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(54) Method and apparatus for manufacturing means for making embossed decorations on ceramic tiles

(57) According to a method for manufacturing means for making embossed decoration patterns on ceramic tiles, a die (M), defining a predetermined decoration pattern, is machined on a plate (3) of gummy material, by computer controlled laser. Then, the plate (3) is removably mounted on a punch (40) of a press (4) and a series of sample tiles (1) is press-died. In case of a satisfying result, the production is started by the same punch (40) with the plate (3); otherwise, the corrections are made and other proofs are performed until the final decoration pattern is obtained; it is possible to start the production with the die (M) defining the final decoration pattern. When the die (M) is worn out, the plate (3) is replaced with another one carrying a new die (M), likewise obtained by laser technique.

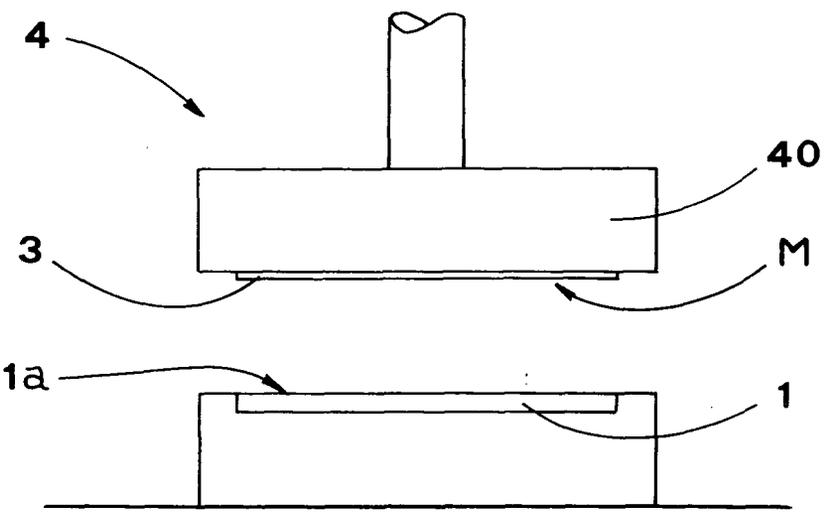

FIG. 2

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Description

[0001] The invention relates to manufacturing means for making decoration patterns on ceramic tiles.

[0002] The ceramic industry produces tiles having different decorative embossed patterns, for example drawings or geometrical figures, or tiles with particular surface roughness or other means for obtaining the desired aesthetic effect.

[0003] The embossed decorations are obtained on the tiles during press-forming, by a press die having a pattern to be reproduced in negative.

[0004] The preparation of the production die is preceded by an experimental step which includes:

- machining, by cutters or similar tools, a decoration pattern master on an aluminum plate;
- preparing of a gum engraving from the machined master;
- using of the gum engraving on a sampling press to obtain sample tiles;
- assessing of the obtained aesthetic effect.

[0005] If the assessment is affirmative, that is if the result is satisfying, the production die can be prepared, otherwise, if the judgment is negative, the whole procedure is repeated, beginning from a new aluminum plate.

[0006] After the final decoration has been obtained, the aluminum plate is used to transfer the pattern impression to the production die, by a known technique called "heat gumming", which includes substantially applying layers of gummy material to the surface, which is intended to push against the tile.

[0007] Such layers are obviously complementary to embossment made on the aluminium plate.

[0008] Taking into consideration that in practice it is difficult to obtain a satisfying decoration after the first attempt, it is easy to understand that the above mentioned procedure is slow and expensive.

[0009] Moreover, during the production, the gum parts of the die wear out, therefore, they must be reconstructed at pre-set times, in order to maintain the tiles within the fixed quality standards.

[0010] In order to restore the gummed parts of the die to the initial condition, it is necessary to remove the die, to take it to a specialized operator, usually situated in a different location, to remove the worn out gum, to apply new layers of gum, and finally, to return and re-mount the die on the press.

[0011] It is easily understood that the resulting costs are high and that it is necessary to prepare at least two dies to be mounted in turn, in order to avoid any production down-time.

[0012] Thus, the object of the present invention is to propose a method for manufacturing means for obtaining embossed decorations on ceramic tiles, by which test samples can be obtained in a rapid and cheap way, avoiding the drawbacks resulting from the use of the master machined in the aluminum plate.

[0013] Another object of the present invention is to manufacture the above means in such a way that they allow to start the production immediately after the final decoration has been obtained.

[0014] A further object of the present invention is to avoid gumming of the die, thus avoiding the subsequent drawbacks and costs.

[0015] A still further object of the present invention is to propose an apparatus, which carries out the proposed method, and which is simple to manufacture in relation to the obtained results.

