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METHOD OF MAKING TILES

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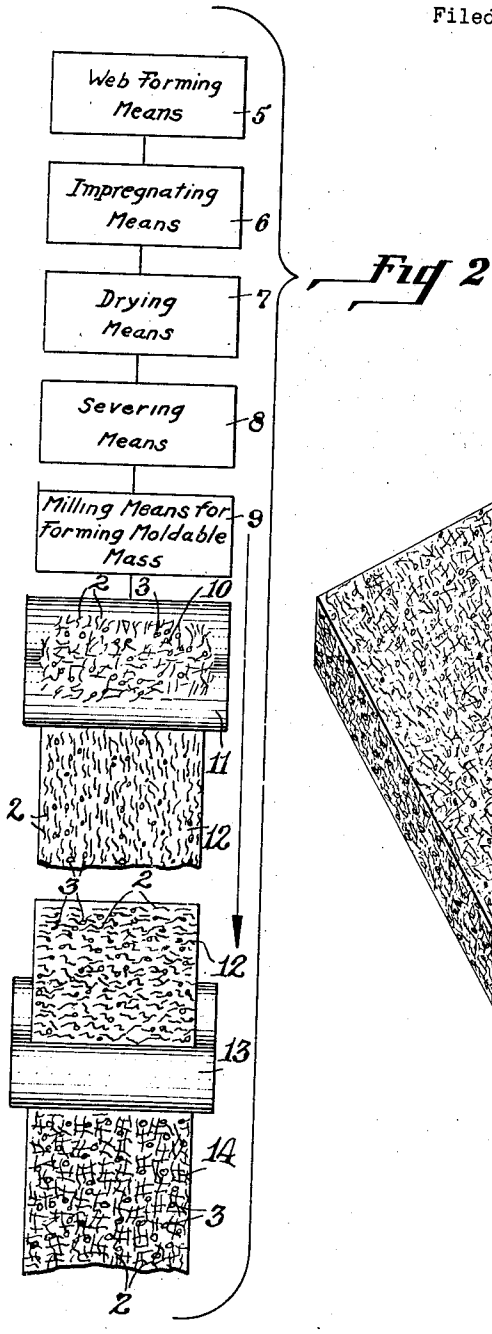


Fig 2

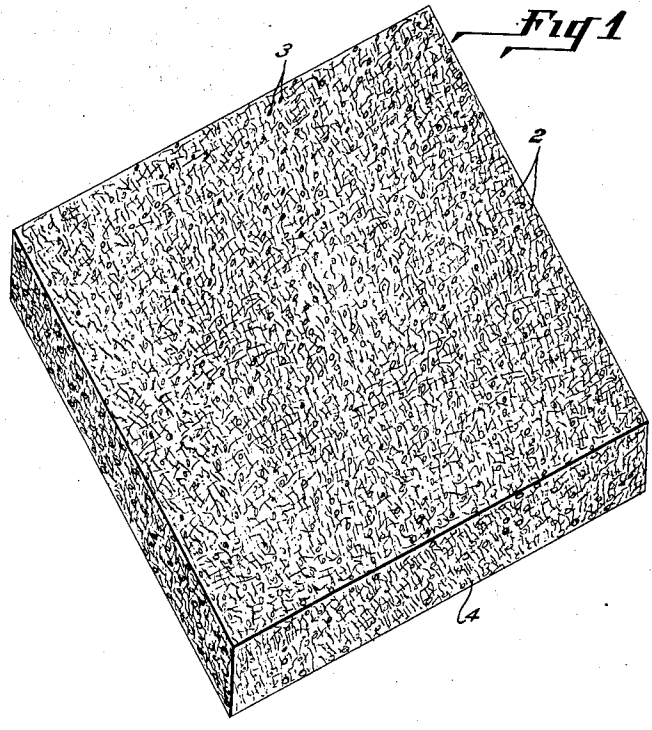


Fig 1

Inventor
John N. Martin
by
Walter F. Hungerford
Attorney

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METHOD OF MAKING TILES

John N. Martin, Manheim Township, Lancaster County, Pa., assignor to Armstrong Cork Company, Lancaster, Pa., a corporation of Pennsylvania

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7 Claims. (Cl. 18—48)

This invention relates to the method of making tiles and, more particularly, to the method of making tiles for industrial uses such as flooring in factories, for shipping platforms, ramps, freight elevators, or in similar places where severe wearing conditions are encountered.

