COATING OR PLASTIC. Cross Reference Examiner

106/86

May 29, 1934. W. J. DAVEY 1,960,372

WALL AND CEILING STRUCTURE AND METHOD OF FORMING SAME

Filed Feb. 4, 1932

FIG. 1.

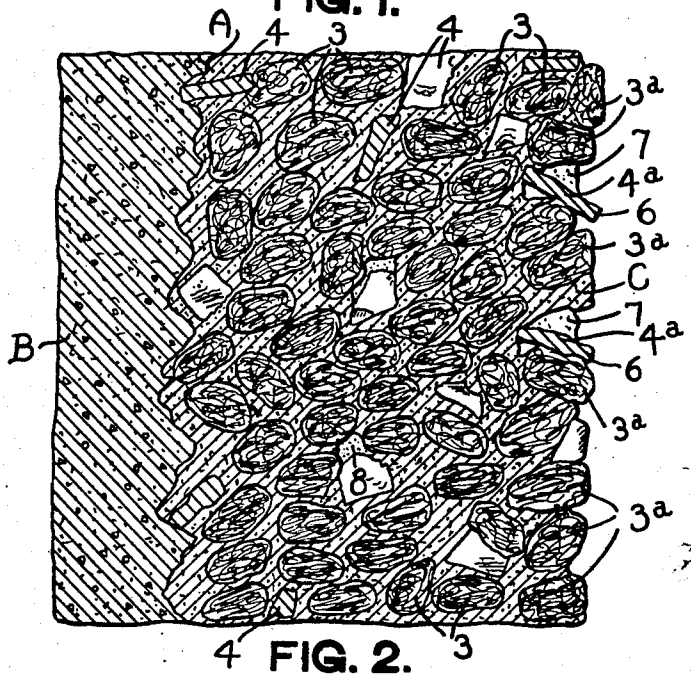
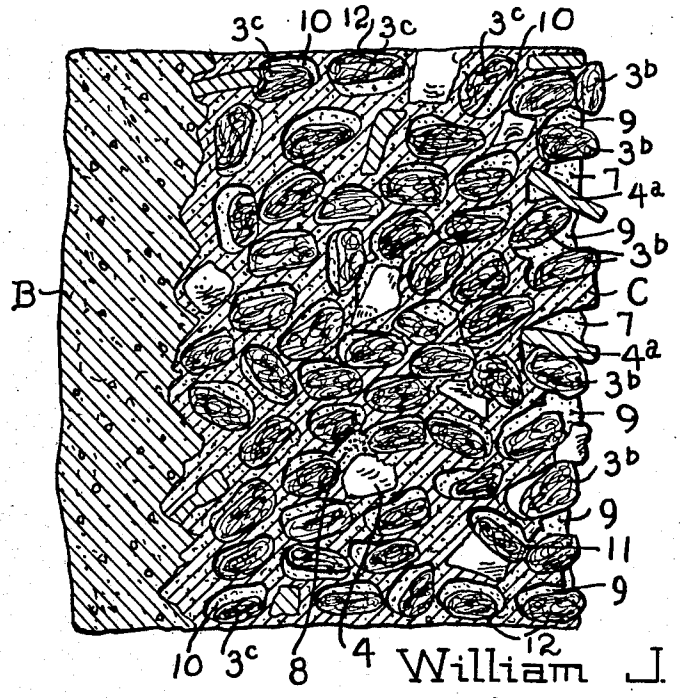


FIG. 2.



INVENTOR.
William J. Davey

BY Lancaster, Allwine and Rommel
ATTORNEYS.

100-00

Patented May 29, 1934

1,960,372

UNITED STATES PATENT OFFICE

1,960,372

WALL AND CEILING STRUCTURE AND METHOD OF FORMING SAME

William Joseph Davey, Takoma Park, Md.

Application February 4, 1932, Serial No. 590,937

6 Claims. (Cl. 72—17)

This invention relates to improvements in the formation of walls and ceiling for structures such as halls, theaters and auditoriums.

