(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 083 062 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.03.2001 Bulletin 2001/11

(51) Int. Cl.[7]: **B44C 5/04**, B44C 3/04, B28B 7/34, B28B 3/12

(21) Application number: **00830605.2**

(22) Date of filing: **07.09.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **08.09.1999 IT MO990181**

(71) Applicant: **Tosi, Sergio**
41049 Sassuolo (MO) (IT)

(72) Inventor: **Tosi, Sergio**
41049 Sassuolo (MO) (IT)

(74) Representative: **Gotra, Stefano**
BUGNION S.p.A.
No. 25, Via Emilia Est
41100 Modena (IT)

(54) A process for realising matrices for use in ceramic tile decoration

(57) The process for realising matrices which can be used for decorating ceramic tiles comprises the following stages: manufacture of a template (1) reproducing, in three-dimensional form and in relief with respect to a reference surface (2) of the template (1), a decoration to be applied on ceramic tiles; creation of a matrix (3) made of an elastomer, obtained by impression of the elastomer on the template (1), thus creating on the elastomer a recessed impression of the decoration on the template (1). The recessed impression is obtained by a dropping of the elastomer in a liquid state onto the template and a subsequent solidification of the elastomer on the template (1) to form a layer. The recessed impression is destined to be filled with a product to be transferred onto the tiles, which will constitute the decoration thereon.

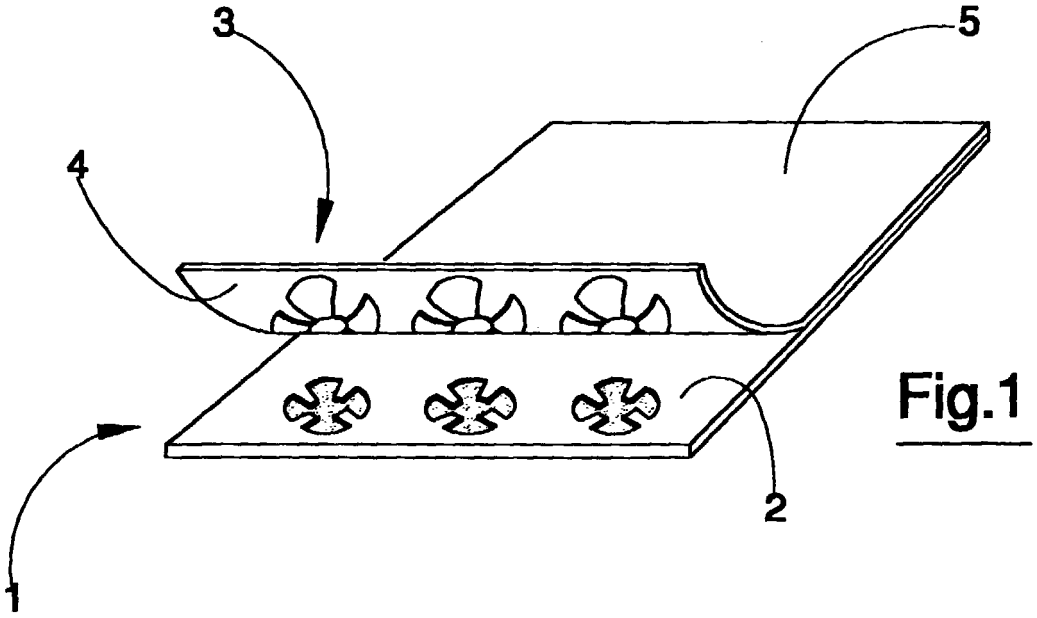

Fig.1

EP 1 083 062 A2

Description

[0001] The prior art contains matrices for ceramic tile decoration realised by various engraving techniques, comprising laser engravure.

[0002] These known techniques are relatively complex or require the use of sophisticated and expensive apparatus.

[0003] The main aim of the present invention is to obviate the limitations and drawbacks of the prior art.

