

Nov. 17, 1931.

J. H. NASH

1,832,571

SOUND ABSORBING MATERIAL

Filed June 11, 1929

Fig. 1.

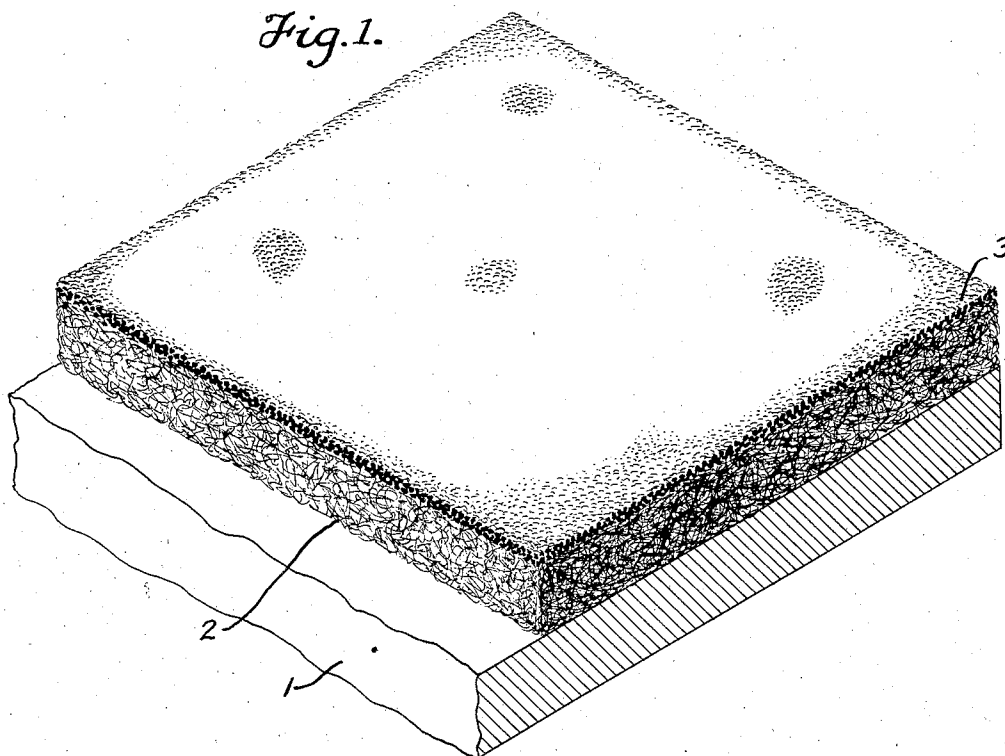


Fig. 2.

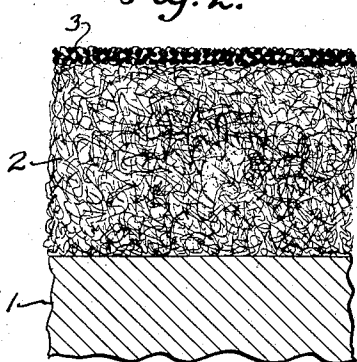
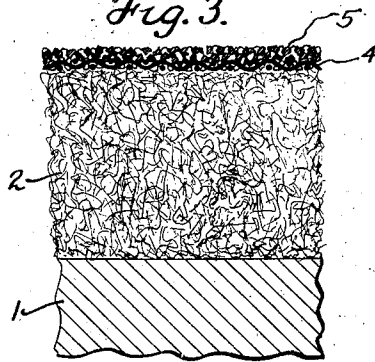


Fig. 3.



INVENTOR
BY *Joseph H. Nash*
D. H. Halstead ATTORNEY

UNITED STATES PATENT OFFICE

JOSEPH H. NASH, OF NARBERTH, PENNSYLVANIA, ASSIGNOR TO JOHNS-MANVILLE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

SOUND ABSORBING MATERIAL

Application filed June 11, 1929. Serial No. 370,013.