The primary object of the invention is to provide a sound wave deadening or absorbing wall which will reduce echoes and resonances.

Another object of the invention is to provide a method of forming a wall structure which when dry requires no further treatment in order to render it sound wave deadening or absorbing.

Another object of the invention is to provide a sound wave deadening or absorbing wall containing voids which wall will not be apt to crack when drying out or when dry.

Still another object of the invention is to provide a sound wave absorbing or deadening wall which presents a pleasing surface appearance.

Another object of the invention is to provide a sound wave absorbing and deadening wall structure which will be economical to produce.

Still another object of the invention is to provide a sound wave deadening or absorbing wall structure formed of material easy to apply and which includes in its composition matter which causes beneficial physical changes in the wall structure while it is drying.

Other objects and advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawing, forming a part of the specification, and in which drawing,

Figure 1 is an enlarged fragmentary sectional view of a wall structure formed in accordance with this invention, before the sound wave deadening or absorbing portion of the structure has dried out.

Figure 2 is a similar view, after the sound wave absorbing or deadening portion of the wall structure has dried out.

Referring to the drawing in detail and wherein similar reference characters designate corresponding parts throughout the several views, the letter A may designate the wall structure as a whole, the letter B the under coat, and the letter C the improved sound wave deadening or absorbing portion of the wall structure.

As to the wall structure A the same may comprise a scratch coat on lath, a brown coat on the scratch coat and an outer or finishing coat consisting of the improved coat or portion of the wall structure over the brown coat.

The under-coat B in the example shown in the brown or floated coat of plaster which has been scratched to form a key. If the under-coat is an old one, it should be hacked and then sprayed with water before the improved portion of the wall structure C is applied.

The improved sound wave deadening or absorbing portion of the wall structure C is composed of a mixture of preferably a hard-setting cementitious binder, particles of cellular material capable of expansion as a result of water absorption, particles of material resistant to chemical change while in the presence of water, and if desirable coloring matter.

The binder may be plaster of Paris, obtained by gentle calcination of gypsum, or other gypsum plaster.

The particles of cellular material capable of expansion as a result of water absorption, and which, when dehydrated, shrink, may compose bran such as the coarse husky outer coat of wheat, rye, or other cereal which, after grinding, is separated from the flour by sifting or bolting. It is preferred, however, to use wheat bran.

The third ingredient may comprise crushed oyster shells or crushed bricks of a size as will pass through a number 8 mesh screen.

opening #8 mesh are 3/32

As a typical example of a mixture for the improved sound wave deadening or absorbing section of the wall structure, the following is given as a typical mixture:—

Plaster of Paris	4 parts by volume
Wheat bran	6 parts by volume
Crushed oyster shells	1 part

Coloring matter to suit, and water enough to be taken up by the bran, to act upon the plaster of Paris and allow the mixture to be applied with a trowel or the like.

This mixture is to be left standing for approximately one hour after mixing, and at the expiration of that time the bran has absorbed water and expanded to approximately one-third more than its volume when dry.

At the expiration of that time, the mixture may be applied to the ordinary under-coat in one or two coats (if in two coats, one coat immediately after the earlier coat), to form a total thickness of the improved sound wave deadening or absorbing portion for at least one-half inch.

In the drawing, the water swollen or expanded bran is shown at 3 and 3ª in Figure 1, the crushed oyster shell at 4 and 4ª, and the binder at 5. It will be noted that the bran is both embedded in the binder as at 3 and is also a part of the outer surface of the wall as at 3ª. The oyster shell is also embedded as at 6, but other shell as at 6ª which is at the surface of the wall aids in the sound deadening qualities of the wall structure,

since the trowel working the surface will catch upon projecting bits of shell 6 and spread them away from their contact with the binder, forming V-shaped pockets as at 7. In this case, the last direction of travel of the trowel was of course downwardly, but whatever the last direction of travel, the bits of shell will project outwardly in that direction forming the pockets mentioned. The shells 4 also aid in cutting the material when being applied, producing interconnection or channels 8 between the bran.