[0004] An advantage of the invention consists in the fact that usual engravure techniques can be used, for example those relating to silk screen incision.

[0005] A further advantage of the invention is that it can be used even where the matrix is destined to be equipped on rotary machines, where the matrix is arranged on a rotary matrix-bearing cylinder.

[0006] These aims and advantages and others besides are all attained by the present invention, as it is characterised in the appended claims.

[0007] Further characteristics and advantages of the invention will better emerge from the detailed description that follows of a preferred but non-exclusive embodiment thereof, illustrated purely by way of non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a schematic perspective view of the matrix during the detachment stage from the template;
figure 2 is a transversal section of the matrix, on which a support has been fixed to prevent the matrix from being stretchable in any direction parallel to the surface thereof;
figure 3 is a very schematic illustration of a possible use of the matrix.

[0008] With reference to the figures of the drawings, 1 denotes in its entirety a template, which reproduces in relief on its reference surface 2 a three-dimensional reproduction of a decoration to be applied on ceramic tiles 12. The template 1 can be made in a variety of ways.

[0009] One way is where the relief decoration is printed (for example by inkjet or silk-screening or by hand) on a shiny support.

[0010] Another way could be using a mechanical process, cutting the template using, for example, a numerically-controlled milling machine working on three perpendicular axes.

[0011] The template can also be made with a "double-working" method, using, for example, a usual silk screen, engraved in a predetermined pattern, an internal side of which has been closed after being engraved. The screen is therefore sealed and its external side is characterised by the presence of the engraved area which is in fact recessed with respect to the non-cut external surface. The result is a sort of first screen matrix which can then be used to produce the true and proper matrix, in which the recessed parts of the original become in relief in the final matrix.

[0012] After manufacturing the template 1, the process of the invention includes the creation of an elastomer matrix 3 which is obtained directly from the template 1 and therefore reproduces a "negative" version of the decoration.

[0013] This "negative" is obtained after solidification of the elastomer material which at first, in the liquid state, is dropped onto the template 1 to form a layer thereon.

[0014] Once solid the matrix 3 is separated from the template 1 and exhibits (in its "active" zone) an exact and three-dimensional negative of the decoration, specially made to be filled with the product constituting the decoration (glaze) to be transferred onto the tile.

[0015] The reference surface 2 of the template 1 has the function of creating a front surface 4 on the matrix 3 which is distinct from the recessed zone. The front surface 4 is destined not to come into contact with the product (glaze) constituting the decoration to be transferred onto the tile.

[0016] The reference surface 2 is smooth so as to generate a corresponding smooth front surface 4 on the matrix 3.

[0017] During the drop of the liquid-state elastomer, and the subsequent solidification thereof, the reference surface 2 is kept in a horizontal position.

[0018] The same operation can be carried out with a cylindrical die, in which the template has been internally applied.

[0019] The matrix 3 can be obtained in the form of a layer which exhibits a back surface 5 which is continuous and parallel to the front surface 4.

[0020] In use, preferably the back surface 5 is solidly coupled to a support 6 which is controlledly extensible but will always return to the original undeformed state. A matrix made with the above-described process can advantageously be used for decorating ceramic tiles using known application techniques. In particular, the matrix can be arranged, with its "active" side facing outwards, on a matrix-bearing cylinder 10, where it can rotate about its own axis and collaborate with a moving rest plane 11 for tiles 12, on which the tiles 12 are moving in a predetermined direction.

[0021] The matrix-bearing cylinder 10 operates in combination with at least one doctor 13, which doctor 13 operates in contact with the front face 4 of the matrix 3 (as described, mounted on the cylinder 10) to scrape it clean and make sure that the glaze is contained only in the recessed zone.

[0022] The matrix-bearing cylinder 10 rotates about its own axis and is positionable with respect to the rest plane 11 so that the front face 4 rolls undraggingly and with a predetermined pressure on the upper surface (the surface to be decorated) of a tile 12 transiting on the rest plane 11.

