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(72) Inventor: **Zini, Massimo**
41100 Modena (IT)

(74) Representative: **Corradini, Corrado et al**
Studio Ing. C. CORRADINI & C. S.r.l.
4, Via Dante Alighieri
42100 Reggio Emilia (IT)

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(71) Applicant: **Gruppo Ceramiche Saicis S.P.A.**
41100 Modena (IT)

(54) **Method for manufacturing tiles having the appearance of old rustic tiles of craftsman production**

(57) A method for manufacturing tiles having the appearance of old rustic tiles of craftsman production, comprising the following operations:

- in a usual mould, forming a crude tile from an atomized powder mix comprising inclusions of material

which volatilizes at a temperature less than or equal to 600°C,

- drying the thus formed tile in a continuous dryer using a usual drying cycle,
- kiln-firing the tile treated in this manner using a usual firing cycle.



FIG.1

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Description

[0001] The ceramic floor and facing tile market is tending towards products having an increasingly sophisticated appearance reproducing natural products or products obtained by craftsman methods.

[0002] Modern methods for manufacturing flooring or facing tiles are hence developing in these directions, and are already able to produce in tiles the appearance of natural stone, such as marble.

[0003] The object of this patent is to provide a method enabling rustic tiles to be obtained which are similar to old tiles produced by craftsman means.

[0004] Such tiles are required to have a surface of irregular brown colour ranging from very light to dark, and be provided with stains and inclusions.

[0005] The surface must be substantially smooth and comprise apparently defective regions characterised by depressed irregular surface parts reproducing the appearance of chipping, or more or less extensive craters, or pores.

[0006] These defects are typical of the materials which were once created by craftsmen, and at their origin were due to imperfections in the mix or to inappropriate firing cycles, or indeed due to wear.

[0007] The object of this patent is to provide a method for the industrial manufacture of this type of tile.

[0008] This object is attained according to the invention by a method comprising the following operations.

[0009] An atomized ceramic mix is fed into the forming cavity of a mould, and then pressed.

[0010] The base mix can be a single-colour mix or can be obtained by partially mixing together at least two atomized powder masses coloured differently so that the tile mass obtained is characterised by veining or staining reproducing the coloration defects of craftsman mixes.

[0011] A layer of atomized clay is applied followed by a second layer of multi-colour glazes variously mixed and distributed.

[0012] The mix fed to the mould cavity includes particles or flakes of volatile material.

[0013] Preferably, the particles or flakes are laid on the surface of the powder previously fed into the mould cavity.

[0014] The term "volatile material" means a material which burns away or sublimates completely at a temperature less than or equal to 600°C, so that it disappears completely at the latest during the initial stage of the kiln firing process, to create more or less extensive craters.

[0015] Materials can also be used which burn away or sublime at lower temperature, typically the temperature attained by the tile during the drying stage.

[0016] A particularly suitable flake forming material is an easily combustible fibrous material, such as sawdust.

[0017] Best results are however obtained with a material comprising starch or other volatile substances which facilitate aggregation with colouring substances or pigments, and could be for example a ground cereal

or cereal bran.

[0018] The material resulting from the crushing or grinding of maize grains has proved particularly convenient.

5 [0019] Other convenient materials are, according to the invention, wheat grains, barley, oats or rice, including unground.

[0020] Cereal flakes have also proved convenient, as have oven-baked cereals such as popcorn, or even straw fragments.

10 [0021] If the volatile material is required to disappear as early as the drying stage, it is convenient to use a wax or an equivalent synthetic material.

[0022] If the base of the craters obtained in this manner is to have a bright or coloured surface, the material before being reduced to flakes is mixed with powdered coloured atomized clay, or with pigments or powdered vitreous glaze.

[0023] According to a variant of the invention, the mix fed to the mould cavity also includes pigment flakes, which can be single or multicoloured.

[0024] The pigment flakes are also preferably rested on the surface of the material previously fed into the mould forming cavity.

25 [0025] The crude tile formed in this manner is subjected to normal drying by known means, and then possibly decorated with pigments.

[0026] The pigment decoration of the crude tile conveniently comprises spraying with an aqueous suspension of neutral or coloured glazes, by directing the jet in a direction inclined to the tile surface.

[0027] This method of applying the aqueous glaze suspension favours the appearance of veining on the tile surface and is known as flashing.

35 [0028] After flashing, brushing is sometimes effected using soft pads of slightly abrasive surface.

[0029] As an alternative or in addition to flashing, the tile can be decorated, after possible brushing, by the controlled application of multi-colour pigment powders through a silk screen, or other known means.

[0030] The application of coloured glaze is followed, according to the invention, by a blowing operation consisting of subjecting the tile surface to an air stream in a substantially tangential direction, the purpose of which is to accumulate the glaze against the edges of depressed regions such as craters.

[0031] The cycle is completed by kiln firing using usual methods and cycles.

[0032] The special characteristics of the invention will be more apparent from the ensuing example given with reference to the accompanying Figure 1, which represents a plan view of a tile obtained in accordance with the invention.

EXAMPLE

[0033] A base ceramic mix is prepared by wet grinding a mixture composed of high quality, high plasticity clays

of very low iron and titanium content, fluxes and feldspathic sands also of very low iron and titanium content. Subsequent drying of the liquid mixture is achieved by an atomizer which produces a powder of controlled moisture content and particle size.

