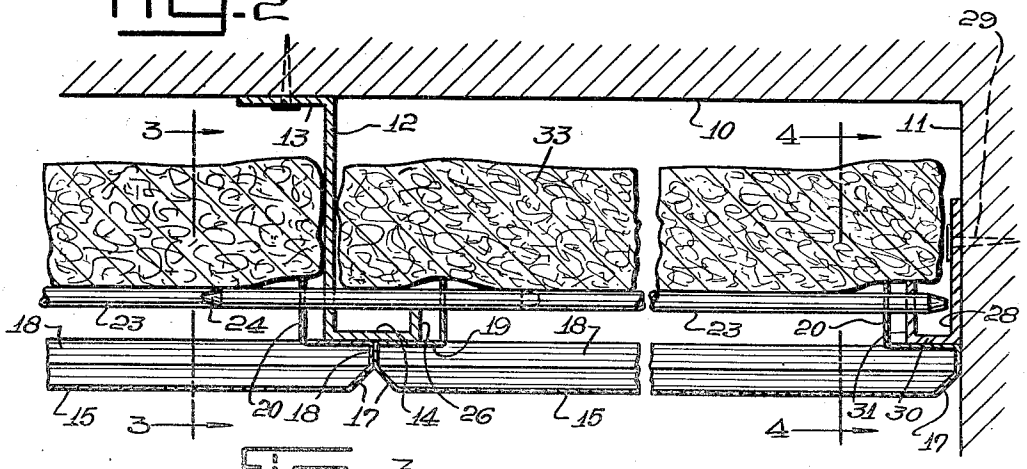


Fig. 3

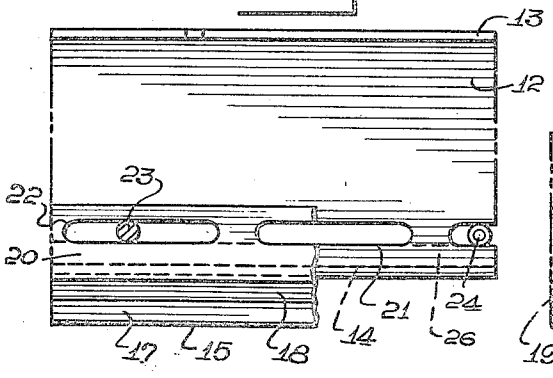
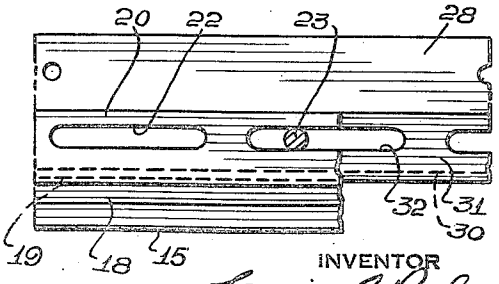


Fig. 4



INVENTOR

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SOUND ABSORBING STRUCTURE

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13 Claims. (Cl. 189—85)

This invention relates to building constructions, and has reference more particularly to building constructions in which the boundaries of a room are treated with sound absorbing materials faced by perforated sheet membranes.

In correcting the acoustics in a room by absorbing a predetermined amount of the sound and preventing reverberation, it is customary to line the room with a sound absorbing material, such as mineral wool, hair felt or other fibrous material, and to face this fibrous material with a perforated metal membrane to conceal the same and present a washable surface. In designing such a structure for acoustical correction, it is desirable to have the parts as simple as possible so as to reduce the cost of manufacture and erection to a minimum. It is also desirable to have the space occupied by the structure as narrow as possible so as to provide as much usable space in a room as possible.

An object of this invention, therefore, is to provide an acoustical building structure which is simple in design, easy to manufacture and erect, and which occupies a minimum of space; 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

Fig. 1 is a perspective view of one of my improved acoustical membranes,

Fig. 2 is a sectional elevation through the acoustical ceiling structure,

Fig. 3 is a sectional elevation through the acoustical structure taken on line 3—3 of Fig. 2, and

Fig. 4 is a sectional elevation through the structure taken on line 4—4 of Fig. 2.

A room of a building is usually formed of a ceiling surface 10 bounded by wall surfaces 11. In order to attach my improved acoustical structure to the ceiling 10 and walls 11, I provide a plurality of spaced, supporting rails 12 having upper outstanding flanges 13 and lower, opposed, outstanding flanges 14. Sheet metal membranes 15 are provided with perforations 16 uniformly distributed over their area, these perforations being preferably triangular, but may be any other shape such as round, square, elliptical, etc. The perimeter of each membrane is formed into beveled flanges 17 which develop into outstanding, right-angle flanges 18. Two opposed flanges 18 are bent inwardly to form return bent flanges 19, the flanges 19 being of substantial widths, somewhat greater than the widths of the rail flanges 14, and terminating in outstanding, offset flanges 20.

A series of slots 21 is formed in the web of rail 12 somewhat above flange 14, and similar registering slots 22 are formed in the flanges 20 somewhat above the flanges 14. Rods 23 having slightly tapered ends 24, are thrust through the slots 21 and 22 during the erection of the structure, so as to connect the membranes 15 to the rails 12. The rods 23 are substantially longer than the distance between rails so that the ends extend beyond the flanges 20 a substantial distance and prevent inadvertent displacement of the rods subsequent to erection. A guide flange 26 extends upwardly from each of the rail flanges 14 and serves to aid the erector in moving the rods longitudinally into the proper slots 22 in the flange of the adjoining membrane. It will be seen that considerable horizontal clearance is provided by the slots 22 so as to insure that the rods 23 are moved easily into position. Little or no clearance is allowed vertically so that the membrane flanges 19 bear tightly against the lower face of the rail flange 14 to make a rigid, finished structure.

