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

(11) **EP 1 745 905 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.01.2007 Bulletin 2007/04

(51) Int Cl.:
B28B 13/02 *(2006.01)*

(21) Application number: **06076159.0**

(22) Date of filing: **02.06.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **19.07.2005 IT RE20050086**

(71) Applicant: **SACMI COOPERATIVA MECCANICI IMOLA SOCIETA' COOPERATIVA**
40026 Imola (Bologna) (IT)

(72) Inventor: **Valli, Silvano, c/o SACMI**
40026 Imola (Bologna) (IT)

(74) Representative: **Corradini, Corrado et al**
Ing. C. Corradini & C. S.R.L.
Via Dante Alighieri 4
I-42100 Reggio Emilia (IT)

(54) **System for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs**

(57) A system for altering the arrangement of the powders (33) forming a strip (100) of coloured powders on a base layer (200) which continuously advances, for the forming of ceramic tiles and slabs, comprising a hopper (34) having a prismatic conformation with a front face (34a) and a rear face (34b) placed transverse with respect to the advancing direction of the underlying and horizontally movable base layer (200), said hopper (34) being adapted to transfer onto said base layer (200) a strip of powders (100) having a prearranged arrangement, where said system comprises means (10) adapted to create grooves (20) on the base layer (200) before said strip of powders (100) is transferred on top of said base layer (200).

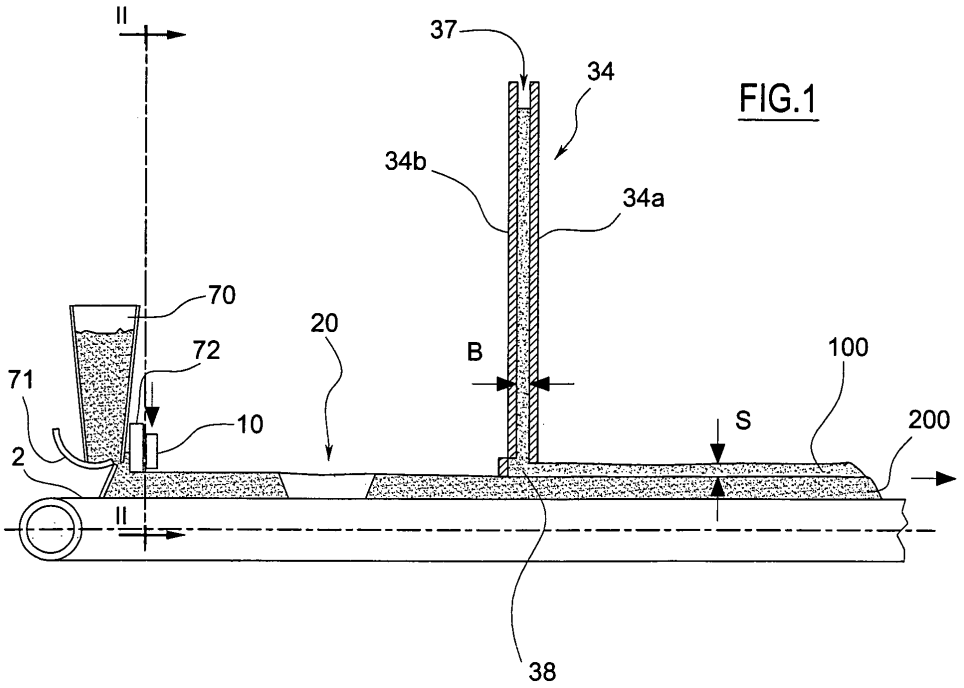

FIG.1

EP 1 745 905 A2

Description

[0001] The present invention refers to a system for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs.

[0002] More in particular, the present invention refers to a system for altering the arrangement of the powders which form the visible surface of ceramic tiles or slabs.

[0003] In the application PCT/IB2005/000025 of the same applicant, a prearrangement facility of coloured powders is described for the forming of ceramic tiles or slabs, comprising a vertical hopper placed above a movable horizontal surface on which a base layer of monochromatic ceramic powders advances. The hopper has a parallelepiped shape with a first pair of faces, called laterals, arranged parallel to the advancing direction of the base layer and a second pair of faces, front and rear respectively, arranged perpendicular to the advancing direction of the base layer. The distance between the front face and the rear face is equal to the thickness of the strip of coloured powders to be deposited on the layer of base powders. The coloured powders are loaded from the opening above and unloaded from the opening below placed at a distance from the base layer equal to the thickness of the strip. The powders are loaded into the hopper in a prearranged manner by means of appropriate feeding means and continuously descend onto the underlying moving base strip. In such a manner, a strip of coloured powders is formed on the base layer, reproducing the same prearranged arrangement of the powders present in the hopper.

[0004] Said facility permits not only continuously forming ceramic slabs of the desired thickness by simply varying the distance between the front and rear faces, and, proportionally, the distance between the unloading opening and the base strip, but also realising slabs having the visible surface which imitate natural stones, like marble and granite.

[0005] Even if the aesthetic effects present on the visible surface of the tiles made with such facility are very close to those present in natural stones, it is not possible however to recreate in a faithful manner the typical discontinuous decorative motifs caused by particular natural phenomena, such as fault slip or those which cause irregular movements of the veining.

[0006] There is therefore a great need to have available a system which permits obtaining, above a base layer, a strip of powders to be compacted having an altered veining arrangement so to reproduce on their surface also the discontinuous decorative motifs caused by particular natural phenomena, such as, for example, fault slip, movements, etc. without giving up the advantages already attained with the vertical hopper facility of the same applicant.

