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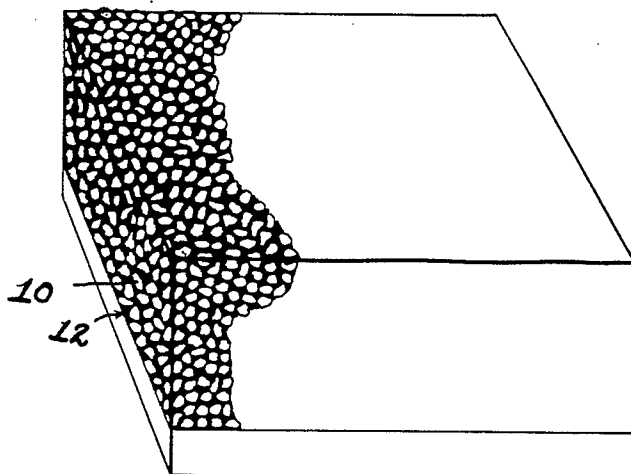
A. M. ZOTTOLI

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ACOUSTIC COATING MATERIAL

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Cork & Cement { *P.P.*
or
P.P.



Inventor.
Anthony M. Zottoli
by J. Stanley Churchill
att'y.

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ACOUSTIC COATING MATERIAL

Anthony M. Zottoli, Quincy, Mass.

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2 Claims. (Cl. 106—24)

This invention relates to acoustic coating material.

The invention has for an object to provide a novel and highly efficient acoustic coating material which after application to a wall, ceiling, or other surface, provides an acoustic coating having a high sound absorption coefficient, which possesses superior cohesive and adhesive properties and strength, and which is therefore more resistant to abrasion, cracking and disintegration than other acoustic plasters now on the market and of which I am aware.

The drawing illustrates the preferred embodiment of the invention.

In general, the present invention contemplates an acoustic coating material and particularly an acoustic plaster, comprising a mixture of particles 10 of resilient material, preferably cork, and cementitious material 12, the latter being capable of setting up with water, and may comprise any of the commercial forms of Portland cement, plaster of Paris, and the like.

I have discovered that a most efficient and commercially practicable acoustic coating material may be produced by utilizing a definite range of sizes of resilient material, preferably cork, mixed with any of the finely divided cementitious materials which are capable of setting with water, such for example as Portland cement, plaster of Paris, etc., and in which the proportion of the cork or other resilient material to the cementitious material lies within a definite range. From extensive experimental work, it has been established that variation of the size of the cork particles or of the mix of cork to cement from the prescribed ranges alters both the physical and acoustical characteristics of the resulting coating material to such a marked extent as to render the material, when applied to a wall, ceiling, or other surface, of little commercial or acoustic value. Accordingly, the present invention contemplates a coating material for acoustic purposes comprising ground or granular resilient material, preferably cork, in which the particle size corresponds to a commercial grade of ground cork known as 12—20, and in which a proportion of cork to cement by volume lies substantially within the range of from 2 to $2\frac{1}{2}$ parts of cork to 1 part of cement. The term "12—20 grade cork"

is an expression commonly used in this art to denote a cork in which the particles lie within the limits of 12—20 mesh screen. I have also discovered that the general resistance of the coating to disintegration under conditions of use, after application to a surface such as a wall or ceiling, may be improved by incorporation of a small proportion of a water soluble adhesive, preferably dextrine.

I am aware that mixtures of cork and cement have been heretofore used in the production of dense composite sheets or blocks used for general building, insulating and flooring purposes, but such material possesses but little sound absorbing properties and is of no commercial value as an acoustic material. I am also aware that an attempt has been made to produce an acoustic material using cork particles and cement and with fibrous material such as hair as a binder for maintaining the cork particles in separated relation to one another and out of contact. This material is described in the Comerma Patent No. 1,358,830. It is alleged in such patent that the use of bicarbonate of soda in the cement effects the liberation of a gas during the setting of the cement such as to perforate the cement or hair binder with minute holes. Experimental work following the disclosure in such Comerma patent has demonstrated that the resulting material is relatively inefficient as an acoustic material and possesses little strength and minimum cohesive and adhesive properties, and in addition is exceedingly difficult and uneconomical to manufacture.