Tile, to be satisfactory for such uses, must be tough and resilient, and possess a maximum of tensile strength and flexibility so as to minimize breaking and cracking. The tile need be abrasion resistant so that it will not be destroyed by the impact of heavy vehicular traffic, and need be weather resistant to adapt it for outside uses. The tile may not be slippery when wet and need be adapted for easy, efficient washing. Above all, the tile must be economical, that is, it must be low in initial cost, cheaply installed, and require little or no attention thereafter.

An object of this invention is to provide a method of making such tiles. Other objects will be apparent when the following description is considered.

This invention relates to a tough, resilient, weather and wear resistant tile suitable for industrial uses comprising a skeleton formed of interlaced, entangled fibers, the skeleton being held in fixed position in a thermoplastic matrix. Preferably, the fibers in such tile carry or are saturated with a moisture resistant substance compatible with the thermoplastic matrix. The thermoplastic matrix is composed of a high melting point natural asphalt blended with a second asphalt having a lower melting point. It is essential that the thermoplastic matrix, which acts as a binder for the interlaced, entangled fibers, be compatible with the saturant of the fibers in order to insure satisfactory tile being produced. Preferably, a blend of such asphalts is used since, if a high melting point asphalt were used alone, the composition would be brittle and susceptible to breaking or cracking, while, if a lower melting point asphalt were used alone, the composition would be soft and, hence, susceptible to abrasion and indentation. The asphalts may be blended together in proportions ranging from 50 parts of gilsonite to 9 parts of blown asphalt to substantially equal proportions of both asphalts. The proportions are varied, of course, depending upon the specific properties it is desired to emphasize in the finished product.

Specifically stated, the tile may comprise the following ingredients in substantially the proportions stated:

	Pounds
Blown asphalt	9.00
Gilsonite	50.00
Fibrous material	68.00
Fly ash	71.00
Pigment	2.00

The above materials are placed in a mixer of ordinary type and blended at a temperature within a range of 290° F. to 310° F. for approximately twenty-five minutes. The materials are mixed or blended together until the batch shows no indications of unmixed material or uneven distribution of pigments.

In the above composition, the fibrous material is placed in the mixer in the form of strips, blocks, squares or other geometrical forms carrying or saturated by a moisture resistant substance compatible with the binder. The fibrous material is saturated in any desired manner with any suitable saturant compatible with the binder prior to the mixing operation. The fibrous material is more thoroughly permeated by the saturant than would be the case if reliance were placed solely upon the mixing operation with the binder to impart moisture resistance to the fibers, and, hence, a greater degree of moisture resistance is secured in the finished product. The fibers are broken down in the mixing operation and are interlaced and entangled by such mixing, forming a skeleton or frame which serves to carry the particles of fly ash, the whole being suspended or held in fixed position in the matrix formed by the asphaltic binder.

After mixing, the composition is conveyed to a two roll mixing mill or rubber mill and is passed between the rolls thereof. In such mill, one roll is heated to a higher temperature than the other roll so that the composition necessarily follows the cooler roll. The material is permitted to make several revolutions about the roll to aid in mixing and is then doctored off the roll in the form of rough sheets. In such sheets, the fibers generally extend in the direction of sheeting. The rough sheets are turned at an angle of 90° to the direction of sheeting and then are folded and passed through a sheeting calender. The sheet is turned at a right angle in order that the interlaced, entangled fibers in the rough sheet may be further entangled by passage through the sheeting calender which changes the direction of at least some of such fibers, thus minimizing any tendency toward directional shrinkage of the finished tiles. The sheets are again passed through the sheeting calender or a similar calender to improve the "face" of the finished product and to produce a sheet of desired thickness.

After calendering, the sheets may be partially cooled by applying a fine spray of water thereto and circulating currents of cold air about their surfaces. The sheets are taken to a punch press and are punched in desired sizes of tile. The tile may then be packed preparatory to shipment.

