W. C. SABINE.

SOUND ABSORBING BLOCK OR TILE.

APPLICATION FILED DEC. 11, 1915.

1,284,933. Patented Nov. 12, 1918.

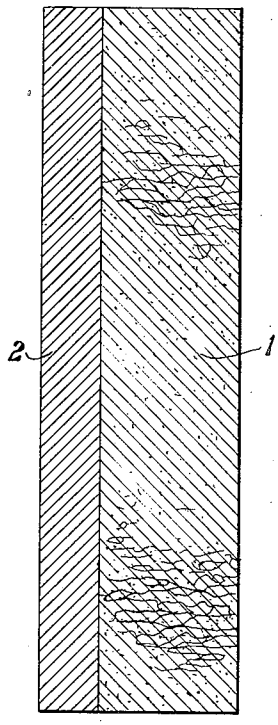


Fig. 1

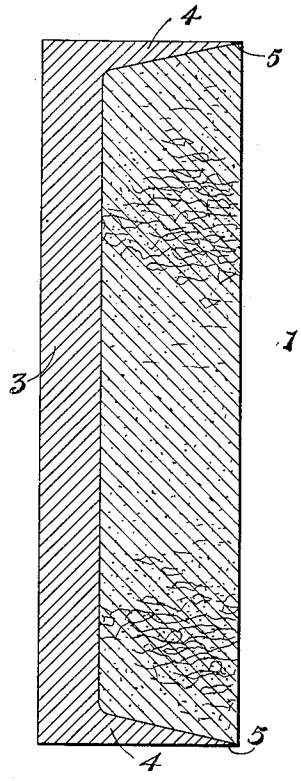


Fig. 2.

Inventor

Wallace Clement Sabine

By his Attorney

C. Van Benschoten

UNITED STATES PATENT OFFICE.

WALLACE CLEMENT SABINE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO H. W. JOHNS-MANVILLE COMPANY, A CORPORATION OF NEW YORK.

SOUND-ABSORBING BLOCK OR TILE.

1,284,933. Specification of Letters Patent. Patented Nov. 12, 1918.

Application filed December 11, 1915. Serial No. 66,374.

To all whom it may concern:

Be it known that I, WALLACE CLEMENT SABINE, a citizen of the United States of America, residing at Boston, county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Sound-Absorbing Blocks or Tiles, of which the following is a specification.

My invention relates generally to the improvement of sound absorbing masonry material designed for the prevention or correction of acoustical difficulties in auditoriums, offices, lecture rooms and the like due to excessive reverberation, echo, and injurious focusing of sound and similar causes. More specifically my invention is designed to so strengthen the back and sides of units of such masonry as to make them a contributing part of the structural masonry of the building, and to protect them during transportation, the sound absorbing portion of such units being relatively fragile.

In some respects the present invention is an improvement on that disclosed in U. S. Patent No. 1,119,543 granted December 1, 1914, to Rafael Guastavino and myself as joint inventors of an improved wall or ceiling for auditoriums and the like, having in combination a supporting masonry structure and attached thereto an exposed inner layer of finished masonry, sponge-like in structure, the latter having pores which have rigid walls and are intercommunicating throughout the mass and openly penetrate the exposed finished surface, the said pores being of such proportional and variant dimensions that said inner masonry material possesses the property of absorbing in excess of ten per centum of sounds lying in pitch between middle C and a third octave above middle C. This masonry material is designed to take the place of felt which is in large use today in acoustical correction in consequence of my investigations. Such masonry material has the advantage of being durable, vermin free and fireproof. It is, however, because of its open structure, friable and incapable of resisting great forces.

It is the object of this invention to produce integral units of masonry material which, while retaining the necessary acoustical qualities, shall also be durable and structurally strong, so that they may be used as pressure sustaining elements in a wall, and can be freely handled in transportation and building operations without danger of breaking. This is accomplished by making solid certain portions of the block or tile which may be devoid of sound absorbing properties without essentially reducing the acoustical efficiency of the unit as a whole.

