July 12, 1932. W. J. YOUNG 1,866,742

WALL CONSTRUCTION FOR ABSORBING SOUND WAVES

Filed July 25. 1928 2 Sheets-Sheet 1

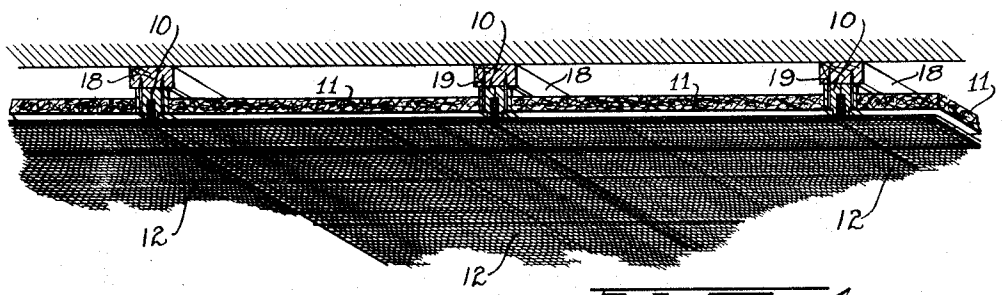


FIG. 1

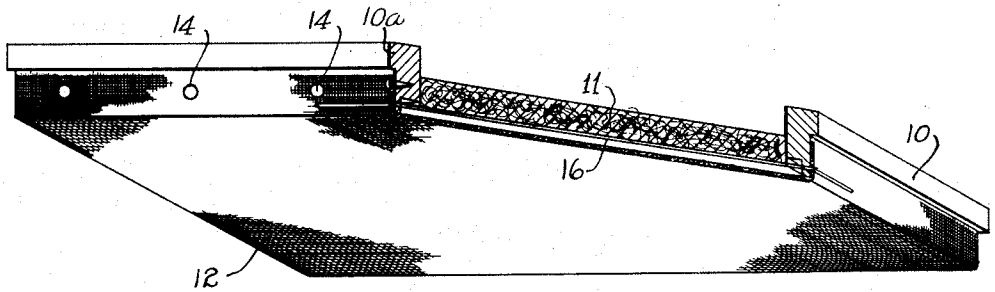


FIG. 2

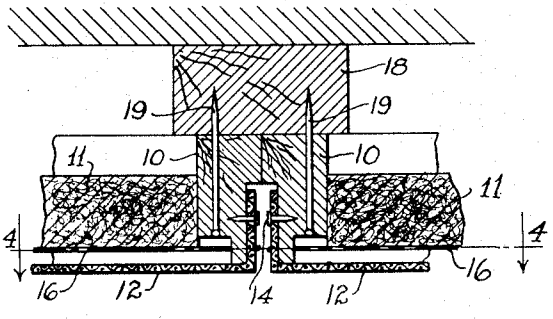


FIG. 3

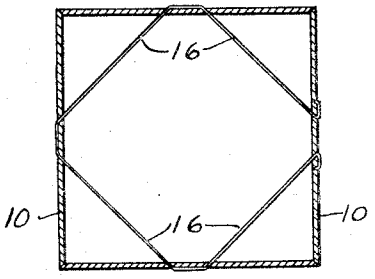


FIG. 4

Inventor

William J Young

By Bates Macklin Golrick & Pearce

Attorneys

July 12, 1932. W. J. YOUNG 1,866,742

WALL CONSTRUCTION FOR ABSORBING SOUND WAVES

Filed July 25, 1928 2 Sheets-Sheet 2

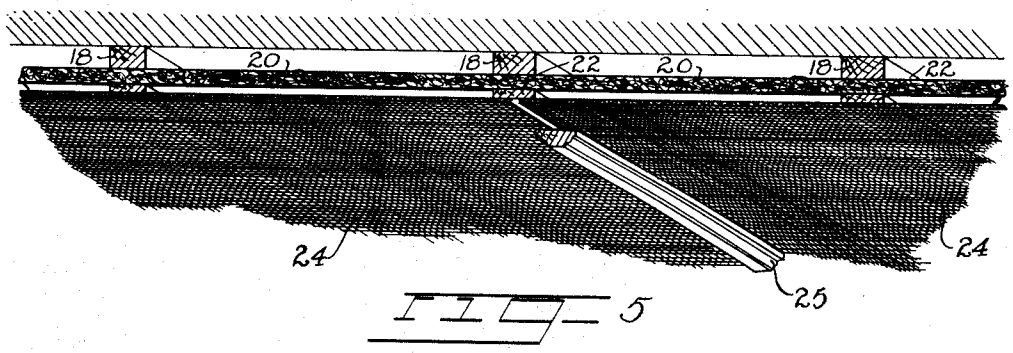


FIG 5

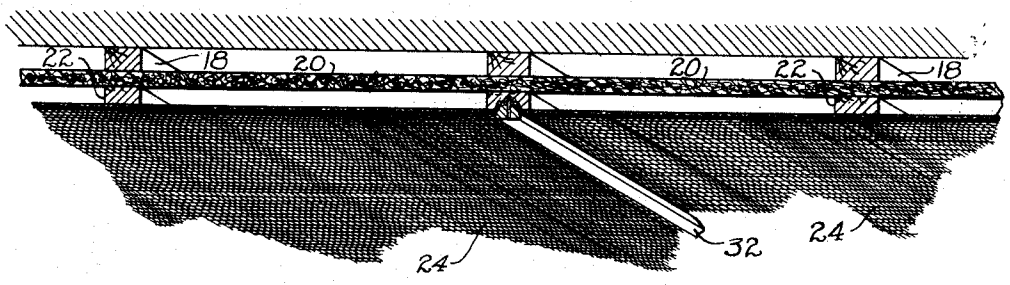


FIG 6

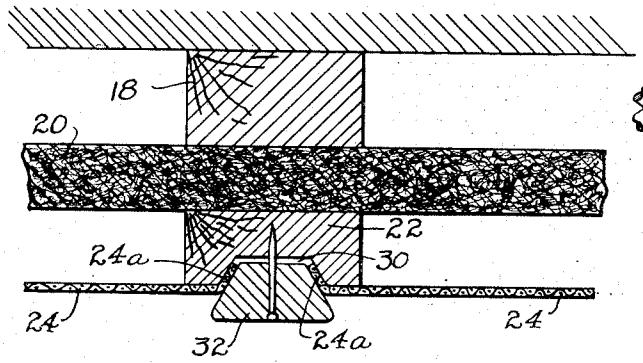


FIG 7

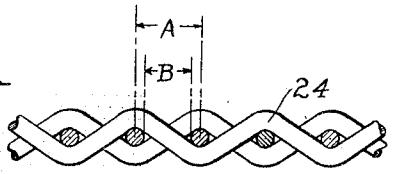


FIG 8

Inventor

William J Young

By Bates Macklin Bolnick & Peare

Attorneys

Patented July 12, 1932 1,866,742

UNITED STATES PATENT OFFICE

WILLIAM J. YOUNG, OF CLEVELAND, OHIO

WALL CONSTRUCTION FOR ABSORBING SOUND WAVES

Application filed July 25, 1928. Serial No. 295,319.

This invention is concerned with the treatment of walls and ceilings of buildings to improve the acoustical environment of the rooms of the buildings and has for its general object, the provision of a novel method of absorbing sound waves and a means for finishing the walls and ceiling surfaces of the building, which surfaces may be painted or coated in any desired manner to conform to the decorative scheme of the room, but which method and means will be highly effective in the sound dampening function to prevent reverberation of the sound waves.

It is the present practice in embodying acoustic wall constructions in buildings to use thick pads, slabs or blocks of fibrous material such as felt, mineral wool, vegetable fibre, etc., for absorbing the sound waves which strike the walls and ceiling surfaces of the building, for experience has disclosed that materials of this class are the only economically available sound deadening mediums suitable for building constructions. The use of such economic materials however, has introduced a difficulty from an architectural viewpoint, namely that the physical nature of these sound absorbing materials is such as to make it difficult to impart to the walls and ceilings of the building an artistic or decorative finish, in an economical manner. The more specific object of my invention therefore is the provision of a surface construction for walls and ceilings which may have applied thereto, the fibrous wall sound deadening materials mentioned and in addition thereto, the utilization of metallic sheathing having closely spaced converging openings extending therethrough which will function in such manner as to increase the sound absorbing factor of the acoustic construction and which is of such physical nature that it may be readily applied to the walls and may be readily coated with finishing material, such as paint, varnish, etc. of any desired shade and thickness.

