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TILE AND KINDRED MATERIAL AND METHOD OF MAKING THE SAME.

No Drawing.

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To all whom it may concern:

public, which is fast acquiring an educated appreciation.

Be it known that I, JOHN C. MACILDOWIE, a citizen of the United States of America, and resident of Nashua, in the county of Hillsborough and State of New Hampshire, have invented new and useful Improvements in Tile and Kindred Materials and Methods of Making the Same, of which the following is a specification.

Opposed to the æsthetic urge, the exigencies of manufacture on a large scale, the necessity of economies and the price inevitably incidental to specialties in production, have had to be taken into calculation. Broadly speaking, the invention herein described aspires to a reconciliation between the demands of the æsthetic and artistic portion of the public, and the economic limitations of the manufacturer of building materials.

My invention relates to the preparation of tile and kindred materials, which in a stage of manufacture are plastic, and are subsequently hardened. The object of this invention is to provide a method by which such materials may be given surfaces of irregular contour, characterized by sharp, clear-cut prominences and depressions of diverse shapes and sizes, by which also the surface texture, or visual appearance of texture may be readily produced in variations of coarseness or roughness adapted to the situation in which the material is to be used, and by which also the geometric diversities and rugosities of contour of such surfaces may be supplemented by irregularly and locally applied coloring matter. The invention is herein described and claimed in its aspects of method and product.

A large proportion of building materials are plastics. Brick, tile, plaster, furnish examples. These, as is well known, have physical properties which render them susceptible of receiving and retaining any superficial characteristics with which they may be impressed; and it is to products of this character, to tile and kindred materials, that my invention is applicable.

Architects, builders, and interior-decorators, both as educators and purveyors, are becoming more and more fastidious and exacting in respect to the æsthetic effects of their designs and products, and are dissatisfied with the limitation and inadequacies of building materials as heretofore commercially produced, in the obtainment of pleasing effects. The fundamental reason for the failure of most materials in this respect lies in their relatively smooth and monotonous surface, their lack of any obvious texture, and the consequent absence of local variations in light-reflection. Many expedients have been tried in the direction of producing patterns, regular or irregular, which break the undesirable smoothness and monotony of surface, and these have succeeded in proportion to the degree of departure from regularity and monotony and approach toward the fortuitous irregularity of broken or weathered surfaces. The high æsthetic values of well-weathered riven shingles, or of ceiling timbers left with adze marks untouched by the plane, offer examples of the effects desired not only by the specialist in æsthetics but also by the

As a specific example of such materials, I take the concrete tiles, composed of short asbestos fibre, sand, and hydraulic cement, such as are made in presses, or formed in continuously emerging sheets by such machines as are described in Norton's United States Patent No. 979,548, dated December 27, 1910. Tiles or shingles of this character have thoroughly demonstrated their utility and durability, but have resisted many attempts to render them attractive and artistic in appearance. They are susceptible, to a limited extent, of receiving coloring matter, and have been produced in colors other than the dull gray which is natural to them. But the uniform flat and unrelieved surface of these tiles, however colored, and whether laid in one, or several colors on a roof, has hitherto rendered it impossible to obtain wholly satisfactory effects. Impression of regular patterns, such as are produced by means of wire mesh, has improved the appearance of these tiles a little, but the regularity itself of such impressed contours, and the necessarily slight departure thereof from the usual smooth surface has placed such limitations on the shadow-producing, reflecting, and light-dispersing properties of the product that such expedients cannot be regarded as successful in any substantial degree.

In order to produce the desired pronounced, irregular, clear-cut impressions

with similarly characterized mutual boundaries in the form of ridges and prominences, in the material chosen to illustrate my invention, I spread upon the upper surface of the tile-material, while it is still plastic and im-

5 pressible, a layer of heterogeneously shaped and sized fragments or granules of solid material, selecting or preparing this granular material with a view to its free separation

10 from the tile after the latter has become hardened. For tiles of the specific character designated, I have found that granular common salt, commercial rocksalt, serves the purpose excellently. The salt-crystals or

15 granules are spread upon the tile-material in the Norton machine after it has been wetted therein, preferably at such a point or in such manner that the secondary pressure roll does not come in contact with the

20 salt, which is liable to be picked up by the roll. If the salt is spread on the material before passage under the secondary pressure roll, a scraper should be provided to remove salt crystals which cling to the roll, and re-

25 deposit them on the tile material. This material is sufficiently soft and plastic on emergence from the machine to permit the salt crystals to be embedded in its surface when the tile squares are, as usual, placed

30 in setting or curing presses with steel sheets alternating with the tile-squares. The cement which forms part of the concrete mixture of which the tiles are composed, sets until the tiles assembled in stacks under

35 pressure in the curing presses, have become hard. Then the tiles are washed in water which liquefies the salt granules, loosening them from their embedment in the tile surface, which after removal of the granules

40 presents a surface which is a true cast or matrix of the originally applied and embedded discrete layer of solid particles.