This invention relates to improvements in sound-absorbing materials adapted to be used in buildings, enclosures and the like.

One of the primary objects of the invention is to provide rooms and enclosures with a sound-absorbing material which is not only highly effective for deadening of sounds, but also neat and attractive in appearance.

A further object is to provide a sound-absorbing material with a fire-resisting surface or facing in such a manner as not to diminish its sound-absorbing capacity.

Another object of the invention is to provide sound-absorbing materials with porous facings having permanent colors, which can readily take various tints or shades to give them a pleasing finished effect.

A further object of my invention is to provide an acoustic composition having the desirable sound-absorbing properties of various fibrous materials combined with the advantages with respect to durability and appearance of plastic or stone-like materials.

A still further object of the invention is to provide a sound-absorbing wall, ceiling or the like which has a suitable backing or support to which sound-absorbing material of a resilient nature is attached, with a coating or layer over said material that is non-combustible, yet sufficiently porous to allow sound waves to freely pass through it into said material, to be damped and deadened; and of such character also that it can be painted or otherwise colored and decorated as may be desired.

For sound-absorbing or acoustic purposes, felt is of superior excellence, and its use has therefore become quite extensive in this field. It is advisable, however, to provide the felt with an exterior coating to increase its durability and improve its appearance, but in the attachment of this coating various difficulties have been encountered. When cloth or some other fibrous material is utilized to cover the felt, the looks may be improved,

and the sound-absorbing properties of the felt are effectively preserved; but the partition is not rendered fireproof; and when plastic or liquid coatings are employed, it is found that they tend to crack, especially where pieces of felt come together, and to become hard and brittle, becoming unsightly and screening the felt to such an extent that the sound waves cannot penetrate it. The chief end and aim of the whole construction is thus sacrificed.

The defects are overcome in the practice of my invention by the provision of a protective coating for the felt or similar sound-absorbing material comprising a relatively thin layer or coating of granular material having numerous openings which permit the passage of sound therethrough into the sound-absorbing material. The granules are preferably of substantially the same size and consist of material adapted to protect and impart a decorative effect to the sound-absorbing material. Mineral material, which term is intended to include hard, non-combustible material having or capable of taking a decorative finish, is especially suitable for the practice of my invention. The granular particles are preferably secured in position with respect to each other and the sound-absorbing material by a suitable binder, so that no blocking results of the sound-transmitting openings through the protective layer. Various other features and advantages of my invention will be apparent from the following detailed description of an example thereof taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view showing the construction of an acoustic composition according to this invention.

Fig. 2 is an enlarged detail thereof in section, and

Fig. 3 is a similar detail of a modification.

Numeral 1 indicates a backing or support for the acoustical composition comprising an

interior layer 2 of a porous, resilient, elastic or non-rigid sound-absorbing material preferably fibrous in structure, such as felt, and an exterior protective layer or coating 3 of granular material having numerous openings therein to permit the passage of sound therethrough into the sound-absorbing material.

The exterior layer of granular material is very thin relative to the interior layer of sound-absorbing material, and in general it is desirable to make the exterior layer as thin as is compatible with its decorative and protective function. For instance, as shown in the drawing, the depth of this coating may approximate the diameter of the individual granules, and in general, this coating need not consist of more than a few layers of granules in order to attain the best results. The thinness of this coating prevents it from absorbing any substantial amount of sound, and this function is accomplished practically entirely by the porous resilient interior layer 2. The screen-like construction of the layer 3, however, serves to break or mutilates the sound waves impinging thereon into numerous small ones which are more readily absorbed by the sound-absorbing layer and in this respect serves to increase the acoustical efficiency of the composition.

The individual granules are preferably of about the same size, such as may be obtained by suitable screening of aggregates of indeterminate sizes. Granules of the same dimensions have a maximum amount of voids or openings therebetween when packed, and by using granules of this character, the coating 3 is provided with the maximum amount of sound-transmitting openings. For this reason, rounded particles are preferable to irregular ones, and I have found rounded particles of pumice particularly advantageous.