[0034] The powder mix obtained in this manner passes through a continuous colouring device in which the powder is pigmented by feeding colouring oxides together with the powder in predetermined proportions, and is fed into the feed hopper of the press.

[0035] The press is fed using a machine which distributes several atomized layers in different successive loadings.

[0036] By means of this machine, the mould forming cavities are filled with a first layer of coloured base mix to the extent of about 90% of the total tile thickness.

[0037] In an immediately following step, a second layer is applied composed of a mixture of four atomized ceramic glazes differing in colour and fusibility.

[0038] This mixture is obtained by withdrawing from four different containers, one per component, cyclically variable quantities of the components and distributing them with a variable repetitive cycle within the forming cavity.

[0039] On this second layer there is distributed a third layer composed of a mixture of different ceramic glazes agglomerated into flakes of a wide particle size range, together with another mixture formed from various granules of volatile substances.

[0040] A grit formed from ground maize is used for this application.

[0041] The three superposed layers are then pressed with a specific pressure of 400 kg/cm² using a hydraulic press.

[0042] The tiles are removed from the mould and then dried in a normal vertical dryer with boat-shaped containers, using a 60 minute cycle at 250°C.

[0043] The dried but hot tiles (at this stage the tile is still at 70°C) are sprayed tangentially, using a spray gun, with a film of liquid ceramic glaze which, after its rapid drying, is removed from the more projecting parts of the tile structure with a rotary disc brush.

[0044] At this point, a layer composed of a mixture of three powdered ceramic glazes, differing in colour and fusibility, is applied to the tile.

[0045] The mixture is distributed by known means.

[0046] Using a tangential blowing machine, the previously applied powdered glaze mixture is partly removed and partly forced into the specific recesses in the tile structure.

[0047] A fixer is then applied to the tile to fix the remainder of the powdered glaze. The fixer used is a 5-10% polymer solution in polyvinyl alcohol.

[0048] The tile is then fired in a ceramic roller kiln at a temperature of 1200°C using a residence cycle of 60 minutes.

[0049] During the initial stage of firing, at about 600°C, the volatile substances volatilize from the support mass

to form small craters and pores in the tile surface.

[0050] By the effect of this rapid volatilization, the upper edge of the craters presents burrs which are removed by abrasion.

Claims

1. A method for manufacturing tiles having the appearance of old rustic tiles of craftsman production, characterised by comprising the following operations:

- forming in a usual mould, a crude tile from an atomized powder mix comprising inclusions of material which volatilizes at a temperature less than or equal to 600°C,
- drying the thus formed tile in a continuous dryer in accordance with a usual drying cycle,
- kiln-firing the tile treated in this manner in accordance with a usual firing cycle.

2. A method as claimed in claim 1, characterised in that said volatile material is fed into the mould cavity to lay on the previously fed powder.

3. A method as claimed in claim 1, characterised in that said volatile material comprises an agglomerating substance facilitating the covering of the material with colouring pigments.

4. A method as claimed in claim 3, characterised in that said substance is starch.

5. A method as claimed in claim 1, characterised in that said volatile material is selected from the following: cereals, ground cereals, crushed cereals, blown cereals, cooked and ventilated cereals, cereal flakes, sawdust, crushed straw, wax.

6. A method as claimed in claim 5, characterised in that said material consists of whole or broken maize grains.

7. A method as claimed in claim 1, characterised in that said volatile material is mixed with a coloured pigment powder.

8. A method as claimed in claim 1, characterised in that said volatile material comprises a vitreous glaze in powder form.

9. A method as claimed in claim 1, characterised in that the atomized clay mix comprises at least two materials of different colour partly mixed together.

10. A method as claimed in claim 1, characterised in that the atomized clay mix comprises a single-col-

our base layer and a second layer of atomized glazes.

11. A method as claimed in claim 1, characterised in that flakes of multi-colour glazes are added to the atomized clay mix. 5
12. A method as claimed in claim 1, characterised in that the flakes of multi-colour glazes are laid on the surface of the atomized clay mix already contained in the mould cavity. 10
13. A method as claimed in claim 1, characterised in that after drying, the coloured atomized clay or powdered pigment is applied as side-by-side or totally or partly superposed layers of different colour by known means. 15
14. A method as claimed in claim 1, characterised in that after drying, the tile is subjected to a flashing operation. 20
15. A method as claimed in claim 1, characterised in that before application of the powdered glazes, the already dried tile is subjected to a brushing operation. 25
16. A ceramic tile consisting of an atomized clay mix pressed in a mould and kiln-fired, characterised by presenting untreated depressed parts and craters of varying size randomly distributed on its surface. 30
17. A ceramic tile as claimed in claim 16, characterised in that at least its surface layer is formed from a mix of atomized clays of at least two different colours. 35
18. A ceramic tile as claimed in claim 16, characterised by comprising a surface decoration obtained from variously distributed coloured pigments or coloured atomized clays. 40
19. A ceramic tile as claimed in claim 16, characterised by comprising surface inclusions of coloured glazes. 45
20. A ceramic tile as claimed in claim 16, characterised by presenting an abraded surface. 50

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FIG.1