If desired, the above composition may include

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comminuted cork and/or matured linoleum scrap as a filler in place of, or in addition to, the fly ash. A formula including such material which I have found generally satisfactory, is as follows:

	Pounds
Blown asphalt	9.00
Gilsonite	50.00
Fibrous material	68.00
Fly ash	12.50
Comminuted cork	27.50
Matured linoleum scrap	31.00
Pigment	2.00

A tile somewhat more pliable or flexible, although not as resistant to indentation as the tiles described above, may comprise the following ingredients mixed together and sheeted by the above described process:

	Pounds
Blown asphalt	31.00
Gilsonite	31.00
Fibrous material	81.00
Comminuted cork	27.50
Matured linoleum scrap	31.00
Pigment	2.00

In the above compositions, gilsonite and blown asphalt are used as a binder for the filler materials. In place of gilsonite, I may use any other high melting point natural asphalt. In place of blown asphalt, I may substitute any low penetration petroleum asphalt having a melting point substantially lower than the natural asphalt with which it is to be used. Cumar may be used as a binder in place of the mixture of blended asphalts although it is not as satisfactory due to its higher cost. It is essential, of course, that any binder substituted for the above be compatible with the saturant of the fibers.

The fibrous material in the above composition is used in the form of strips, blocks, squares or the like, although the fibrous material may be shredded or in fibers when it is added to the composition in the mixer. Preferably, the fibrous material is saturated or impregnated by a moisture resistant material, such as a low melting point asphalt, which readily penetrates the fibers, as is well known in the industry. The saturated fibrous material used in the above composition may be felt base scrap such as trimmings or selvage edges derived from the manufacture of saturated felt base floor covering, which is a product well known in the hard surface floor covering industry. In its place, any suitable fibrous material may be used, such as cotton or wool fibers, asbestos fibers, or similar materials, preferably, saturated with a moisture resistant substance. Fibrous material, as used in the above composition, adds strength and flexibility to the finished tile.

The comminuted cork I prefer to use is that termed in the industry "cork mill collector dust cork" which generally ranges in particle size from 100 mesh to dust. Wood flour may be used in its place although it is not as satisfactory and considerably increases the cost of the finished product. Any comminuted matured linoleum scrap may be used in the composition, such scrap being used to increase the density, and perhaps, render some degree of resiliency to the finished product. In place of fly ash, I may use anthracite ash or ground limestone or other suitable fillers.

Although I have described the fibrous material used in the above composition as being in the form of strips, squares, blocks or the like, derived as scrap in the manufacture of floor coverings or roofing, it will be understood my invention contemplates a continuous process and comprehends the steps of forming a fibrous web, saturating or impregnating such web with a moisture resistant substance, then drying, severing the web in strips, blocks, squares, or other sections, milling such sections with a thermoplastic binder compatible with such moisture resistant substance to form a moldable mass in which fibers are present in interlaced, entangled relation, forming the mass in sheets, the majority of the fibers in each sheet extending in the direction of sheeting, turning said sheets at a right angle to the direction of sheeting, calendering the turned sheets to further entangle the fibers by changing the direction of at least some of such fibers, and pressing the sheets to final thickness.

In the attached drawing, Figure 1 is an isometric view of the tile of my invention, and Fig. 2 is a diagrammatic view illustrating the method of making the tile. Referring to Figure 1, there is illustrated a skeleton formed of interlaced, entangler fibers 2 saturated with a moisture resistant substance and carrying particles 3 of comminuted cork, matured linoleum composition, and fly ash, the whole being suspended in a thermoplastic matrix 4 compatible with the saturant of the fibers, the matrix 4 being composed of a high melting point asphalt blended with a second asphalt having a lower melting point.

Figure 2 illustrates diagrammatically the method of making the tile. A fibrous web may be formed by any suitable equipment illustrated diagrammatically at 5, such web being impregnated or saturated with a moisture resistant substance as shown at 6; then passed through a suitable drying device as shown at 7 and severed in blocks, strips, squares or other sections as shown at 8 for suitable mixing with the thermoplastic binder. The fibrous material is placed in a mixer illustrated diagrammatically at 9 with the other ingredients and blended at a temperature within a range of 290° F. to 310° F. for approximately twenty-five minutes.