[0023] The elastomer constituting the matrix 3 is water-repellent and non-stick, which render it easy to detach from the template 1 during manufacture and which properties also favour complete expulsion of the glaze from the recessed zone during operation.

Claims

1. A process for realising matrices, usable in decorating ceramic tiles, characterised in that it comprises the following stages:

manufacture of a template (1) reproducing, in three-dimensional form and in relief with respect to a reference surface (2) of the template (1), a decoration to be applied on ceramic tiles;
creation of a matrix (3) made of an elastomer, obtained by impression of the elastomer on the template (1), thus creating on the elastomer a recessed impression of the decoration on the template (1); the recessed impression being obtained by a dropping of the elastomer in a liquid state onto the template and a subsequent solidification of the elastomer on the template (1) to form a layer; the recessed impression being destined to be filled with a product to be transferred onto the tiles and constituting the decoration to be applied on the tiles.

2. The process of claim 1, characterised in that the reference surface (2) creates and identifies a front surface (4) of the matrix (3) which is distinct from a zone of the matrix (3) affording the recessed impression, which front surface (4) is destined not to come into contact with the product constituting the decoration to be transferred onto the tiles.

3. The process of claim 2, characterised in that the reference surface (2) is smooth so as to produce a front face (4) of the matrix which is equally smooth.

4. The process of claim 3, characterised in that during the dropping of the elastomer in liquid state and the subsequent solidification of the liquid, the reference surface (2) is kept in a horizontal position.

5. The process of' claim 3, characterised in that during the dropping of the elastomer in liquid state and the subsequent solidification of the liquid, the reference surface (2) is kept in a cylindrical arrangement.

6. The process of claim 3, 4 or 5, characterised in that the dropping of the elastomer in liquid state is done in such a way that the matrix (3) is obtained in a layer form exhibiting a back face (5) which is continuous and parallel to the front face (4).

7. The process of claim 6, characterised in that it comprises a solid coupling of the continuous back face (5) with a support (6).

8. The use of a matrix for decorating ceramic tiles, made according to the process of the preceding claims, characterised in that the matrix (3) is arranged on a matrix-bearing cylinder (10) which rotates about an axis thereof above a mobile rest plane (11) for tiles (12), on which mobile rest plane (11) the tiles (12) transit in a predetermined direction, the matrix-bearing cylinder (10) operating in collaboration with a doctor (13), which doctor (13) scrapes the front face (4) of the matrix (3) arranged on the matrix-bearing cylinder (10) and cleans the front face (4), confining the product constituting the decoration exclusively to the recessed impression;

the matrix-bearing cylinder (10) being provided with a rotation motion about an axis thereof and being positionable with respect to the rest plane (11) so that the front face (4) rolls with no dragging and at a predetermined pressure on the tile (12) transiting on the rest plane (11).