When the water swollen bran 3 and 3^a gives up water either by evaporation or by having it taken up by the binder, the bran shrinks as is shown at 3^b and 3^c in Figure 2. Upon shrinking, the surface bran 3^b and the adjacent binder forms pockets 9, while the bran 3^c and the adjacent binder forms voids or cavities 10, some isolated and others interconnected with the pockets 9 by channels 11. It will be noted also that there are interconnections between the voids formed by the embedded shrunken bran due to the channels 8. Of course a portion of the shrunken and waterless than 3^b and 3^c adheres to the binder as at 12. It has been found that the wall itself does not shrink, perceptively,—the shrinkage is only in the bran, which, it has been discovered, begins to shrink after the binder has set sufficiently for the binder walls of the voids to remain substantially of the same configuration as the swollen bran, which latter might be termed a mould.

The shrunken bran itself, being of cellular structure, has sound deadening or absorbing qualities and it will be readily seen that the shrunken bran, the voids formed by the shrunken bran, the pockets formed by the shrunken bran, the pockets formed by the oyster shell, and the interconnecting channels formed by the oyster shell, all contribute towards the sound deadening or absorbing qualities of the improved portion of the wall structure.

Ample samples of the improved sound deadening or absorbing material made up as one-inch tile, three-eighths plaster, and three-quarter inch plaster were measured for sound absorption by the Bureau of Standards of the United States Department of Commerce with the following results:—

Coefficient of sound absorption

Frequency	1" Tile	3/8" Plaster	3/4" Plaster
1024	.67	.32	.36
2048	.73	—	.52
4096	.64	—	.65

From the foregoing it will be apparent that an improved construction for walls and ceilings has been provided, for the deadening or absorption of sound waves.

Changes in detail may be made to the form of invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

What is claimed is:

1. The method of finishing a wall structure which consists in mixing a hard setting cementitious binder with particles of cellular material capable of expansion as a result of water absorption, and with particles of material resistant to chemical and physical change in the presence of water, adding water to render said binder plastic and said particles of cellular material expanded, applying said mixture to said walls so that said articles of material resistant as above stated will be physically displaced in said mixture forming channels between said particles of cellular material, and permitting said binder and particles of cellular material to dry, to provide a rigid wall structure wherein the said particles of cellular material shrink in the binder and provide sound deadening voids interconnected by said channels.

2. The method of finishing a wall structure which consists in mixing a hard setting cementitious binder with particles of cellular material capable of expansion as a result of water absorption, and with particles of material resistant to chemical and physical change in the presence of water, adding water to render said binder plastic and said particles of cellular material expanded, applying said mixture to said wall so that said articles of material resistant as above stated will be physically displaced in said mixture forming channels between said particles of cellular material and forming with said binder and cellular material pockets in the surface of said mixture, and permitting said binder and particles of cellular material to dry, to provide a rigid wall structure wherein the particles of cellular material shrink in the binder and provide sound deadening voids interconnected by said channels.

3. A wall structure comprising a hard setting cementitious binder having voids and pockets therein containing adhering shrunken particles of material capable of expanding when wet, and contracting when dry and having sound deadening qualities when dry.

4. A wall structure comprising a hard setting cementitious binder having voids and pockets therein containing adhering shrunken particles of dehydrated bran, and having sound deadening qualities when dry.

5. A wall structure comprising a hard setting cementitious binder having voids therein containing shrunken particles of sound deadening material capable of expanding when wet, said particles attached to a portion of the walls of said voids by said binder.

6. A wall structure comprising a hard setting cementitious binder having pockets and voids therein containing shrunken particles of sound deadening material capable of expanding when wet, said particles attached to a portion of the walls of said pockets and voids by said binder.

WILLIAM JOSEPH DAVEY.

See 1,519,311, Dec. 16, 1924
106 — 24