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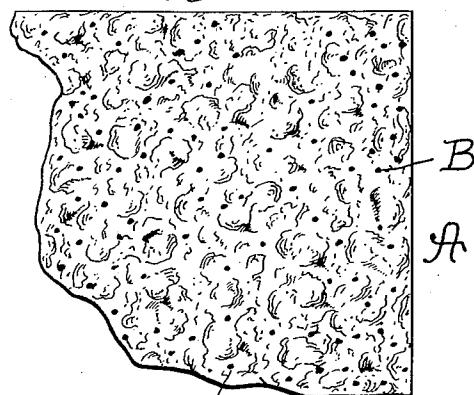
1,682,986

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SOUND ABSORBING SURFACE AND PROCESS OF PRODUCING SAME

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Fig. 1.



B

A
B

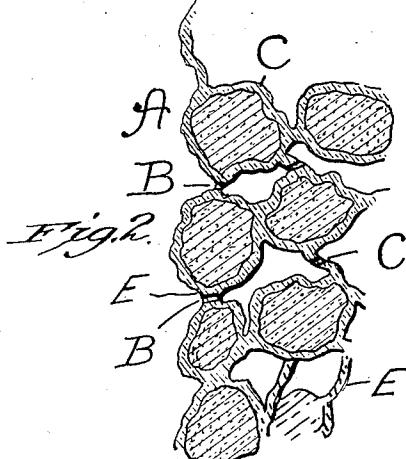


Fig. 2.

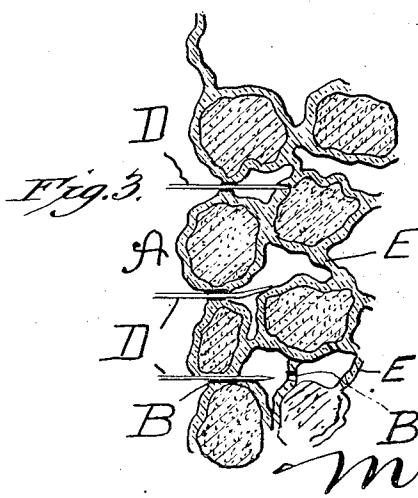


Fig. 3.

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SOUND-ABSORBING SURFACE AND PROCESS OF PRODUCING SAME.

Application filed August 29, 1927. Serial No. 216,825.

This invention relates to sound absorbing surfaces, such as walls, ceilings and the like, and a new and novel process of producing same.

5 The invention consists in means for producing an extremely porous surface by virtue of the inherent properties of the constituents employed and in afterwards subjecting the resultant product to a treatment that 10 will greatly augment the insulating quality of the product.

In sound absorbing wall surfaces, it is old in the art to construct same of plaster made up of granular particles, such as 15 pumice, slag, coarse sand or the like, and a bonding material such as gypsum, Keen's cements or other suitable well known materials, adapted to form a product characterized by many voids throughout the mass and 20 upon the exposed surface thereof. Plasters of this character are adapted to be applied directly to a wall or the like by means of hand operated tools such as a trowel. They may be made to possess, respectively, varying 25 measures of bonding material in proportion to respectively varying measures or amounts of granular matter. It follows, in consequence thereof, that in the step of applying the wet plaster to a wall surface or 30 the like by means of tools of the craft, there is a seepage of cementitious moisture upon the outer or exposed face of the wall induced by the troweling action when applying the plaster, and that this cementitious seepage 35 when hardened forms a scale or crust which retards the intended functional characteristics of a plaster of this nature. It must be borne in mind that a sound absorbing plaster to be efficient as a deadener of sound 40 should be highly porous and cellular so that without a doubt a very large part of the incident sound will be absorbed. If this incrustation, as it were, or hardened surface seepage is permitted to remain upon the exposed 45 surface of a wall, it is reasonable to say the least, that the functional qualities of the wall are greatly impaired, because, and as is evident, same acts to fill and hence

destroy the porous or intended cellular exposed surface of the finished wall. It is accordingly an important object of the present invention to subject this surface incrustation or hardened aftermath following the step of applying the plaster, or incident thereto, to a treatment to rupture, fracture or penetrate 50 same and produce therein a multiplicity of surface voids and for effecting communication between same and the underlying voids in the body of the material. It is reasonable to infer that unless this incrustation is attacked and broken down, at least in part, after the wall is set, the fullest efficiency of 55 the wall as a sound deadener cannot be obtained. But, and in view of the invention now made and about to be fully described herein, it is possible in sound absorbing 60 plasters to obtain the highest measure of sound absorbing efficiency.