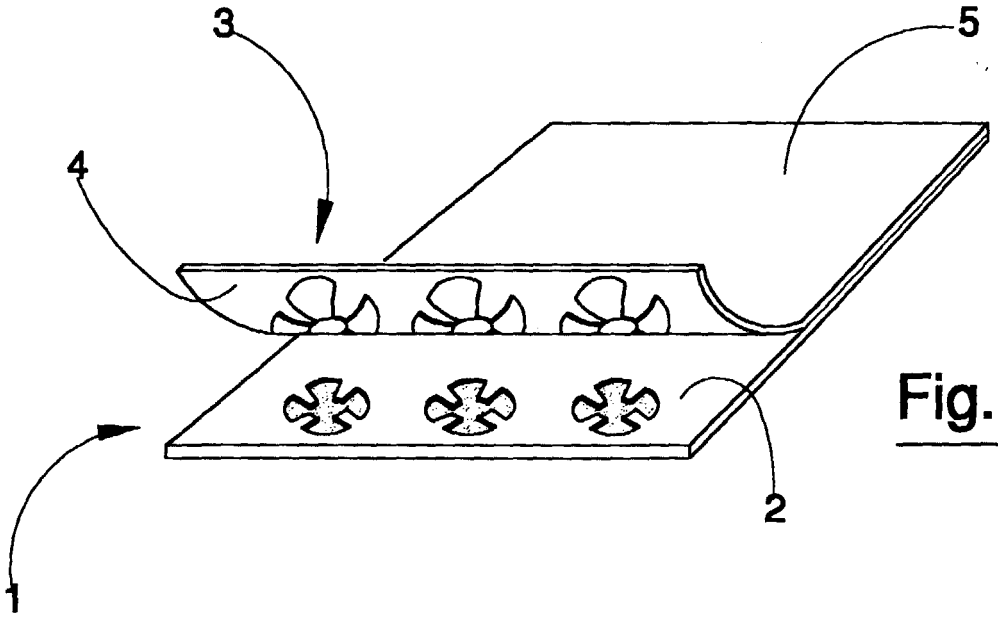

Fig.1

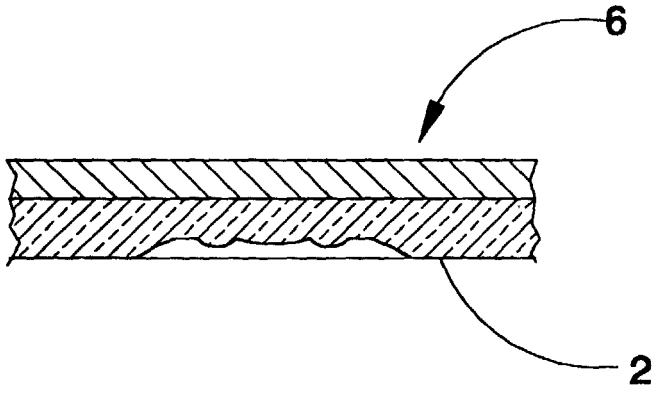

Fig. 2

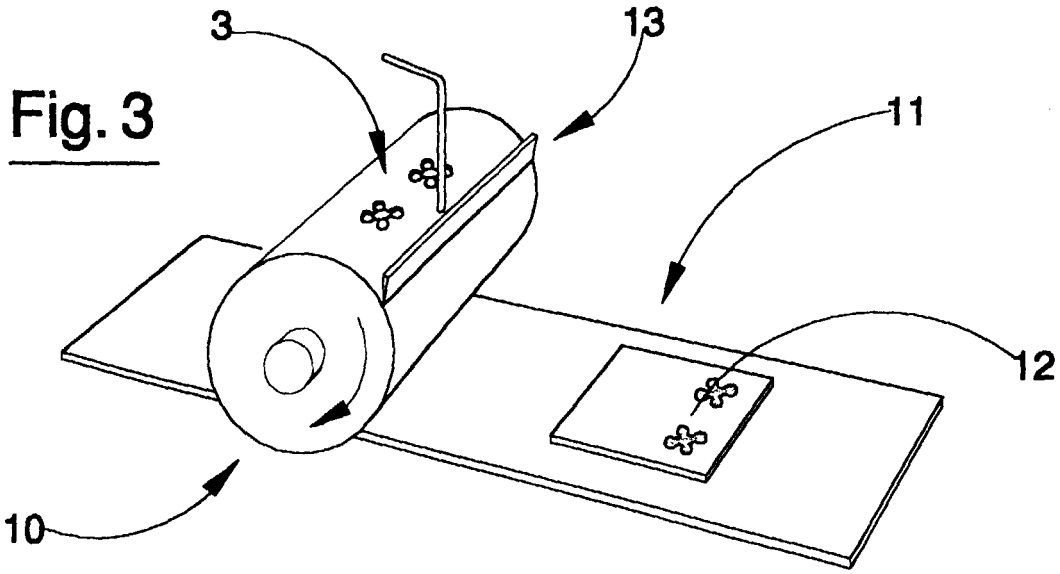

Fig. 3