P. E. DENIVELLE.

MANUFACTURE OF ARTIFICIAL STONE STRUCTURES.

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1,212,331. Patented Jan. 16, 1917

Fig. 1.

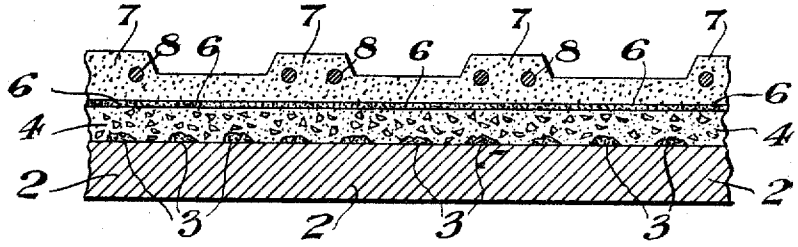


Fig. 2.

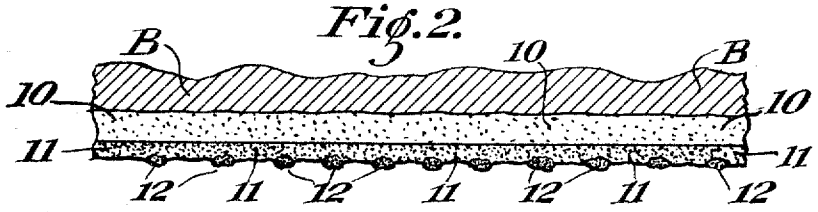
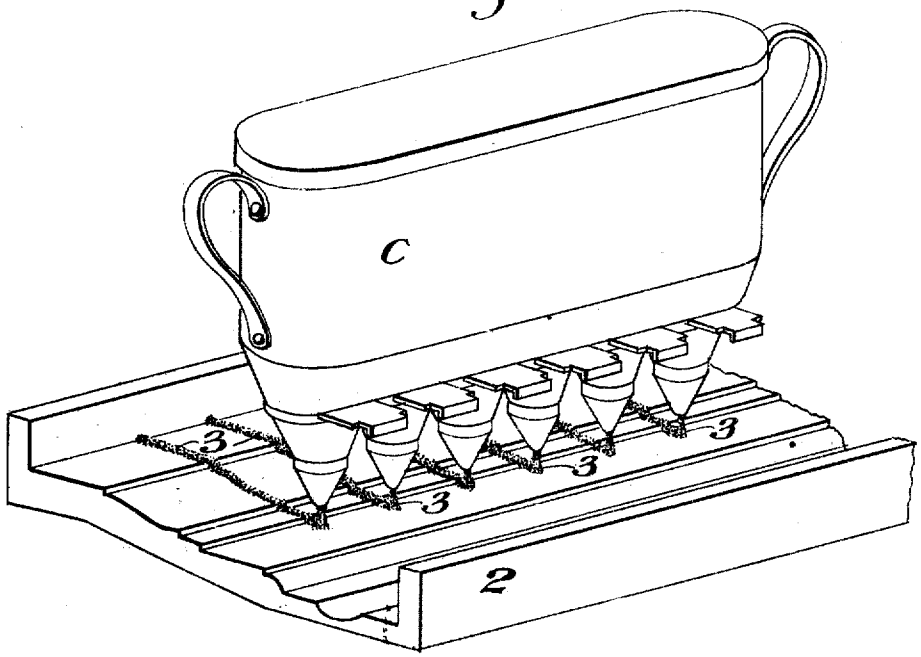


Fig. 3.



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MANUFACTURE OF ARTIFICIAL-STONE STRUCTURES.

1,212,331. Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed October 20, 1915. Serial No. 56,879.

To all whom it may concern:

Be it known that I, PAUL E. DENIVELLE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in the Manufacture of Artificial-Stone Structures, of which the following is a specification.

This invention comprehends a process to be used in the manufacture of an artificial stone simulating travertin stone or marble and adapted to be used especially for its architectural and decorative surface effect.

The embodiment of the invention may be considered in two aspects: (A) representing the method as practised for casting separate articles, such as columns, capitals, figures, etc., later to be set in place. (B) representing the method as practised for surfacing and finishing structures already in place, such as walls, cornices, etc.