The invention further contemplates the scheme of determining the sound absorbing 65 qualities of the plaster after the same has set and hardened, whereby and after the sound absorbing property of the plaster has been tested, and found lacking in its property to absorb certain sounds, said property can be 70 elevated and gauged where it will function most satisfactorily to a far greater degree than would be possible with plasters heretofore known and employed where no provision was made to penetrate the aforementioned 75 surface incrustation caused by the hardening of the cementitious seepage which is naturally caused to be expressed from the plaster when spreading same. The advantages flowing from the invention are especially noticeable when the invention is 80 used in conjunction with plasters employing a large amount of gypsum or other bonding material, but the benefits to be derived are not confined to such plasters, as even in instances where the measure by weight of bonding material is relatively negligible the power of the plaster to absorb incident 85 sound is increased when one resorts to the use of the invention.

To the best of my knowledge, I am the

first in the art to provide ways and means for treating plaster after the latter has set and hardened, or after the plaster has been applied, for boosting, so to speak, the sound absorbing virtues of the finished product. Heretofore it has been sufficient that the plaster, when set and hardened, shall possibly function to accomplish some part of an end in view according to some precalculated formula pertaining to the art of acoustics, supplemented by a consideration of the physical properties of the material employed in the manufacture of the plaster, but, in no instance, has an attempt been made to accentuate the sound deadening or absorbing virtues of the plaster after it has been actually produced as a wall surface.

Other objects and advantages will more fully appear as the description proceeds.

20 In the drawings,

Figure 1 is a plan view of a portion of a wall surface made in accordance with the invention;

25 Figure 2 is a transverse section therethrough; and

Figure 3 is a diagrammatic view similar to Figure 3, showing the manner of breaking down the outer face of the wall surface and the inner texture of the surface.

30 As an example of the process and its resulting product, I will make reference to some well known ways of producing porous material having a large number of air cells so that without resorting to the use of my invention the material per se will function as a sound absorber. I will also indicate some marked ways of changing the character of the material so that an extremely high measure of efficiency will be had when resorting to the use of the invention. The well known examples of porous materials capable of being treated according to the step of my invention so that the porosity of the finished product may be increased, 40 either before or after it has been tested, may consist of:

Example No. 1.

45 A plaster comprising granular particles that will prevent close packing and leave voids therebetween, to which is added a bonding material of such nature as to not completely fill the voids between the granular particles. The bonding material may be of the kind disclosed in United States Patent No. 1,458,631, dated June 12, 1923, issued to Paul E. Sabine.

Example No. 2.

60 A plaster formed of particles of body material and a binding substance bonding the particles to each other only at their points of contact. A plaster of this character is shown and described in United States Letters Patent Reissue No. 14,992,

issued November 23, 1920, to Wallace C. Sabine and Rafael Guastavino.

Example No. 3.

A plaster formed of pumice stone, slag or the like, four to ten parts, mixed with a binding material, about one part, such as cement, gypsum, asphalt or with silicate, pitch or the like, as disclosed in United States Letters Patent No. 1,003,406, issued to Heinrich Ottman on September 12, 1911.

In order that a cellular material can be produced that can be applied by the well known troweling tools, and, at the same time possess an extremely high degree of sound absorbing efficiency, I form my plaster according to the following examples:

Example A.

2 parts by weight pumice;

1 part by weight bonding material; or

Example B.

3 parts by weight pumice;

1 part by weight bonding material; or

Example C.

1 part by weight pumice;

1 part by weight bonding material.

To each of the above is added a suitable percent of soap whose function is two-fold, namely, that it causes bubbles to be formed in the plaster as it is troweled or worked so as to increase the cellular formation of the product and provide readily fragile films of cement that can be quickly penetrated and torn down, and, secondly, that it furnishes what is known in the art as "slip" enabling the plaster to run quickly and smoothly at the same time lending some cohering or viscous quality to the plaster that will cause it to take quick purchase against the surface being coated. In either of the Examples A, B and C above set forth, it will be observed that, in effect, they may be called "high sand plasters."

Whether a wall surface is constructed according to the aforementioned Examples 1, 2 and 3 or in accordance with the Examples A, B or C, it is impossible to prevent the excess moisture from being expressed from the plaster during the troweling process, and, in consequence thereof, said moisture, which is heavily laden with cement, settles on the front or exposed face of the wall and, when hardened, it presents a sort of skin or cementitious film which traverses a large number of the underlying voids or cells in the body of the mass. This natural consequence is decidedly detrimental and the efficiency of the product as a sound absorber is lowered to a very marked extent.