Other objects of my invention will hereinafter become apparent in the following description which refers to the accompanying drawings showing preferred embodiments thereof. The essential characteristics of the invention are summarized in the claims.

In Fig. 1, I show a wall or ceiling construction embodying the features of my invention. In Fig. 2, I show in perspective and having one corner thereof in cross section, a panel tile or slab comprising one of the units of the wall construction shown in Fig. 1. In Fig. 3, I show an enlarged cross sectional detail of part of the wall or ceiling construction shown in Fig. 1. In Fig. 4, I show a cross sectional view taken substantally along the line 4—4 of Fig. 3; Fig. 5 is a modified form of wall or ceiling construction embodying the features of my invention; Fig. 6 is still another form of wall or ceiling construction embodying the features of my invention; Fig. 7 is an enlarged detail of the construction shown in Fig. 6; Fig. 8 is an enlarged cross sectional view of a preferred form of sheathing material which I utilize in my acoustic wall and ceiling constructon.

The present practice in acoustically finishing or covering walls is to apply fibrous material to walls and ceilings for sound dampening or sound absorbing purposes, the fibrous slabs being applied directly to the wall construction and between furring strips which serve as an anchoring means for a surface covering in the form of muslin or cotton cloth which is stretched over the fibrous material. While such constructions function properly to effect the deadening of reverberating sound waves, nevertheless after the rooms of the buildings in which the walls or ceilings are thus treated have been in use for a period of time, the surfaces become soiled or accumulate dirt which is difficult to remove and no refinishing of the surfaces thus treated can be affected without the application of new fabric.

Some attempts have been made to overcome this serious difficulty by applying the fibrous material in the form of units or tile slabs to the wall surfaces, the units being built of perforated sheet metal affording a finishing surface and beneath which is disposed the fibrous sound absorbing slabs. Such a finshing surface, while being adaptable to refinishing by the application of paint or varnish, never-

theless presents a major percentage of flat surface which prevents to a considerable extent, the passing through of the sound waves to be absorbed to the underlying fibrous material.

I propose to use in my construction, metal sheathing which will have openings with converging walls closely spaced so as to eliminate all flat surfaces that tend to cause reflection and this sheathing may be in the form of flexible screening of such mesh and wire diameter that the screening may be applied to the wall over the fibrous material in a simple artistic manner and the mesh being such as to provide the greatest efficiency in sound passage while affording a suitable surface which may be decorated while remaining even, to preserve the surface continuity of the walls and ceilings of the room. To successfully use or embody wire screen sheathing, it is important to determine upon a mesh which will not effect a decrease in the presented opportunity of the fibrous material underlying the screening to absorb the sound waves. A screen mesh of from 8 to 20 per inch will be found to be satisfactory. The nature of the openings of the screen is such that the air passages through which the sound waves pass will be such as to cause friction which occurs in the constricted part of the passage, due to the immediate oscillating air particles, and thus function to a certain extent to change the sound wave energy into heat. The screen thus aids the fibrous material and does not deter it in its sound deadening function. It will be apparent that the nature of the passages or openings through the screen are such that the openings converge, thus preventing any major reflections of the sound waves but do cause a partial obstruction of the same, before the waves reach the fibrous material beneath the screen where it is absorbed by being converted through friction into heat energy.

In Fig. 8, I show a screen in enlarged cross section and the maximum mesh opening is indicated by the dimension A, this opening converging to the minimum opening B. This converging opening while it is easily obtained by using screen sheathing and thus highly practical from an economical viewpoint, the screening material being relatively inexpensive, is also highly efficient in its sound destroying reaction as above set forth. When pigment is applied to the screen, the openings become slightly rounded but the converging feature is not lost inasmuch as the pigment follows the general shape of the wire and accumulates only in corners where the wires cross.