[0016] The steps of the proposed method will be pointed out in the following description in accordance with the contents of claims and with the help of the enclosed drawings, in which:

- Figure 1 is a view of a plate of gummy material with the decoration pattern master machined therein;
- Figure 2 is a schematic view of a press for press-forming tiles.

[0017] The method being subject of the present invention proposes manufacturing of means for obtaining embossed decorations on ceramic tiles, indicated with reference numeral 1 in the above drawings.

[0018] The above means are obtained by a series of steps including a first proof-evaluation step, during which the final decoration pattern, to be embossed in the tiles later on, is obtained.

[0019] The first operation of the above mentioned first step includes machining the decoration pattern die M on a plate 3 of natural or synthetic material, for example gummy material, by using a laser beam controlled by a computer (not shown), in which the decoration pattern to be obtained is stored in digital form (Figure 1).

[0020] The second operation is mounting (by removable fastening) the plate 3 on a punch 40 of a press 4, with the die M turned toward the upper surface 1a of a tile 1 situated below, onto which the punch 40 is intended to push.

[0021] The third operation is press-forming a series of sample tiles 1 and evaluating the obtained result.

[0022] If the result is satisfying, the production starts immediately, using the plate 3 already mounted on the punch 40 as a die.

[0023] Otherwise, if the result is not satisfying, the plate is removed from the punch, the digital pattern stored in the electronic processor is modified and then, the first three operations described above are repeated, preferably on a new plate, until the desired result is obtained.

[0024] When the desired result is obtained, the punch 40 carries, fastened removably thereon, the plate 3

forming the die M of the final decoration, therefore it is possible to pass directly to the production without further operations.

[0025] After a certain number of tiles has been produced, the die M of the plate 3 mounted on the punch 40 is worn out and must be replaced.

[0026] For this purpose, according to the proposed method, a new die M is machined on another plate 3, using the same laser technique described previously.

[0027] The plate 3 can be applied on a metal foil; the so obtained a metal foil - plate group is extremely flexible and is applied onto the outer surface of a roller, in order to optimize the cutting of the plate 3 by laser beam, due to the rotation of the roller on its axis.

[0028] The metal foil - plate 3 group is fastened to a support of known type, which stabilizes the group (e.g. metallic support, net support, etc.).

[0029] The support is removably fastened to and centered with respect to the punch 40 by known systems, e.g. magnetic or mechanical.

[0030] The material of which the plate is made can be sensitive to ultraviolet radiation, in this way, the hardness of the plate can be adjusted in relation to the time of exposition to the radiation.

[0031] The extreme simplicity of the described method is much more appreciable when compared with its important advantages.

[0032] Actually, the proof-evaluation step for preparing the final decoration die is much quicker and cheaper, thus it saves time and costs necessary for cutting the aluminium sheet.

[0033] The laser technique for machining the sheet gummy material allows complicated patterns of high definition to be obtained without considerable cost increase.

[0034] Moreover, when the effect is satisfying, it is possible to start the production without further operations, which results in obvious advantages.

[0035] Another advantage derives from the complete elimination of the die gumming operations, described previously and necessary with the currently used technique.

[0036] A further advantage results from the fact that the substitution of the gummy plate does not require the removal of the punch from the press and it is a rapid operation, which can be performed even by non-specialized operators.

[0037] The considerable costs reduction offered by the method, allows to obtain sufficiently cheap groups of even few tiles, with personalized decorations.

[0038] It is to be pointed out that the plate 3 machining operation can be obtained also by other techniques different from the one based on the use of a laser beam.

Claims

1. Method for manufacturing of means for making embossed decorations on ceramic tiles, **characterized in that** it includes a first proof-evaluation step consisting of:

- Machining a die (M), defining a predetermined decoration pattern, on a plate (3) of natural or synthetic material, by computer controlled means, in which the decoration pattern to be obtained is stored in digital form;
- removably mounting said plate (3) on a punch (40) of a press (4), with said die (M) turned toward the upper surface (1a) of a ceramic tile (1) situated below, onto which the punch (40) is then made to push;
- press-forming a series of sample tiles (1) and evaluating the obtained result;
- in case of an unsatisfying result, removal of the plate from the punch, modification of the digital pattern stored in the computer and then, repetition of the operations mentioned in the above points until the plate (3) with the final pattern is defined;

the same method including a second step for production of tiles (1) with the final decoration pattern, including:

- press-forming said tiles (1) by said punch (40), with removably fastened thereto a plate (3) of synthetic or natural material, carrying, machined therein, a die (M) reproducing the final decoration pattern;
- substitution of said plate (3), when worn out, with a new one, carrying, machined therein by the same technique, an identical die (M).

