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ANTISLIPPING TREAD AND METHOD OF MAKING THE SAME

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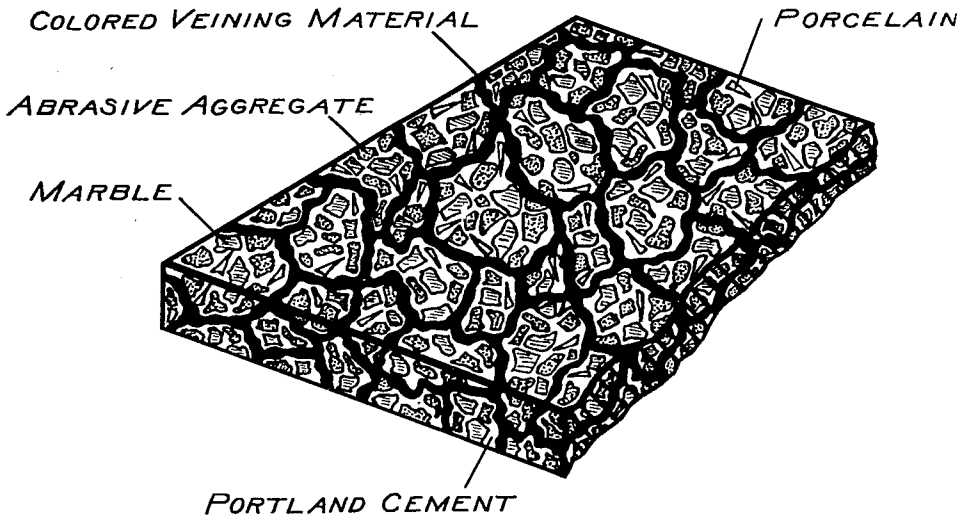

WITNESS

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ANTISLIPPING TREAD AND METHOD OF MAKING THE SAME

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My invention relates to safety tread surfaces and more particularly to anti-slip terrazzo flooring constructions and non-slip tiles having decorative and veined color effects in imitation of natural stone and marble and to a method of making the same.

In the construction of large public buildings such as hotels, banks and various types of business buildings, it is customary to employ considerable quantities of highly expensive and elaborate natural stone, such as marble, in blocks or slabs, for finishing the interior wall surfaces in various public places, such as stairways and the halls and lobbies, where the materials are used especially for their attractive architectural design and beautiful color schemes, and in which the graining, color, texture, veining and other natural characteristics of the stone, when finished and polished, are such as to form pleasing and artistic ornamental and harmonizing color effects. Such architectural designs have ordinarily involved the use of various kinds of floor tread surfaces in the manufacture of which an attempt has been made to reproduce the colored and ornamental surface effects in simulation of the natural decorative stone.

One method heretofore practiced is to make a tread flooring by incorporating chips of natural stone such as marble chips, in a surface of plastic concrete which, when set, is ground to form a substantially plane tread surface. This resulted in a crude flooring construction which was particularly unsuited as an interior wear-resisting floor surfacing in which durability and anti-slipping properties are essential and since the tread produced cannot simulate the veined appearance of natural marble. Furthermore, such marble surfaced floors are very slippery and are not anti-slipping and it has been found that under severe conditions of usage that the marble, being a relatively soft material, tends to wear away rapidly and so leaves a rough, uneven surface of the concrete beneath exposed which is of poor frictional qualities and likely to prove dangerous to pedestrian travel.

Another method comprises making a non-slip floor surface in which the tread surface is formed by embedding isolated abrasive grains in concrete and similar plastic setting materials, but owing to the smoothness of the grains and the poor bonding properties of the grains and the embedding magma, the abrasive granules are not held securely in place under the abrasions of pedestrian traffic and so do not form a permanent anti-slipping surface.

Anti-slip floors have also been made of abrasive chips embedded in a cementitious settable material but these are very unpleasing in appearance as safety treads. These treads have not been satisfactory for use on interior floors where decorative effects and a dense non-absorbent surface are essential since they do not wear substantially uniformly and do not match the elaborate architectural settings. Similarly, chips or aggregates of ceramic bonded abrasive grains have been embedded in cement and while these floors have been satisfactory from a practical viewpoint and they have lent themselves to decorative purposes because of possibilities of using various colors of abrasive chips and intermixed with marble chips yet such floors have still failed to give the pleasing appearance of natural marble.