It is essential to the acoustical quality of this masonry material that the pores be not merely variant in dimension, but that they be intercommunicating and that they reach to the outer exposed surface of the wall. Any closed cellular structure which does not communicate with and openly penetrate the surface exposed to the auditorium is without perceptible acoustical effect. The extent to which the sound is absorbed in penetrating this open porous structure is dependent on the size of the pores and their variant dimensions. The distance to which the sound penetrates such structure is dependent on the pitch of the sound, the size of the pores, and their intercommunicating character. By giving sufficient thickness to a material having pores of a given size and character a depth is reached beyond which its acoustical character is of negligible importance, as added depth of porous material will add little to its sound absorbing qualities. Beyond this depth the material may be solid.

Moreover the edges or sides of units of this masonry material,—tiles, blocks, or bricks,—may be made protectingly solid to a slight but structurally sufficient distance without detracting greatly from the acoustical quality, for the penetration of sound is in the main perpendicular to the exposed surface and parallel to such sides or edges.

Such compound masonry units may be made in either one of two ways depending on the purpose especially to be served.

The solid portion may be cast separately in cement or concrete with or without reinforcement, as purely structural considerations may dictate. On top of this, or in this, should it have sides, may be cast the porous material which is especially sound absorbent. Or the tile, brick or masonry block may be made of the porous material to the full dimensions and then dipped, back and edges, in a still fluid mixture of Portland cement which, penetrating the pores by

capillarity, will set, making a protecting shell of concrete about the back and sides and ends of the block. It is obvious that the latter method is better adapted to the production of a shell which will protect the tile during transportation, while the former method is the one better adapted to the production of a masonry supporting unit.

It is obvious that other processes may be employed in the production of such compound masonry material. I do not limit my invention to the process by which the tile is produced.

The best form of construction embodying my invention at present known to me is illustrated in the accompanying sheet of drawings in which—

Figure 1 is a cross section of a compound masonry unit having a high sound absorbing portion combined with solid back, and

Fig. 2 is a cross section of such a unit having a solid back and sides or ends.

Throughout the drawings like reference characters indicate like parts.

In both figures of the drawing 1 is the porous sound absorbing portion of the masonry unit, which may be either ceramic or non-ceramic. In Fig. 1 the solid portion forming the back of the compound masonry unit is shown at 2. This may be a slab of any hard material, as brick, tile, or concrete, to which the porous material adheres by reason of its being cast or cemented in position, or it may consist of a zone of porous material 1, which has been saturated, solidified and hardened by a cement such as Portland cement.

In Fig. 2, the solid portion of the block extends not only along the back, as at 3, but also along the sides and ends as at 4, 4. Preferably, the edge portions taper out to a very thin tip at the face of the block, as shown at 5, 5, so that the entire face of each block or unit is left acoustically efficient. Here again the solid portion 3, 4, may be formed of ordinary brick or tile or other strong substance, and the porous body 1, cast therein, or the block may be made originally entirely of the porous material and the zones 3, 4, subsequently rendered hard and solid by dipping in cement.

In all constructions the body of porous material 1, is preferably made of a depth or thickness sufficient to substantially exhaust its sound absorbing capacity, *i. e.*, it is given a dimension along lines perpendicular to its face such that the maximum absorption of sound of which it is capable is produced, and beyond which any further addition of material of that particular degree and character of porosity would be acoustically useless.

Among the advantages of such masonry units in addition to the greater structural strength in use and protection from breakage during transportation may be mentioned the fact that they can be laid in courses of masonry much more satisfactorily than can entirely porous units. The latter are liable to absorb the water from the mortar or cement in which they are being laid, before the matter has time to set, and so prevent strong adhesion between adjacent surfaces.

Various changes could be made in the details of the preferred construction herein shown and described without departing from the substance of the invention so long as the principle of arrangement and operation of parts, above set out, is retained.

Having described my invention, I claim:

As an article of manufacture, a building block having a face and main body of porous, sound absorbing masonry material and a protecting pressure-supporting shell of stronger, relatively non-porous material inclosing the back and edges of the porous body, the edge protecting portions being wedge shaped in cross section, tapering to a fine edge from back to front whereby the exposed face of the block is formed practically entirely of sound absorbing material.

WALLACE CLEMENT SABINE.

Witnesses:
MARJORIE MARBLE,
ANNA C. PARKER.