In the acoustic material embodying the present invention the utilization of the proper particle size of the cork or other resilient material and the use of the requisite proportion of cement appears to have the effect that when the material is rendered plastic with water and applied to a surface such as a wall or ceiling, the resiliency of the cork or other resilient particles, together with just the right amount of the cement and dextrine results in the production of a honeycombed mass which possesses great strength, superior adhesiveness, and a relatively high sound absorption coefficient. As the material is troweled or otherwise applied by pressure onto a surface and the pressure is removed, the resiliency of the cork particles ap-

pears to cause the same to spring from one another, producing voids, and the proportion of cement used is such as to retain the voids thus formed in the final mass. I have also found

that the use of a small proportion of a water soluble adhesive such as dextrine, glue, gum arabic, or the like, and which preferably comprises about three ounces of dextrine to one gallon of water, substantially improves the cohesive and adhesive characteristics of the mass when applied to the wall or other surface.

As above stated, the present invention is based upon the discovery that, of the various possible mixtures of cork and cementitious material and of the various sizes of ground cork which might be employed, only by selecting ground cork of a size corresponding substantially to that of the commercial 12—20 grade of ground cork and by maintaining the proportions of cork to cementitious material within substantially the limits of 2 to 2½ parts by volume of cork to 1 part by volume of cement and water soluble adhesive, can acoustic material be produced, having the desirable acoustical and physical properties of the present product, including a high absorption coefficient and strength, an ability to withstand cracking and disintegration under commercial use when subjected to vibration, and in addition having superior adhesive qualities forming an excellent bond with various surfaces upon which it may be applied.

As illustrative of the relationship between the proportions of cork and plaster and the efficiency of the various mixes in absorbing sound, the following typical experimental data is furnished.

Plaster	Cork	Absorption coefficient
Part by volume	Parts by volume	
1	1	0.26
1	1½	.40
1	2	.44
1	2½	.60
1	3	.61

The foregoing samples were tested for sound absorption at 512 cycles per second. While the 1—3 mix gave a slightly increased sound absorption coefficient, nevertheless the predominance of the cork detracted to such an extent from the strength as to render the product of little or no commercial value. From a consideration of the foregoing data it will be apparent that the proportions of plaster to cork from 1 to 2 or 2½ produced acoustic products having relatively high absorption coefficients, and these products possess the strength and ability to withstand abrasion and deterioration under vibration necessary for a most successful commercial acoustic material of this character.

As illustrative of the relationship between the particle size of the cork and the sound absorption efficiency of the product, the following data is furnished based upon comparative samples produced of a mixture of plaster and cork in proportions of 1 to 2 parts by volume and tested at a frequency of 512 cycles per second.

Material	Absorption coefficient
12—20 grade	0.44
¼" cork	.28
¼" and ½" cork	.19

A similar test upon two samples of a mixture of 1 part plaster to 3 parts cork gave the following results when tested at 512 cycles per second.

Material	Absorption coefficient
12—20 grade	0.61
Very fine size cork	.21

In addition sample produced of a proportion of 1 part plaster to 2½ parts cork when tested at 512 cycles per second gave the following results.

Material	Absorption coefficient
12—20 grade	0.60
Cork slightly smaller than 12—20	.58
Cork slightly larger than 12—20	.56
Cork still larger than 12—20	.45

From a consideration of the foregoing data, it will be observed that the particle size of the cork plays an important part in the efficiency of the resulting product as an acoustic material and that for best practical results a size corresponding substantially to the commercial grade of ground cork known as 12—20 grade gives the best results.

The present acoustic coating material having dextrine incorporated therein forms a very excellent bond on the various surfaces to which it may be applied. I have found that it lends itself particularly to application to an ordinary scratch coat of plaster, to various forms of gypsum wallboard, to various forms of wood fiber board, and that it can even be troweled directly on metal or wood lathe. The adhesive property of the present material is such that after setting, it cannot be pried from the surface of a wallboard or wood fiber board without tearing the backing. If desired the present coating may be successfully applied to sheet iron painted with asphalt paint. Extensive tests under vibration have indicated that the present acoustic coating composition possesses cohesive strength sufficient to resist vibration for long periods of time without any signs of cracking, disintegration, or separation from the surface to which it is applied.