It is accordingly one object of my invention to overcome such difficulties and provide an anti-slipping floor tread which simulates natural stone and marble and yet has anti-slipping and wear-resisting properties which render it safe and capable of resisting footwear and preventing slipping thereon when exposed and subjected to the constant abrasions of traffic and pedestrian wear.

Another object of my invention is to provide a safety tread having anti-slipping granular material incorporated therein which is of a dense strong structure and is substantially impervious to moisture, and which is constructed to produce a veined tread in simulation of marble to form pleasing color patterns and an attractive appearance.

A further object is to provide a non-slip tread having anti-slipping, wear-resisting abrasive aggregates incorporated therein, which can be formed or laid in a plastic condition and thereafter set to produce a hard wear-resisting anti-slipping surface, which is artistically and naturally veined to represent marble, and in which the veins do not appear only on the surface but penetrate the entire depth of the non-slip tread and so are always present as the body wears away.

A still further object is to provide a simple and economical method of making such a veined tread product and of providing a dense and strong body of bonded anti-slipping granular material and forming a finished smooth plane and polished tread surface.

Further objects will be apparent from the following disclosure.

Referring to the drawing, I have there illustrated in perspective view, a fragment of a flooring or a tile embodying my invention.

In accordance with my invention, I propose to make a non-slip safety tread by utilizing a suitable plastic cementitious material capable of setting to a solid body, such as Portland cement, and forming therefrom a hard, anti-slipping, wear-resisting tread portion provided with vari-colored pigment material arranged as veins, which render the tread pleasing in appearance, and in which there is incorporated and distributed throughout the entire tread portion but exclusive of the veins,

aggregates of anti-slipping abrasive granules united into an integral structure by a bond, such as a vitrified ceramic material. The anti-slipping aggregates, which are employed to resist wear and render the tread safe for pedestrian traffic, may be incorporated and embedded in the plastic setting cementitious mass alone or they may be intermixed with colored decorative chips, such as marble or other suitable natural stone or porcelain, etc. and combined in desired decorative combinations and color schemes so that the mass of plastic cement, when set into a solid body, serves to integrally bond the abrasive aggregates and the decorative chips into a unitary tread structure. Preferably, the aggregates with or without the decorative chips are washed and mixed with a plastic setting medium, such as dry Portland cement, and water in an amount sufficient to cause the mass undergoing mixing to form soft plastic concretions or lumps of varying sizes and of a moldable consistency. These plastic lumps are then mixed and coated with a colored veining material, such as a dry mixture of Portland cement and suitable pigments of either one color or a blend of several colors in order to produce the peculiar and continuous veins between the masses when the plastic lumps are later kneaded or pressed together.

In order that a floor tread may be made expeditiously and economically, I propose to apply the coated lumps at random or in accordance with a suitable color pattern as a tread surfacing laid in position as a top layer on a rough concrete flooring and rolled or otherwise forced into a compact consolidated mass to produce a plane continuous slip-proof surface thereon or I may preform tiles in suitable color schemes, shapes and sizes by depositing and distributing the plastic coated lumps in a suitable mold and then shaping them as a dense compact body by a pressing operation or any other suitable method to compress and consolidate the masses into an integral and unitary structure. This causes chips and aggregates to be closely arranged with their flat faces in the tread surface and they are surrounded by a dense mass of cement which, when set, has a lower porosity and water absorptive power than is possessed ordinarily by cement. The compacting force at the same time also serves to squeeze the veined coatings into irregular patterns, and the finished tread will then contain veins which not only appear as irregular streaks on the surface but they extend throughout the entire portion of the tread embodying the anti-slipping qualities. The cementitious veining coating, when set, also serves to integrally bond the individual lumps into a unitary body.

A desirable type of floor tread may be made of porcelainic chips of variegated colors and shapes interspersed in individual concrete masses, each covered with a non-abrasive coating of a cementitious veining pigment, with anti-slipping aggregates of crystalline alumina granules bonded by a vitrified ceramic material and with sufficient stone chips to give a desired color scheme to the tread surface when the whole masses are incorporated into a unitary tread body. The relative amounts of the various chips are not important except that sufficient anti-slipping chips should be employed and so uniformly distributed throughout the tread surface that they receive substantially all of the pedestrian wear and thereby protect the smooth marble, porcelain and cement portions of the surface. In order that the tread may present a pleasing appearance and be in harmony with its architectural surroundings, I preferably so treat the surface materials as to emphasize the color scheme and give an irregular lined appearance and this is done preferably by rubbing, grinding and polishing the surface and treating it with suitable polishing and preserving materials.