The size of the individual granules may vary, but obviously excessively large or small granules should not be used. Granules varying in size from about 1/64th inch to 1/8th inch in average dimension have been found to be suitable.

Various methods may be utilized for applying the protective layer 3 of granular material to the sound-absorbing material 2.

The granular material or aggregate may be fixed to the layer 2 with a suitable binder which may be applied directly to the felt or other sound-absorbing material and the aggregate sprayed or blown into place; or the binder may be mixed with the aggregate and the mixture spread or trowelled on to the felt surface. The binder used, in addition to having the requisite adhesive properties, should be waterproof and of such a character that it will shrink upon drying so as to produce a minimum amount of blocking of the openings between the aggregate, thereby

leaving the granules and sound-absorbing layer bound to a large extent only at their points or areas of contact. While various binders may be used, I have found casein glue, and a binder containing a pyroxylin base such as is used in the leather industry, particularly suitable.

An advantageous modification of my invention is shown in Fig. 3, wherein a screen 4, preferably of a suitable metal, such as copper or galvanized iron, is combined with the protective layer 5. The mesh of this screen should be such that the granules will not pass entirely therethrough, but is of such a size that a large proportion of the granules may pass partly through or become embedded therein. The screen may be stretched over the surface of the sound-absorbing material and the mixture of binder and aggregate applied thereto and trowelled into place, or the aggregate may be applied by stretching the screen on a frame and then adding the aggregate. When made by the latter method, the reinforced screen may be made and marketed separately from the sound-absorbing felt or like material, and assembled therewith upon the construction of the acoustical wall or partition. A loosely woven fabric or netting may be substituted for the metal screen to advantage under some conditions.

My acoustical composition may be either in tile form, or it may be built up or fabricated directly on the wall, ceiling or other surface.

When a tile is to be produced, the felt may be applied to a rigid backing 1 of any suitable material, then the aggregate is applied by one of the methods above described and the sheet of material cut into blocks or tiles of suitable size which may be applied by nailing or cementing into place. This method of manufacturing my product has the distinct and highly important advantage that all operations are carried out in the factory, where conditions may be accurately controlled.

In forming my product directly on the wall or ceiling, the felt is attached to the surface thereof and the granular coating formed as in the construction of the tile. No backing is necessary in such cases or is furnished by the wall or ceiling structure.

Felt, especially reinforced felt, such as "punched" felt, has been found to be particularly adapted for use according to my invention; however, various other resilient sound-absorbing materials may be substituted therefor, as, for example, fibrous materials such as balsam wool, rock wool, fibre board and fabrics. A loosely woven fabric or netting may be applied to the felt or other sound-absorbing material to give additional reinforcement before application of the granular layer.

The granular material used for the pro-

5 tective coating 3 may consist of any of a wide
variety of hard crushed materials. Pumice
and tufa, and various other mineral sub-
stances, have been found to be suitable for
this purpose. The granular material select-
ed may have a natural decorative tint, or such
a tint may be imparted to it by painting or
dyeing either before or after its application
to the sound-absorbing surface. When the
10 granular material is tinted after being ap-
plied to the sound-absorbing surface, the
coloring material employed should prefer-
ably be a light bodied paint or lacquer which
will not unduly reduce the porosity of the
15 coating. A certain amount of the coloring
matter will soak into the sound-absorbing
material, but a sufficient amount will remain
on the granular particles to impart the de-
sired color. By proper selection of coating
20 material, a great many different decorative
effects can be obtained. The resulting com-
position has the distinct advantage of simu-
lating stone and ceramic acoustical structures
in its appearance and durability, both as to
25 wear and fireproof qualities, but possesses
sound-absorbing properties much greater
than such structures.

What I claim is:

1. An acoustical construction comprising a
30 sound-absorptive layer of porous resilient
sound-absorbing material provided with a
relatively thin exterior protective layer upon
which the sound waves impinge of granular
particles having numerous openings therebet-
35 tween to mutilate the sound waves and permit
the passage of sound therethrough into the
sound-absorbing material.