I produce a plaster preferably according to one of the examples A, B or C, mixing the constituents together with water until

a plaster of the proper consistency is had. The plaster is then troweled into position upon the wall to be covered and same is permitted to set and dry in the regular manner.

I now scrape over the outer or exposed surface of the wall thus formed so as to break down, at least at many points, the aforementioned cementitious skin coat which resulted from the seepage moisture induced by the troweling pressure. Or better still, I employ a wire brush whose bristles are stiff and of suitable transverse diameter, and by advancing the free ends of the bristles against said skin coat while retaining suitable pressure thereagainst, I cause these bristles to penetrate the said film coat and to pass into the body of the plaster so as to tear down all film surfaces that reside in their path. In this manner, I not only reopen the exposed surface of the plaster, but, and as will be seen, I tear away certain of the material within the body of the mass or through the thickness thereof. If, incident to the troweling process, certain of the voids are obstructed and, hence, the quality of the plaster impaired, it manifestly follows from the foregoing description that I re-establish lanes of communication between the voids so as to bring the material to a point of maximum efficiency as a sound absorbing plaster.

When resort is made to a scraping action as a means to open up the surface pores, a flat steel blade can be employed whose edge portion can be impelled manually over the exposed surface of the wall while the blade is advanced against the wall by pressure of the arm of the plasterer. When use is made of a stiff bristled brush, the bristles can be of the same transverse diameters, or they may be respectively of different diameters, some very small and others appreciably larger. In either instance, I rectify the mistakes which were made to present themselves, as a natural consequence, when applying the plaster, and the finished product not only is possessed of its erroneously calculated degree of absorption, whatever that may be, but in addition thereto I have multiplied by many times the number of surface voids, and aside therefrom have opened up the paths of communication within the body of the product.

A wall constructed according to Examples Nos. 1, 2 and 3, or A, B and C, may be set up and tested when hard and dry, or at least, or preferably, while semi-dry, and if found too low in its sound absorbing property the objection can be remedied and other tests made until the desired results are had. I am able to use a high bonding plaster and a low percentage of granular particles. The plaster can be applied like hard plaster, or non-sound absorbing plaster. The colloidal matter, (soap), adds to the number of air

cells, so as to facilitate the step of breaking down the parting walls between them. The soap is preferably in the form of finely ground powder so that it will mix with the other constituents to the extent that the plaster material may be sold in a dry ready-to-mix form.

I have stated that one desirable way of carrying my invention into practice is to produce a wall of plastic material and then break down what may be called the surface or skin coat of the wall before the latter has set, so as to produce the greatest multiplicity of surface interstices or voids. However, I wish to make clear that in so far as may concern the broad phases of my invention there are other and very desirable ways of accomplishing not only the results hereinbefore mentioned but results that may be had with great accuracy in consideration of a previously calculated acoustical formula which I have used as a pattern in the production of a wall or surface whose sound absorbing qualities may be controlled according to a predetermined formula or pattern. With this end in view, perforations of respectively graduated sizes may be formed within the wall surface as may be necessary to meet a given condition. By "graduated sizes" I, of course, have reference to both the diameters of the holes to be formed, as well as to the depth of such holes.

On reference to Figure 1, it will be observed that the exposed face of the wall surface A is formed with a multiplicity of holes B which extend into the thickness of the material. In Figure 2, it is observed that the holes B traverse certain of the voids C in the body or thickness of the plastic mass. In this manner, I am able to open these inner voids to the outer or exposed face of the wall surface and thereby increase the porosity of the material.

Upon reference to Figure 3, the bristles D are shown as penetrating the material from the outer face thereof to a point in the direction of or through the thickness of the material. The thin shells or films E around the principal voids C are likewise penetrated and broken through so that communication is established between these voids and the outer face of the material by way of the holes B.

I claim as my invention:

1. The process of producing a sound absorbing wall which consists in providing a plaster including porous granular particles that will prevent close packing and produce voids between the particles, applying the plaster to the surface to be covered, permitting the plaster to set, and in penetrating the exposed face of the plaster and continuing this step of penetrating the material to break down the hardened surface film induced by seepage of cementitious moisture

in the act of applying the plaster and to break down the inner texture of the material at the boundaries of the voids between the granular particles, whereby to establish inter-communication between the voids and to open the voids to the exposed outer face of the material.

2. As a new article of manufacture, a cel-

lular sound-absorbing material formed of granular particles and a gypsum base, the said material having openings extending from its exposed surface and extending into the material through the thickness thereof and traversing the walls of adjacent cells of the material.

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