As a satisfactory anti-slipping aggregate for this purpose, I preferably utilize abrasive materials which have a hardness of nine or more on Mohr's scale, and preferably crystalline alumina, either as prepared artificially or as found in nature, such as corundum, emery or electrically fused alumina, but I may also employ silicon carbide or other suitable abrasive materials. Grain sizes smaller than 16 meshes to the linear inch and preferably 60 and finer are ordinarily chosen. In order to bond such anti-slipping grains into durable chips, I ordinarily utilize a ceramic bond and one which preferably may be fused to a vitreous condition in a ceramic kiln. A serviceable mixture may comprise the following ingredients:

	Parts by weight
Slip clay	44
Feldspar	44
Ball clay	12

These proportions may obviously be varied and other materials added or substituted for the ingredients mentioned, depending upon the bond characteristics desired, as is known to one skilled in the art. The bond may be mixed in suitable proportions with crystalline alumina granules of say #60 grit size, such as 77% by weight of alumina and 23% of bond. These materials may be mixed in a dry condition and then dampened with water sufficient in amount to form it by the dry press method into lumps or shapes convenient for firing. The shapes are burned in a suitable ceramic kiln under a heat treatment corresponding with Seger cone 12 after which the vitrified product is removed and crushed to desired lump sizes which ordinarily grade from ⅛ inch to 1 inch in size. The porosity depends upon the size of grain and the amount and type of bond used. I preferably employ an aggregate chip which has a porosity of not over 5%, such as one made in accordance with the proportions above specified, since it is desirable that the chips, or those which are adapted to be exposed on the tread surface, have small capillarity and be of a dense compact structure.

The marble chips are selected and graded according to the purposes desired and preferably are sized to correspond with the abrasive aggregate. I may also employ porcelain chips in many types of flooring, such as where it is not advisable or necessary to use a high percentage of the anti-slipping chips and yet the floor must have long life, or where the artistic features demand the use of porcelain chips either because of a desired color scheme or because of the peculiar sliver-like shapes which porcelain may break into. The porcelain chips or slivers may be obtained by suitably crushing old porcelain ware but may if desired be made initially by approved methods. I may, for example, employ a ceramic mixture of the following ingredients in the proportions specified:

	Parts by weight
Ball clay	35
Feldspar	25
Flint	40

These materials after being suitably molded, dried and burned to vitrify the mixture, are crushed to desired sizes and are ready for use.

As one method of manufacturing a satisfactory tread in accordance with this invention, the anti-slipping aggregate and the marble or porcelain chips are first washed with water to clean them and particularly to fill the pores of the porous material with water before the cement is applied, and they are then combined and mixed in suitable weight proportions, as for example one part of white crystalline alumina aggregates to one and one-half parts of white marble or porcelain chips, and to three and one-half parts of dry white Portland cement, and thoroughly commingled together to form a uniform mixture. Water is then introduced into the mix while the ingredients are being thoroughly stirred in such quantities as will cause the dry materials to become adhesive and start to form soft plastic concretions or lumps of a moldable and pasty consistency which develop in varying sizes. As the amount of water increases the range of sizes of the lumps grows larger, so that care must be observed, however, to avoid the use of so large quantities of water as will very greatly impair or destroy the lumps thus formed and cause a flowing together of the ingredients to form a mass of a wet soupy consistency. The plastic lumps, thus obtained, are then coated with dry coloring materials of the desired veining color or a blend of several colors, which may consist of a dry mixture of Portland cement and suitable pigment materials, such as lamp black and iron oxide, and spread upon the surface of the lumps by sifting or otherwise so as to completely cover the outer surfaces of the lumps. For one type of tread I may use, for example, a dry mixture of one part of lamp black or iron oxide and one to three parts of white Portland cement, by weight, depending upon the shade or depth of color desired.