2. An acoustical construction comprising a
40 sound-absorptive layer of felt sound-absorb-
ing material provided with a relatively thin
exterior protective layer upon which the
sound waves impinge of granular particles
having numerous openings therebetween to
45 mutilate the sound waves and permit the pas-
sage of sound therethrough into the sound-
absorbing material.

3. An acoustical construction comprising a
sound-absorptive layer of fibrous sound-ab-
sorbing material provided with a relatively
50 thin exterior protective layer upon which the
sound waves impinge of granular particles
bonded to each other and having numerous
openings therebetween to mutilate the sound
waves and permit the passage of sound there-
55 through into the sound-absorbing material.

4. An acoustical construction comprising a
sound-absorptive layer of porous resilient
sound-absorbing material having bonded
thereto a relatively thin exterior protective
60 layer upon which the sound waves impinge
of granular mineral material having numer-
ous openings therebetween to mutilate the
sound waves and permit the passage of sound
therethrough into the sound-absorbing ma-
65 terial.

5. An acoustical construction comprising a
sound-absorptive layer of porous resilient
sound-absorbing material provided with a
relatively thin exterior protective layer upon
70 which the sound waves impinge of substan-
tially equally sized granular mineral mate-
rial bonded to each other only at their points
of contact.

6. An acoustical construction comprising
an interior layer of porous resilient sound-
75 absorbing material, a relatively thin exterior
protective layer upon which the sound
waves impinge of incombustible mineral ma-
terial comprising granular pumice having
numerous openings therein to permit the pas-
80 sage of sound therethrough into the sound-
absorbing material, and a bonding material
to secure the protective layer to the sound-
absorbing material.

7. An acoustical construction comprising
85 an interior sound-absorptive layer of sound-
absorbing felt, a relatively thin exterior pro-
tective layer upon which the sound waves
impinge of granular particles having num-
erous openings therebetween to permit the
90 passage of sound therethrough into the
sound-absorbing material, and a bonding ma-
terial adhesively securing the protective
layer to the sound-absorbing material.

8. An acoustical construction comprising
95 an interior sound-absorptive layer of porous
resilient sound-absorbing material, a rela-
tively thin exterior protective layer upon
which the sound waves impinge of substan-
tially equally sized incombustible granular
100 particles, and a bonding material containing
casein glue binding the protective layer of
granular particles to the sound-absorbing ma-
terial only at the points of contact.

9. An acoustical construction comprising
105 an interior sound-absorptive layer of fibrous
sound-absorbing material, a relatively thin
exterior protective layer upon which the
sound waves impinge of substantially equally
sized granular particles of mineral material,
110 and a bonding material binding the protective
layer on the sound-absorbing material and of
a character adapted to shrink sufficiently on
drying to prevent blocking of the openings
115 between said particles.

10. An acoustical construction comprising
an interior sound-absorptive layer of porous
resilient sound-absorbing material, and a re-
latively thin exterior protective layer upon
120 which the sound waves impinge comprising a
meshed element having incombustible granu-
lar particles embedded in the apertures there-
of so as to permit the passage of sound there-
through into the sound-absorbing material.

11. A protective screen for sound-absorb-
125 ing surfaces comprising a meshed element
having incombustible granular particles em-
bedded in the apertures thereof so as to per-
mit the passage therethrough of substantial-
ly all of the sound impinging thereon.
130

12. An acoustical construction comprising
an interior sound-absorptive layer of porous
resilient sound-absorbing material, and a rel-
atively thin exterior protective layer upon
5 which the sound waves impinge comprising
a metallic meshed sheet having a coating se-
cured thereto of incombustible mineral ma-
terial having numerous openings therein to
10 permit the passage of sound therethrough
into the sound-absorbing material.

Signed at New York, in the county of New
York and State of New York, this 10th day
of June, A. D. 1929.

JOSEPH H. NASH.

15

20

25

30

35

40

45

50

55