Adjacent the wall 11, an L-shaped runner 28 is secured to said wall surface by means of nails 29, or other suitable fastening devices. The runner 28 has an outstanding web 30 which is arranged to bear against one of the membrane flanges 19, and said runner 28 also has an upstanding flange 31 which is provided with slots 32 for receiving the ends of the rods 23. A rather thick sound absorbing pad 33 of mineral wool, hair felt or other sound absorbing material is laid on top of the rods 23 and flanges 20 and 31. It will be seen that the rods 23 thus support both the membranes 15 and the sound absorbing pads 33, thus reducing to a minimum the number of structural parts necessary to manufacture. Furthermore, the vertical space occupied by the acoustical structure is reduced to a minimum owing to the comparatively narrow width of the webs of the rail 12. The bottom of the perforated membrane 15 presents an attractive, washable surface resembling tiles. Owing to the substantial width of the flanges 19 relative to the rail flange 14, accurate spacing of the rails 12 is not essential since considerable clearance is provided to permit slight variations in spacing. The rods 23 are readily assembled into position by reaching the hand into the space occupied by the pad 33 prior to the insertion of said pad. The pad 33 may be considerable length to cover several membranes.

I would state in conclusion that while the illus-

trated example constitutes a practical embodiment of my invention, I do not wish to limit myself 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 my invention, I claim as new and desire to secure by Letters Patent:—

1. An acoustical ceiling construction comprising a plurality of apertured rails in spaced parallel relation, a plurality of perforated membranes below said rails, apertured flanges formed on said membranes, and tapered rods extending across said membranes through the apertures of the rails and flanges so as to connect said membranes to said rails, said rods being movable axially after erection of said ceiling construction.

2. An acoustical ceiling construction comprising a plurality of apertured rails in spaced, parallel relation, a plurality of perforated membranes below said rails, apertured flanges formed on said membranes, rods extending through the apertures of the rails and flanges and across said membranes so as to support said membranes on said rails, and sound absorbing material supported by said rods above a membrane.

3. An acoustical ceiling construction comprising a ceiling structure, a plurality of Z-shaped rails secured to said structure in substantially parallel relation, perforated sheet membranes supported by said rails, axially slidable rods engaging said membranes and apertures in the webs of said rails, and a sound absorbing material positioned between said membranes and ceiling structure on said rods.

4. An acoustical ceiling comprising a plurality of perforated membranes arranged in a plane and having outstanding offset flanges, a supporting rail having a lower outstanding flange positioned between the offset flanges of adjoining membranes, and rods extending across said membranes and through said offset flanges and rails so as to connect said membranes to said rails.

5. An acoustical membrane comprising a perforated metallic sheet, outstanding flanges formed around the perimeter of said sheet, and opposite, offset, slotted flanges formed on said outstanding flanges, said slots being arranged for the facile introduction of supporting rods for said membrane.

6. An acoustical membrane comprising a perforated, metallic sheet, and a plurality of outstanding, slotted flanges formed on said membrane, said slots being arranged for the reception of supporting rods extending across and substantially parallel to said membrane.

7. In an acoustical ceiling construction, a ceiling structure, a plurality of Z-shaped rails having webs and opposed, outstanding flanges, one of said flanges being secured to said ceiling structure, said webs having a plurality of apertures, a plurality of rods extending from web to web through said apertures, a perforated membrane supported by said rods, and sound absorbing material supported by said rods.

8. In an acoustical building construction, a plurality of perforated membranes supported in a plane and having outstanding, slotted, opposed flanges, slotted rails extending between flanges of adjacent membranes, axially slidable rods extending through the slots of the rails and flanges and across said membranes so as to connect said membranes to said rails, and a guide flange associated with a rail to aid in the insertion of rods into slots of said rail during erection of the ceiling.

9. An acoustical membrane construction comprising a perforated, metal sheet, return bent flanges formed on two opposite edges of said sheet, and outstanding, apertured flanges formed on said return bent flanges, and axially slidable rods extending across said membrane and through said apertures and connecting said membrane to a supporting member.

10. In an acoustical building construction, a plurality of slotted rails secured in spaced, parallel relation, a plurality of perforated, sheet metal membranes having outstanding edges and outstanding, offset, slotted flanges, supporting rods extending through the slots of the flanges and rails, said slots being arranged to a maximum of horizontal registry clearance for said rods but little vertical clearance.

11. An acoustical ceiling construction comprising a plurality of fixed rails in spaced, substantially parallel relation, a plurality of perforated, semirigid membranes below said rails, each membrane having upturned, abutting flanges on at least two opposite edges thereof, elongated support members spanning from rail to rail above said membranes and engaging both the upturned membrane flanges and said rails, and a sound absorbing material supported above said membranes by said support members, said support members serving the dual purpose of connecting the membranes to said rails and supporting said sound absorbing material.

12. An acoustical ceiling construction comprising a plurality of rails fixed in spaced, substantially parallel relation, a plurality of perforated semirigid membranes having upturned, opposed, marginal flanges, a supporting rod extending across and above each membrane, said rod passing through said flanges and engaging said rails so as to connect said membrane to said rails, and a layer of sound absorbing material supported by said rod in spaced relation to said membrane.

13. An acoustical ceiling construction comprising a ceiling structure, a plurality of Z-shaped rails having upper and lower substantially parallel flanges, the upper of said flanges being secured to said ceiling structure so as to maintain said rails in spaced, parallel relation, a plurality of perforated metal membranes positioned below the lower flanges of said rails in edge abutting relation, each membrane having upturned flanges on at least two opposite edges thereof, the upper portions of said membrane flanges abutting against the bottom flanges of said rails, rods extending across the back of each membrane and securing said membranes to said rails, and a sound absorbing pad supported on said rods.

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