2. Method for manufacturing means for making embossed decoration patterns on ceramic tiles, **characterized in that** it includes:

- machining a die (M), defining a predetermined decoration pattern, on a plate (3) of natural or synthetic material, by computer controlled means, in which the decoration pattern to be obtained is stored in digital form;
- removably mounting of said plate (3) on a punch (40) of a press (4), with the die (M) turned toward the upper surface (1a) of a ceramic tile (1) situated below, on which the punch (40) is made to push;
- press-forming tiles (1) by the punch with said plate;

- removal, when worn out, of said plate (3) from the punch (40), and substitution with a new one, carrying a die (M) defining the same decoration pattern of the previous plate.

3. Method, according to claim 1, **characterized in that** said computer controlled means, are constituted by a laser beam.

4. Method, according to claim 2, **characterized in that** said machining is obtained by a laser beam.

5. Method, according to claim 1 or 2, **characterized in that** said synthetic or natural material is gummy-type.

6. Method, according to claim 1 or 2, **characterized in that** said synthetic or natural material is sensitive to ultraviolet radiation and that the hardness thereof is a function of the duration of exposition to said radiation.

7. Method, according to claim 1 or 2, **characterized in that** said plate (3) is applied onto a metal foil.

8. Method, according to claim 7, **characterized in that** the group formed by the metal foil and the plate (3) is fastened to a support, which is removably fastened to, and centered with respect to said punch (40).

9. Apparatus for manufacturing means for making embossed decoration patterns on ceramic tiles, including a press (4) with a punch (40), **characterized in that** it includes a plate (3), of synthetic or natural material, with a die (M) machine therein and defining a predetermined decoration pattern, with said plate being removably mounted on said punch, so that the die (M) is turned toward the upper surface (1a) of a tile (1) situated below.

10. Apparatus, according to claim 9, **characterized in that** said machining is obtained by a laser beam.

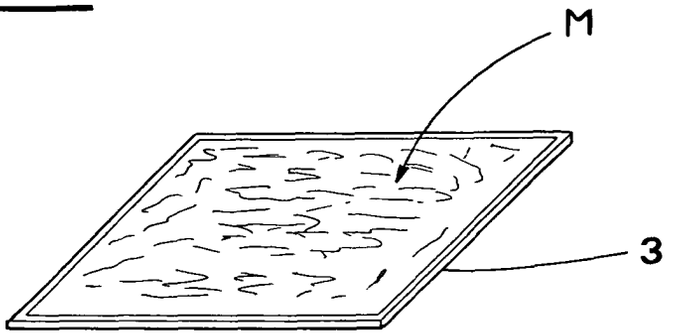
11. Apparatus, according to claim 10, **characterized in that** said plate (3) is applied on a metal foil.

12. Apparatus, according to claim 11, **characterized in that** the group formed by said metal foil and plate is fastened to a support, which is removably fastened to, and centered with respect to said punch (40).

13. Apparatus, according to claim 10, **characterized in that** said synthetic or natural material is sensitive to ultraviolet radiation and that the hardness thereof is a function of the duration of exposition to said radiation.

14. Apparatus, according to claim 9, **characterized in that** said synthetic or natural material is gummy-type.

FIG.1



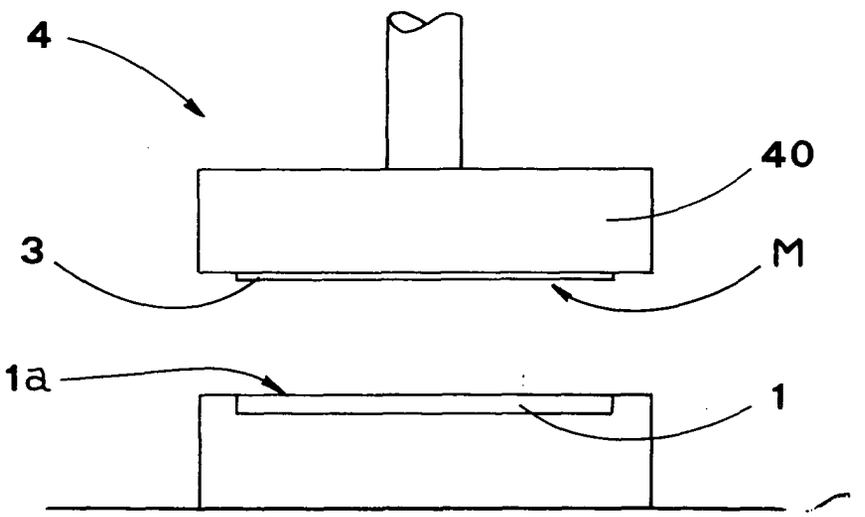


FIG.2