Additional tests have been made to determine sound absorption coefficients of various layers of the present coating compositions when applied to various bases, and the following have been the results.

Material	Sound absorption coefficient
¼" coating on sheetrock	0.28
¼" coating on wood fiber board	.33
¾" coating on wood fiber board	.44
1" coating on sheetrock	.45
1½" coating on wood fiber board	.77

Tests have also been made of the sound absorption for one inch of the present coating material on gypsum wallboard at five different frequencies, the sample being a 2—1 mix of 12—20 grade cork having incorporated therein a small proportion solution of envelope glue.

The results of experimental work to determine the resistance of the present coating material to abrasion indicated that under the conditions of test, the percentage loss in weight by abrasion for the test period of five minutes of the present

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coating material was 0.24%, while comparative tests on commercial acoustic plasters of the prior art containing no cork indicated losses of upwards of 1.4%. Abrasion tests upon various mixes of cork and plaster gave the following results:—

Mix	Percentage loss
	Percent
1-1-----	0.45
2-1-----	0.50
3-1-----	4.3

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As above stated it has been found experimentally that the incorporation of a small proportion of soluble adhesive, such as envelope glue, dextrine, and the like, imparts superior cohesive and adhesive properties to the resulting acoustic products, and as illustrative of the effect of the use of a small proportion of dextrine in products produced of cork and plaster mixes when subjected to comparable abrasion tests, but in which more abrasive force was applied than in the foregoing abrasive tests, for periods of five minutes, the following results are typical:—

	Percentage loss
Test No. 1	
3-1 mix, no dextrine; cork soaked in water and then mixed with plaster without draining cork first-----	11
Test No. 2	
Same as No. 1, except cork was allowed to partially drain before mixing with plaster---	16
Test No. 3	
Same as No. 2, except cork was well drained before mixing. On abrading the plaster mix first left the sheetrock backing and then completely crumbled into small pieces. Very unstable -----	
Test No. 4	
2½-1 mix, 3 oz. dextrine to 1 gal. water. Cork soaked in water, drained and mixed----	2.4
Test No. 5	
Preferred product; 2½-1 mix, 3 oz. dextrine to 1 gal. water; cork not soaked previous to mixing-----	1

From these tests the superiority of the present product including a small amount of dextrine is clearly apparent compared with similar products containing no dextrine or other soluble adhesive. In using the water soluble adhesive it is preferred to utilize a solution thereof in the amount

found most desirable for the particular character of product, and I have experienced good results using dextrine in amount of 3 oz. to 1 gallon of water. In preparing the dextrine solution from powdered dextrine, I prefer to first make a slurry using a relatively small amount of water and then to introduce the dextrine slurry into substantially a gallon of boiling water. This solution may then be used during the mixing of the plaster and cork into a plastic state ready for application to the wall or other surface. In some instances it may be desirable to pretreat the cork with the dextrine or glue solution, permit it to dry, and then the treated cork may be mixed with plaster and bagged and shipped in this condition, or the treated cork may be mixed with the plaster on the job and made up to the proper consistency with water just preparatory to the application of the coating. When utilizing Portland cement as the cementitious material, I prefer to utilize as the water soluble adhesive a solution of sodium silicate.

This application is a continuation of my prior application, Serial No. 554,789, filed August 3, 1931, as to all common subject matter.

Having thus described the invention what is claimed is:—

1. As a new article of manufacture, an acoustic coating material containing ground cork having a particle size corresponding to that of commercial 12—20 grade ground cork, a small proportion of water soluble adhesive selected from the group of dextrine, sodium silicate and gum arabic, and cementitious material capable of setting with water, the proportions of cork to cementitious material lying substantially within the range of 2-2½ to 1 part by volume, said coating after setting being characterized by a high sound absorption coefficient, by high cohesive and adhesive strength, and by the ability to resist abrasion.

2. As a new article of manufacture, an acoustic coating material containing ground cork having a particle size corresponding to that of commercial 12—20 grade ground cork, a small proportion of dextrine, and cementitious material capable of setting with water, the proportions of cork to cementitious material lying substantially within the range of 2-2½ to 1 part by volume, said coating after setting being characterized by a high sound absorption coefficient, by high cohesive and adhesive strength, and by the ability to resist abrasion.

ANTHONY M. ZOTTOLI.