This surface, depending for its texture on the size and shape of the solid granules

45 which produced the cast or matrix, may be given any desired degree of rugosity or abruptness of contours, simply by the selection of the granules which are used to form the removable layer. For tiles or kindred material to be used in an interior, when the

50 usual distance of the material from an observer is relatively small, the desired effect may be obtained with granules screened through a relatively fine mesh; whereas for

55 exteriors and roofing, a much coarser granular material may be used, to produce a correspondingly bold solid contour in the surface produced.

A surface which is a cast or matrix of

60 diversely sized and shaped particles of solid material, originally laid as a discrete layer upon and embedded in it, presents to light falling upon it from any direction, a very large diversity of points and inclinations for

65 reflection, throws local shadows of diverse

sizes and shapes, and thus in effect diversifies the resultant color impression made upon the observer.

All monotony of visual impression is eliminated, the total impression is pleasing,

70 for the same fundamental reason that the impression imparted by old and weather surfaces is agreeable and satisfying to the aesthetic sense.

Be it remembered, that the instance above

75 described, of a plastic asbestos-concrete tile and an embedded impression-layer of rock salt crystals, is given only as representative of my invention. The specific tile mentioned

80 is for this purpose representative of any product or material which is plastic and impressionable at one stage, and hardened at a later stage, of manufacture, and all materials similarly characterized are kindred to

85 tiles and similarly susceptible to surfacing by the method described.

Likewise, rock salt crystals represent any granular or fragmentary material which

90 either by its natural constitution or by reason of artificial preparation is in whole, or superficially, liquefiable. Solubility of such particles, in respect to the environment here involved, is one aspect or form of liquefiability. For the purposes of re-

95 lease from their seats of embedment, superficial liquefiability or solubility is substantially the same as complete liquefiability or solubility.

For instance, granules of crushed stone, superficially coated with thin films of paraffin, would serve the purpose and perform the

100 function, when embedded as a layer in the surface of plastic material, described in connection with the specifically different

105 rock-salt material, because the paraffin coating, if heated, would liquefy and allow the stone granules to unseat themselves from the cast or matrix formed in the plastic material. The prepared granules would be

110 liquefiable to the extent that liquefaction is functionally necessary to the method. Granules of paraffin alone, crushed when quite cold and relatively brittle, will serve the

115 same purpose in the same way; thus the superficially liquefiable granule is the full equivalent of a completely liquefiable granule, in the relationship under consideration.

Likewise, granules in themselves insoluble, but superficially coated with a soluble substance, will be released when a solvent of

120 the superficial coating is applied; superficial solubility is, for the purposes of the method, equivalent to complete solubility.

The capability of the described method

125 of producing widely diversified effects will now be readily understood. If, for instance, a layer of reddish granules, insoluble or non-liquefiable as a whole, be embedded in the surface of the plastic tile or kindred material; and if the supply of granules of

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which the layer is composed has been in part only coated with a liquefiable or soluble film, when the layer is loosened from its embedment by liquefaction of the film-substance, those granules which had not been originally thus coated will remain in their seats, and, being irregularly scattered over the surface of the plastic material, will provide patches of contrasting color, enhancing the color and light effects produced by the cast or matrix left in the material by the granules which were released.

The particles destined to remain attached to the material may be made of coloring material which acts specifically in a different manner. For instance, if iron filings, or brass filings, are irregularly distributed in the supply of granular bodies which form the impressed layer, these remain when the granules themselves are released, and thereafter, by oxidation or other chemical action produce spots and patches of color in the surfaces of the cast or matrix itself, with optical effects of the same general character as have been alluded to.

In this connection, the specific manner in which materials operate to produce color effects is immaterial. The coloring material may perform this function by reason of its own inherent and permanent coloration, or it may be of such a character as to undergo color change by exposure, or it may act as a stain upon and altering the color of the tile-material.

The use of a water-soluble salt granule for the impressed layers is of value for other reasons. Many plastic materials, after hardening, effloresce; the patches of efflorescence may be considered undesirable (though it is quite conceivable that the reverse opinion would hold in some cases) and if so, it is of value to the maker or user that efflorescence should be eliminated or corrected.

The action of rock-salt or other water soluble crystals in this situation has been observed to have the effect of preventing efflorescence after the tile or kindred material is a finished product. Probably the moisture in the surrounding air produces sufficient superficial deliquescence of the soluble crystals to form a liquid film in contact with the plastic material, into which film the efflorescent material, which is always close to the surface, is absorbed, possibly by osmotic action, possibly by electrolysis, since the setting or hardening of many plastic materials involved chemical action. Be this as it may, tile material surfaced by embedment of a layer of water soluble granules has been observed to be singularly free from efflorescence on the matrix-surface.