In Fig. 1, I show a wall and ceiling construction embodying the screen sheathing, the sheathing being made up and formed to mount upon a unit frame 10, the frame being preferably formed of wooden strips and this frame serves to carry the fibrous pads 11. Frame members 10 are provided with flanges 10*a* around the outer surfaces thereof of a width substantially equal to the thickness of the screen sheathing 12, the sheathing being drawn tightly over the frame and attached thereto by any suitable means, such as brads or tacks 14. I prefer to maintain the fibrous pads 11 in spaced relation to the screen sheathing 12 which may be accomplished by providing a retaining bail or wire 16 to extend diagonally across the frame corners as shown in Fig. 5 to thus support the fibrous pads 11 in spaced relation to the screen sheathing 12.

The unit which I have described and which I show in Fig. 2 may be made up in standard dimensions at the source of manufacture and may be applied to the walls of the buildings by first attaching furring strips 18 in uniformily spaced relation and thereafter, the sound absorbing units, which I prefer to call sound deadening tile, may be attached to the furring strips, the latter being attached to the walls as shown in Figs. 1 and 3 by nails or brads 19.

If it is desired, the wall or ceiling may be treated in the manner shown in Fig. 5 wherein the furring strips 18 are first applied and fibrous slabs 20 may then be attached to the furring strips 22 which serve as a spacing medium between the screen sheathing 24 and the fibre slabs and the abutting edges of the sheathing may be covered by finishing strips 25 in the manner shown.

In Fig. 6, I show an application of my invention to a wall or ceiling in a modification of the application thereto shown in Fig. 5, to the extent that binding strips may be provided with beveled grooves 30, as shown in Figs. 6 and 7, and the sheathing 24 is cut to such dimensions as to terminate along the grooves 34 whereby a beveled binding strip 32 may be applied to the strips 22 to lock the ends of the sheathing 24 in position; the strips 32 also serving as finishing strips.

It will be apparent from the description of the foregoing invention that same may be embodied in a variety of forms and that the screen acts as an obstructing medium by effecting a modification of the sound waves to the extent that the waves are partially destroyed as they pass through the screen, leaving the energy of the waves greatly reduced and the nature of the finishing sheathing made in the screen form is such that it is locally flexible thus also functioning to reduce the energy of any sound waves which would strike the screen wires in such manner as to tend to create minor reverberations. The physical nature of the screen sheathing is such that any desired decorative finish may be applied thereto without decreasing the efficiency of the sound absorbing material disposed beneath the screen, the screen serving

even when decorated to increase that efficiency. It is to be understood that while I have selected metallic screening for economic reasons as an interposed flexible membrane between the source of sound and the sound absorbing materials nevertheless other forms of sheathing might be found to be feasible but which I would consider within the scope of my invention if converging openings were formed therein.

I claim:

1. In an acoustic wall construction, the combination of a fibrous sound absorbing material laid adjacent the surface being treated, means for securing said material to the surface being treated, a locally flexible metallic sheathing material applied over the fibrous material but in spaced relation thereto, means for securing the metallic covering in position in said spaced relation to the fibrous material, said metallic sheathing comprising a sound filter having closely spaced converging openings extending therethrough, which function to preliminarily dissipate the volume of the sound waves before the sound waves impinge upon the fibrous material.

2. In an acoustic wall construction, a sound deadening tile comprising a frame structure, a slab of sound deadening material disposed therein and a metal wire screen sheathing from eight to twenty mesh overlying the frame and attached thereto in spaced relation to the slab of fibrous material.

3. In an acoustic wall construction, a sound deadening tile, a frame structure, a slab of sound deadening material disposed therein and a flexible metallic sheathing overlying the frame and attached thereto in spaced relation to the slab of fibrous material, said flexible metallic sheathing having closely spaced converging opening extending therethrough which function to preliminarily dissipate the volume of the sound waves before the sound waves impinge upon the fibrous material.

4. In a sound-deadening wall construction, the combination of a fibrous sound absorbing material laid adjacent the surface being treated, means for securing said material to the surface being treated, a metallic sheathing material applied over the fibrous material in spaced relation thereto, and means for securing the metallic covering in position in spaced relation to the fibrous material, said metallic sheathing comprising a sound filter formed of wire screen of from eight to twenty mesh.

In testimony whereof, I hereunto affix my signature.

WILLIAM J. YOUNG.