After mixing, the composition 10 is conveyed to a two-roll mixing mill or rubber mill 11 and is passed between the rolls thereof. Preferably, the material is permitted to make several revolutions about the cooler roll of the mill 11 to aid in mixing and is then doctored off the roll in the form of rough sheets 12. In such sheets 12, the fibers 2 generally extend in the direction of sheeting. The rough sheets 12 are turned at an angle of 90° to the direction of sheeting and then are folded and passed through a sheeting calender 13 to produce a sheet 14. The sheet 12 is turned at a right angle in order that the interlaced, entangled fibers in the rough sheet may be further entangled by passage through the sheeting calender 13 which changes the direction of at least some of such fibers, thus minimizing any tendency toward directional shrinkage of the finished tiles. Preferably, the sheets 14 are again passed through the calender 13 or a similar calender to improve the "face" of the finished product and to produce a sheet of desired thickness. The sheets 14 are cooled, if desired, punched or severed into desired sizes of tile, and packaged for shipment.

It will be understood the saturated fibrous material placed in the mixer 9 may be, if desired, in the form of felt base scrap such as trimmings

or selvage edges derived from the manufacture of saturated felt base floor covering and in such case, for example, the method comprises the steps of forming a moldable mass including such fibers as illustrated at 9, forming the mass by means of the rubber mill 11 in a sheet 12 in which the majority of the fibers in the sheet extend in the direction of sheeting, and entangling the fibers 2 by changing the direction of at least some of the fibers by means of a calendering operation as shown at 13.

My invention provides a tile which is economical in manufacturing cost, costing only one-third as much to manufacture as any tile for similar uses heretofore known. It is tough, resilient, resistant to abrasion and identation and not slippery when wet. It is moisture resistant so that it is adapted for use in places where it may be exposed to the natural elements.

While I have described and illustrated certain preferred embodiments of my invention, it will be understood that my invention is not so limited since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In the method of making a tough, resilient, weather and wear resistant tile, the steps comprising, forming a moldable mass including fibers in interlaced relation held together by a thermoplastic binder, forming the mass in sheets in which the majority of the fibers extend in the direction of sheeting, turning said sheets at an angle to the direction of sheeting, further entangling the fibers by changing the direction of at least some of such fibers by a calendering operation, and pressing the sheets to final thickness.

2. In the method of making a tough, resilient, weather and wear resistant tile suitable for industrial uses, the steps comprising, forming a fibrous web, impregnating said web with a moisture resistant substance, then severing the web in sections, milling said sections with a thermoplastic binder compatible with said moisture resistant substance to form a moldable mass in which fibers are present in interlaced, entangled relation, forming the mass in sheets in which the majority of the fibers in each sheet extend in the direction of sheeting, and further entangling the fibers by changing the direction of at least some of such fibers.

3. In the method of making a tough, resilient, weather and wear resistant tile suitable for industrial uses, the steps comprising, forming a fibrous web, impregnating said web with a moisture resistant substance, drying said web, then severing the web in sections, milling said sections with a thermoplastic binder compatible with said moisture resistant substance to form a moldable mass in which fibers are present in interlaced, entangled relation, forming the mass in sheets in which the majority of the fibers in each sheet extend in the direction of sheeting, turning said sheets at an angle to the direction of sheeting, further entangling the fibers by changing the direction of at least some of such fibers by a calendering operation, and pressing the sheets to final thickness.

4. In the method of making a tough, resilient, weather and wear resistant tile suitable for industrial uses, the steps comprising, milling under heat strips of saturated felt and a thermoplastic substance thereby forming a moldable mass in which fibers are present in interlaced, entangled relation, sheeting the mass, the majority of the fibers after sheeting extending in the direction of sheeting, turning the sheets at an angle to the direction of sheeting, further entangling the fibers by changing the direction of at least some of such fibers by a calendering operation, and pressing the sheets to final thickness.

5. In the method of making a tough, resilient, weather and wear resistant tile, the steps comprising forming a moldable mass including fibers in interlaced relation held together by a thermoplastic binder, forming the mass in a sheet in which the majority of the fibers in each sheet extend in the direction of sheeting, and entangling the fibers by changing the direction of at least some of such fibers.

6. In the method of making a tough, resilient, weather and wear resistant tile, the steps comprising forming a moldable mass including fibers in interlaced relation held together by a thermoplastic binder, forming the mass in a sheet in which the majority of the fibers in each sheet extend in the direction of sheeting, turning said sheet at an angle to the direction of sheeting, and entangling the fibers by changing the direction of at least some of such fibers.

7. A method according to claim 6 in which the fibers are entangled by a calendering operation.

JOHN N. MARTIN.

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