Apart from the æsthetic values which are the chief object of the above described invention, the product characterized by a

surface which is a cast or matrix of a discrete layer of diversely shaped and sized solid granules possesses practical and purely utilitarian merits. The septa between the depressions of the cast are steep sided and sharp in outline, they may in many cases overhang the adjacent depression; consequently the surface as a whole, when the material is laid as tile or shingle on a pitch-roof, will hold snow tenaciously and prevent snow-slides. For the same reason, this material provides a very secure footing to a person having to walk upon the roof which it covers.

If it be objected, that such a surface is defective because of its capacity for collecting dirt, the rejoinder is, that this very capacity is a virtue rather than a defect, because the main object of producing a surface of irregularly diversified light and color effect is served rather than defeated by the collection of dust and dirt, which not only will produce desirable irregular patches of contrasting color and light-reflecting capacity, but will also (being in large part of earthy matter) facilitate the growth of lichen and other vegetable organisms, and enable the building to acquire a pleasing weathered effect more quickly than could otherwise be the case.

I claim:

1. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of solid particles which are liquefiable superficially at least, hardening the material with the said layer embedded in it, and thereafter separating from the material the said layer by liquefaction of the particles thereof.

2. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of solid particles which are soluble superficially at least, hardening the material with the said layer embedded in it, and thereafter separating from the material the said layer by solution of the particles thereof.

3. The method of surfacing tile and kindred material, characterized by embedding in the surface of the material while plastic a layer of soluble solid particles, hardening the material with the said layer embedded in it, and thereafter dissolving the particles of said layer.

4. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of soluble salt-crystals, hardening the material with the said layer embedded in it, and thereafter dissolving the crystals of said layer.

5. The method of surfacing tile and kindred materials, characterized by embedding

in the surface of the material while plastic a layer of diversely sized and shaped solid particles which are liquefiable superficially at least, hardening the material with the said layer embedded in it, and thereafter separating from the material the said layer by liquefaction of the particles thereof.

6. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped solid particles which are soluble superficially at least, hardening the material with the said layer embedded in it, and thereafter separating from the material the said layer by solution of the particles thereof.

7. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped soluble solid particles, hardening the material with the said layer embedded in it, and thereafter dissolving the particles of said layer.

8. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped soluble salt crystals, hardening the material with the said layer embedded in it, and thereafter dissolving the crystals of said layer.

9. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of solid particles which are liquefiable superficially at least, with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter separating from the material the said layer by liquefaction of the liquefiable particles thereof, leaving the coloring matter in the material.

10. The method of surfacing tile and kindred material, characterized by embedding in the surface of the material while plastic a layer of solid particles which are soluble superficially at least, with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter separating from the material the said layer by solution of the soluble particles thereof, leaving the coloring matter in the material.

11. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of soluble solid particles with coloring matter irregularly distributed in said layer, hardening the material with the layer embedded in it, and thereafter dissolving the soluble particles of the layer, leaving the coloring matter in the material.

12. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of soluble salt crystals with coloring

matter irregularly distributed in said layer, hardening the material with the said layer embedded in it, and thereafter dissolving the soluble crystals of the layer, leaving the coloring matter in the material.

13. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped solid particles which are liquefiable superficially at least, with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter separating from the material the said layer by liquefaction of the liquefiable particles thereof, leaving the coloring matter in the material.

14. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped solid particles which are soluble superficially at least, with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter separating from the material the said layer by solution of the soluble particles thereof, leaving the coloring matter in the material.

15. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped soluble solid particles with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter dissolving the soluble particles of said layer, leaving the coloring matter in the material.

16. The method of surfacing tile and kindred material, characterized by embedding in the surface of the material while plastic a layer of diversely sized and shaped soluble salt-crystals with coloring matter irregularly distributed in said layer, hardening the material with said layer embedded in it, and thereafter dissolving the soluble crystals of said layer, leaving the coloring matter in the material.

17. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous solid particles.

18. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous, diversely sized and shaped solid particles.

19. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous, solid particles, said surface colored in irregularly distributed patches.

20. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous, diversely

sized and shaped solid particles; said surface colored in irregularly distributed patches.

21. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous, diversely sized and shaped, crystals.

22. Tile and kindred material, characterized by a surface which is a matrix of a discrete layer of closely contiguous, diversely sized and shaped, crystals; said surface colored in irregularly distributed patches.

23. The method of surfacing tile and kindred materials, characterized by embedding in the surface of the material while plastic a layer of solid particles, hardening the material with the layer embedded in it, and thereafter separating the particles of said layer from the material to expose the collective matrices thereof in the surface of the material.

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Signed by me at Nashua, N. H., this 27th day of March, 1923.

JOHN C. MACILDOWIE.