The first method embraces the application of colored plastic material or ingredients, such as Portland cement, plaster of Paris, Keene's cement, magnesite and water or other liquid substance with or without aggregates to an upturned negative form, or mold of existing type, of wood, plaster, cement, etc., wherein these colored materials are so applied before the final set or crystallization of the mass, in a variety of progressive steps consecutively, as to produce in the cast or positive taken from said mold, form, etc., automatically as a result of the progressive steps and special application, a certain striated form of texture porousness in simulation of a stone known as "travertin" or "Roman travertin." This process has to do mainly with producing or obtaining a surface especially desirable for reproducing in architectural and decorative effect; this method of use and effect being an innovation.

The second method involves the use of the above colored materials in a certain definite and novel manner during their direct application to a wall or ceiling, or similar surface, and before the set or crystallization is complete, in order that the resulting surface may have a colored striated or porous surface in simulation of travertin or Roman travertin texture or stone of similar striated porousness; this form of use and effect being an innovation.

The drawings illustrate the application of the invention simply in a schematic manner.

Figure 1 illustrates one form of process. Fig. 2 represents another form of process. Fig. 3 is a perspective of a device suitable for producing the veining effect on or in a mold.

In practising the invention under method (A) I proceed as follows: I employ a mold or negative, as 2, having the surface or contour of the article to be reproduced.

Isolating.

(1.) The mold form or upturned surface or negative is prepared and greased or treated with any suitable isolator to produce a smooth surface that imparts no influence to the nature of porosity expected in the cast.

Veining.

(2.) A mixture of colored cement and water, or other liquid, or similar substance, in a semi-liquid state is poured over the surface of the form or mold from a receptacle as C, or openings (individual or a series of nozzles or openings that produce jets by gravity) in such a way that if pouring is repeated back and forth over the form surface, it will produce a series of thin lines of the mixture, indicated at 3. This can be repeated in several colors. This is for the purpose of producing veins of one or more colors and for the purpose of leaving smooth striated lines on the surface of the finished cast or positive when taken from said form. It is also for the purpose of providing an interruption to the finished effect in the degree of porousness to be obtained by applying the next coating.

Stippling.

(3.) Sometimes this veining is stippled with a stiff wire brush to interrupt the veining and give a serrated edge effect to the veins.

Forming pockets.

(4.) Before the material of step (2) has set or hardened, a mixture of different or similarly colored cement or similar plastic material 4, with or without sand or other aggregates, with enough water or other liquid added to reduce the mixture to a semi-dry and lumpy consistency is distributed, by hand or otherwise, either over the uncolored surface of the form or negative as left after operation (2), or distributed more or less evenly over the whole form or mold until a sufficient thickness has been lightly placed

thereon. This is for the purpose of preventing the next coating of step (5) from entirely enveloping, by gravity or seepage, the intent of said operation (4). Coating 4 is so applied and is of such loose lumpy consistency as to provide in the finished surface of the cast a porous, pocket-like appearance between the striated poured lines or veins 3, described in operation (2).

Bonding.

(5.) A mixture of similarly or differently colored cement and water or other liquid, with or without the addition of sand or other aggregate reduced to a semi-liquid consistency, is poured or placed over the semi-dry, lumpy layer 4 in such a quantity and in such a way as to permit of its percolating or seeping through the layer 4. This fluid cement makes a bond to fill the voids in the loose lumpy layer 4, except for the pockets, that forms on the surface and serves to bind the portion of the surface produced by operation (2) with that of the semi-dry layer of operation (4).

Blotting and drying.

(6.) In the case of the use of Portland (white or standard) or similar slow setting materials containing an aggregate which gives the mass a heavy specific gravity, it is necessary to check the seepage of material in the binding coat of step (5), which is done by a sprinkling of dry cement 6, or such a mixture as has been used in any of the previous operations, or a similar combination, over the surface of operation (5). This check is necessary for the purpose of preventing continuing seepage or mixture of operation (5), by gravity, from the entirely surrounding semi-dry particles of mixture laid in operation (4), and thereby destroying the porosity or effect desired in the finished surface of the cast or positive. In the case of quicker setting material of lesser specific gravity this operation (6) is not always necessary.