The plastic lumps, thus coated with the veining material, may be placed in a suitable mold and distributed therein so as to conform to a desired color pattern of natural stone or marble, and they may fill the mold in a sufficient quantity as to give the proper thickness to the tread which is being formed. The mold employed may be of iron and it is provided with an interior cavity of the shape which it is desired to give the finished tile. The lumps are then compacted and consolidated, as by means of pressure, so as to cause the whole mass to adhere together and form a dense compact body in which the relative positions of the coated lumps are changed so as to produce the broken appearance of veins. This slipproof and veined tread portion may form the whole tile and penetrate the entire thickness thereof or if desired it may be employed as a surface layer, in which case, a backing of two parts of sand and one part of Portland cement is then added to the mold and molded integrally in situ with the tread thus formed. The mass is then set away in the mold for a short period to dry after which the tile is removed from the mold and further cured as for any cement product. For example, the tile may be allowed to set in the atmosphere for a day or so, after which it is immersed in water and allowed to remain several days when it will be ready for use.

The tile which has thus been made and presents a rough and unattractive surface, is then rubbed on a rubbing bed with suitable abrasive grains or grinding blocks until the aggregates and chips have been provided with large plane surfaces in which the colored veins show to the best advantage. Then the tile is given a final rubbing and is polished in order to acquire a high gloss and to bring out the marble-like color scheme, as required.

Referring to the drawing, I have there shown a fragment of a tile, in which abrasive aggregates, together with porcelain and marble chips, are embedded in a Portland cement body made as above described, and veins of colored pigment are arranged in an irregular pattern throughout the body of the tile. It will be appreciated from the appearance of the drawing that when the lumps of abrasive aggregates, chips and cement are coated with the dry pigment mixture, and are then subjected to pressure to produce the desired tile shape, the lumps are flattened out and the coatings of pigment are squeezed into irregularly shaped streaks, but which still remain as coatings on the flattened lumps and lie as veins therebetween. When the surface of the tile is finished, as by a grinding operation, the coatings on the top are removed, thus exposing the abrasive aggregates and stone chips, but still leaving the walls of pigment between the abrasive concretions. As shown at the broken edge of the tile, these veins extend downwardly from the exposed surface, and no matter how much the tile becomes worn from usage, the veins will always show at the surface in a pleasing pattern. Where the pigment is employed in mixture with dry cement, the latter absorbs moisture from the wet lumps and so sets properly with the rest of the body. Hence the veins which traverse the tread body unite with the lumps and bond them into an integral mass. If thin veins are desired, the pigment may be used alone, in which case the cement of the lumps breaks through the vein material in places and bonds the mass integrally.

As a simple form of apparatus capable of carrying out the mixing process the device may comprise a power driven revolving barrel mixer of the oblique, tilting type, which has an open top so that the mixing operation may be watched and samples of the mixture may be taken and inspected while the mixing is in progress and without stopping the machine. The mixing barrel is preferably such that while the machine is running it may be tilted at different angles to produce a greater or less degree of mixing action besides being easily filled and emptied to discharge the mixture. During the veining step of the process, the dry colored mixture of pigment and cement in a finely-divided condition is dusted upon the surface of the lumps in the mixing barrel while the machine is in motion and until all of the lumps have been thoroughly coated with the pigment mixture, after which the mixing barrel is then tilted while revolving to discharge and deposit the coated lumps into the mold.

While this invention is particularly applicable to the manufacture of tiles or blocks, yet it is within the scope of the invention to the laying of floors in a plastic condition and capable of setting to a solid body. In this case, various cementitious materials may be utilized, but I preferably employ a suitable hydraulic cement and I may make use of the various processes known in the art of laying concrete or cement floors. As a specific example of one type of process, I may lay a cement flooring of Portland cement and water, which may be mixed with sand,

aggregate or other suitable ingredients according to well known methods. To make a safe tread therefor, I cover the surface of the foundation layer with a layer of my slip-proof, wear-resisting and decorative material applied thereto in the form of plastic lumps consisting of cement, abrasive aggregates and chips of decorative material which are mixed in accordance with the above procedure and then coated with the veining mixture. I may then roll or otherwise force the lumps containing the anti-slipping aggregate into place on the top of the concrete foundation to compact and consolidate the material sufficiently to provide a plane continuous top surface. When the cement has set and has become hardened, the tread surfaces may then be finished off by grinding to a plane surface with a suitable floor surfacing device moved over the surface of the floor.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A non-slip tread comprising a hardened cementitious body having interspersed throughout its tread portion a mass of abrasive aggregates which serve to resist wear and render the tread safe for pedestrian traffic and veins of colored pigment in the cementitious body arranged as a pattern and rendering the tread pleasing in appearance.

2. A non-slip tread comprising a hardened cementitious body having interspersed throughout its tread portion a mass of abrasive aggregates which serve to resist wear and render the tread safe for pedestrian traffic and non-abrasive veins of colored pigment in the cementitious body arranged as a pattern and rendering the tread pleasing in appearance.

3. A non-slip safety tread veined in imitation of natural stone and marble comprising hardened concretions of previously plastic and settable cement traversed and bonded into a unitary and integral body by veins of a cementitious coloring material, in which said concretions solely contain anti-slipping aggregates of vitrified ceramic bonded abrasive material interspersed therein.

4. A non-slip safety tread veined in imitation of natural stone and marble comprising hardened concretions of substantially different sizes covered with a cementitious coloring material which traverses said concretions in lines resembling veins and bonds them into an integral and unitary body, in which said concretions solely contain anti-slipping abrasive aggregates interspersed with chips of ornamental material.

5. A safety tread comprising a cement body of unified and hardened concretions of substantially different sizes and shapes covered with a cementitious colored veining material and having incorporated solely throughout the masses exclusive of the veining aggregates of ceramic bonded abrasive grains interspersed with colored chips of vitrified ceramic material which are so arranged with the surrounding areas of cement that the aggregates will contact with and prevent foot gear from slipping thereon, the tile being dense and substantially non-absorbent of water and having a ground and polished surface of said unified concretions traversed by veining lines, the former being made largely of the aggregates and the ceramic chips which are adapted to receive substantially all of the wear and protect the surrounding cement bond.

6. The method of making an anti-slip tread containing veins in imitation of natural stone and marble comprising the steps of making a dry mixture of abrasive aggregates and a settable cement, separating the mixture into plastic masses by introducing and mixing regulated amounts of water into the dry mass, coating said individual masses with a coloring material, and then compressing the masses together before they have become completely hardened whereby they may be consolidated into an integral and unitary structure having the coatings arranged as vein patterns appearing on the surface of the tread.

7. The method of making an anti-slip tread containing veins in imitation of natural stone and marble comprising the steps of making a dry mixture of abrasive aggregates, colored chips and Portland cement, separating the mixture into lumps of varying sizes by introducing and mixing regulated amounts of water into the dry mass, coating the lumps with a cementitious coloring material, and then compressing the lumps together before they have become completely hardened whereby they may be consolidated into an integral and unitary structure having the coatings arranged as vein patterns appearing on the surface of the tread.

8. The method of making a terrazzo-like anti-slipping floor having veins in imitation of natural stone and marble comprising the steps of depositing upon a suitable support plastic masses of substantially different sizes containing granular anti-slipping material mixed with a settable cement and coated with a cementitious coloring and veining material, consolidating the masses by pressure before they have been completely set, and finally grinding and finishing the tread surface so as to give a partly colored and lined appearance with the anti-slipping material incorporated solely in the hardened concretions.

9. The method of making a non-slip floor tread comprising the steps of depositing in a suitable mold plastic masses of varying sizes containing anti-slipping aggregates mixed with a settable cement and coated with a pulverulent colored cementitious veining material, then consolidating the masses by pressure in the mold before drying to compact them into a unitary tread body, and finally smoothing the tread surface of the unified and hardened concretions so as to remove any irregularities and thereby to present a colored veined appearance resembling marble in which the anti-slipping material is located solely in the hardened concretions.

10. The method of making a non-slip safety tread comprising the steps of forming plastic masses of varying sizes containing anti-slipping abrasive aggregates mixed with a settable cement, providing them with a coating of a pulverulent, colored, cementitious veining material, thereafter consolidating the coated masses by pressure before they have been completely hardened to compact them into a unitary body of the desired shape, and finally smoothing the upper exposed portions of the unified and hardened concretions so as to form large plane surfaces and thereby present a substantially plane tread surface in which the coatings appear as colored vein patterns and with the anti-slipping material located solely in the mass of each concretion.

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