Reinforcement.

(7.) Where the foregoing material coatings have not resulted in a cast or positive of sufficient strength, an ordinary mixture 7, of a plastic substance of the same or other ingredients, with or without fiber, may be spread over the surface formed by operation (6) either solid to the required thickness or in cross-rib formation. In this coat may be placed reinforcements, such as steel rods 8, etc. This is for the purpose of providing any required strength in the cast or positive by applying this coating after the initial set or crystallization of previous coats has taken place, thereby not disturbing the position on the surface of the form or mold of the ingredients provided by the previous steps of the process.

In proceeding by process (B), as in the case of walls, ceilings, etc., already erected into position, I employ the following steps: The plastic materials or ingredients, such as Portland cement, Keene's cement, magnesite, plaster of Paris, or a combination of the ingredients, are applied to walls or ceilings, interior or exterior, whereby the resulting surface obtains a striated porosity of the nature and for the purpose of producing a simulation or imitation of the surface that obtains in Roman travertin stone commonly known as "travertin"; the object being to incorporate several or all of the following steps in accordance with the degree or perfection in imitation or simulation required in the finished surface from the architect's viewpoint:

1. To a concrete, brick, metal or wood lath, or any similar form of construction B, one or two coats of plastic material or mortar, as 10, composed of plaster of Paris, Portland cement or Keene's cement and sand or aggregate, is applied and straightened to a fair surface. This application may be varied in method and result; the object being to form a foundation for the steps which follow.

2. Next, a colored mixture, as 11, composed of white Portland cement, Keene's cement, magnesite, plaster of Paris, or similar materials, with or without a percentage of aggregate or sand added, is reduced to a consistency of a soft paste in semi-liquid form, by the addition of water or other agency, and applied to the wall in that state by means of a trowel, float or similar device to a varying thickness, in accordance with the depth of porosity required in the finished result. This application is immediately straightened roughly by means of a rule or straight-edge. The foregoing coat 2 is for the purpose of producing a background coating of the general color form required, of sufficient thickness to permit of the next operation.

3. One or several mixtures of different colors of the foregoing ingredients, or reduced with water or other liquid to a soft pasty consistency, is applied in a series of horizontal veins 12, of varying length, with a narrow, long, soft brush, or other device immersed in the one or several colored mixtures successively and applied to the coating 11 of operation B^2 above by stippling in while the material of coat 11 is very soft. A light horizontal trowel action is repeatedly applied. This is for the purpose of providing light, horizontally striated veins or lines of different colors or tones of color in the finished result.

4. While the foregoing coats 11 and 12 are

still very soft, a sharp stipple is produced to the full depth of coatings 11 and 12 by means of a slender or narrow brush of stiff bristles held horizontally and applied in a series of alternating sharp jabs and pressure, said stippled jabs being placed staggered, with varying sequence between the colored veins 12 described heretofore.

5. A light horizontal trowel application follows. This is for the purpose of producing the greater porosity in texture markings required in the finished result; the form and nature of the bristles producing a jagged series of depressions, horizontally striated formation, and the trowel's pressure reducing the width of these depressions, together with providing an undercut quality to the stippling it would not otherwise have.

6. While the coating 11 is still soft, but in an advanced stage approaching set or crystallization, a smaller series of jabs is applied in a horizontal rotation by means of a stiff wire brush enough to penetrate the surface, gradually hardening, and applied between the grosser markings and veins described in operations B^2 and B^3. This is for the purpose of producing the refinements of texture or horizontal strata of porous quality not provided or possible by prior operations described.

7. The surface mixture 11, with its added veining mixture 12, is now finished by the application of vigorous troweling. This is for the purpose of removing all imperfections, or unevenness that may accrue during operations B^2, B^3, B^4, B^5, B^6 and B^7, and to leave a straight smooth surface of different color tones produced by the variegated striated veins and the shadows of the depressions, such as are characteristic of Roman travertin or stone commonly known as "travertin".

8. In such moldings, cornices, panel moldings, or forms of ornamentation as may require it, the same methods are applied in forming the same as described in operations B^2, B^3, B^4, B^5, B^6 and B^7 except that following the last step a knife mold that has the form or outline of the object required will be used in addition to the foregoing methods of B^2, B^3, B^4, B^5, B^6 and B^7 and run over the surface of the object its full length to retain perfection of contour.

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

1. A process for the manufacture of striated artificial stone structures which comprises depositing upon a prepared surface of desired form a series of narrow layers of plastic material, depositing upon said layers and upon the exposed surfaces therebetween a suitable material of such texture and consistency as will leave numerous small portions of said exposed surfaces out of contact with said material, binding together said layers and said material with a fluid cement, and allowing the mass to set.

2. A process for the manufacture of striated artificial stone structures which comprises depositing upon a prepared surface of desired form a series of narrow layers of plastic material of a certain color, depositing upon said layers and upon the exposed surfaces therebetween a suitable material of a different color and of such texture and consistency as will leave numerous small portions of said exposed surfaces out of contact with said material, binding together said layers and said material with a fluid cement, and allowing the mass to set.

3. A process for the manufacture of striated artificial stone structures which comprises depositing upon a prepared surface of desired form a series of narrow layers of plastic material, serrating the edges of the layers, depositing upon said layers and upon the exposed surfaces therebetween a suitable material of such texture and consistency as will leave numerous small portions of said exposed surfaces out of contact with said material, binding together said layers and said material with a fluid cement, and allowing the mass to set.

4. A process for the manufacture of striated artificial stone structures, which consists in depositing upon a prepared surface a series of veins of plastic material in simulation of the stone striations, depositing a loose lumpy material over the veining material to leave a porous body, binding the foregoing with a fluid cement, blotting up the excess seepage of the binding fluid to prevent all the interstices in the loose lumpy material from filling up, and allowing the mixture to set.

5. A process for the manufacture of striated artificial stone structures, which consists in preparing a mold of suitable outline with an isolator forming veins of plastic material over this prepared surface, depositing loose, lumpy material over the veining to provide pockets, binding the pocket-forming material with the veining material, and leaving certain pockets exposed on the surface adjacent to the mold surface.

6. A process for the manufacture of striated artificial stone structures, which consists in preparing a mold of suitable outline with an isolator, forming veins of plastic material over this prepared surface, stippling the veins to provide a serrated edge effect, depositing loose, lumpy material over the veining to provide pockets, binding the pocket-forming material with the veining material, and leaving certain pockets exposed on the surface adjacent to the mold surface.

7. A process for the manufacture of stri-

ated artificial stone structures, which consists in preparing a mold of suitable outline with an isolator, forming veins of plastic material over this prepared surface, stippling the veins to provide a serrated edge effect, depositing loose, lumpy material over the veining to provide pockets, binding the pocket-forming material with a fluid cement, and depositing a drier on the upper surface of the mass to take up the excess seepage and prevent filling of all the pockets on the surface next to the mold.

8. A process for the manufacture of striated artificial stone structures, which consists in preparing a mold of suitable outline with an isolator, forming veins of plastic material over this prepared surface, stippling the veins to provide a serrated edge effect, depositing loose, lumpy material over the veining to provide pockets, binding the pocket-forming material with a fluid cement, depositing a drier to take up the excess seepage and prevent filling of all the pockets on the surface next to the mold, and reinforcing the structure.

9. A cementitious structure suitable for decorative purposes comprising a mass of cementitious material at least one surface of which is shaped and striated and formed with small irregularly spaced depressions, the striæ constituting the exposed portions of shallow inlays of uniformly colored cement.

10. A cementitious combination for decorative use such as a finish for exterior or interior building walls and ceilings, which combination is formed of differently toned thin layers or strata, the said layers only partly connected one to the other in such manner as to leave serrated voids in stratified formation between said layers, said layers and voids existing only adjacent to the surface but giving an appearance, when erected, of extending through the depth of the mass, the resulting decorative surface simulating that of a natural stone structure of sedimentary origin.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PAUL E. DENIVELLE.

Witnesses:
W. W. Healey,
M. E. Ewing.