[0007] Object of the present invention is that of providing a system for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs having structural and functional characteristics such to satisfy the aforesaid needs and to remedy at the same time the aforesaid drawbacks.

[0008] Such object is achieved by means of a system for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs in accordance with claim 1.

[0009] The dependent claims outline preferred and particularly advantageous embodiments of the system according to the invention.

[0010] Further characteristics and advantages of the invention shall be evident from the reading of the following description, provided as exemplifying and not limiting, with the aid of the figures illustrated in the attached tables, wherein:

- Figure 1 schematically shows a vertical sectional view of a system for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs, in accordance with the present invention;
- Figure 2 shows a view of the system of figure 1 taken along the line II-II of figure 1.

[0011] In the figures, a system is shown for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs in accordance with the present invention.

[0012] The system comprises a vertical hopper 34 placed above a surface 2, movable in the direction of the arrow of figure 1, adapted to transport a predefined layer 200 of ceramic powders, simply called base layer.

[0013] The base layer 200 is realised with ceramic powders exiting from a dispenser 70 having unloading mouth closed by a small door 71. Said powders are unloaded on top of said horizontal movable surface 2 and appropriately levelled by means of a scraper 72 adapted to adjust the thickness of the base layer 200.

[0014] The hopper 34 has a parallelepiped conformation with a first pair of faces 34c, called laterals, arranged parallel to the advancing direction of the movable surface 2 and a second pair of faces 34a,34b, front and rear, respectively, arranged perpendicular to the advancing direction of the movable surface 2. The hopper 34 is loaded from an opening 37 above by appropriate feeding means, not illustrated here for display ease, with coloured powders 33, which are arranged in a prearranged manner and continuously descend by gravity through a lower opening 38, the latter placed at a distance from the base layer 200 (which is transported by the surface 2) equal to the thickness "S" of the strip 100 of coloured powders to be deposited.

[0015] Preferably, the hopper 34 has the distance "B" between the front face 34a and the rear face 34b equal to the thickness S of the strip 100 of coloured powders to be deposited on the base layer 200. In such a manner, on the surface of such continuously advancing base layer 200, a layer 100 of coloured powders can be formed, reproducing the same prearranged arrangement of the

coloured powders 33 present in the hopper 34. In particular, the prearranged arrangement of the coloured powders 33 forming the strip 100 is adapted to reproduce the typical veining of the natural stones.

[0016] In accordance with the present invention, the system comprises means for creating, on the base layer 200, upstream of the hopper 34, grooves 20 which will be subsequently filled, during the advancing of the base layer 200, with the coloured powders 33 exiting from the hopper 34.

[0017] Such grooves 20 cause an alteration of the prearranged arrangement of the coloured powders 33 forming the strip 100, which without such grooves 20 would reproduce the same arrangement of the powders 33 present in the hopper 34.

[0018] Indeed, without grooves 20, the descent of the powders 33 occurs at a constant speed. Instead, in the presence of a groove 20, when the latter reaches the outlet opening 38 of the coloured powders 33, there is an increase in the descent speed of the portion of coloured powders 33 above said groove 20 with respect to the surrounding powders.

[0019] This occurs because the groove 20 requires a greater amount of powders 33 with respect to the surrounding flat zones of the base layer 200. Such phenomena causes an alteration of the arrangement of the powders 33 descending from the hopper 34, which is transferred and reproduced on the powder strip 100 deposited on the base layer 200, giving place to the formation of a "fracture" of the veining which is very similar to fault separations.

[0020] In the illustrated example, said means for creating grooves 20 comprise a groove maker which can be vertically moved between a raised position, visible in the figures, wherein it does not interfere with the advancing underlying base layer 200 and a lowered position, not illustrated, wherein it intercepts a portion of the powders forming the base layer, creating a groove 20. Said interruption element 10 is a scraper having a width preferably comprised between 1/3 and 1/10 of the width "L" of the hopper 34.

[0021] In accordance with the preferred embodiment of the present invention, the groove maker 10 is placed adjacent to the levelling rod 72, in the example on the downstream side with respect to the advancing direction of the base layer 200. Due to such particular arrangement, the action of the groove maker element 10, during the creation of the groove 20, does not cause an alteration of the thickness of the powders of the base layer 200 surrounding the groove 20 itself.

[0022] In order to obtain variations of the desired effect, it is necessary to modify the point wherein the groove is created and/or the size of the groove. For example, it is possible to make the groove maker element 10 slidable along a direction perpendicular to the advancing direction, as well as to vary the stay time in the lowered position, the lowering distance and the width of the groove maker element 10.

[0023] In an alternative embodiment, it is possible to use an aspirator (not shown) as means to create grooves, which can be movable and which sucks on the base layer to create the desired groove.

[0024] As can be appreciated from that described, the system for altering the arrangement of the powders forming a strip for the forming of ceramic tiles or slabs according to the present invention permits satisfying the needs and overcoming the drawbacks stated in the introductive part of the present description.

[0025] Indeed, the system of the present invention permits obtaining a strip of coloured powders deposited over a base layer to be compacted for the forming of slabs reproducing the typical motifs of the natural stones on their surfaces, comprising the "defects" caused by some natural phenomena such as fault slips, cracks etc.

[0026] Of course, a man skilled in the art, in order to satisfy contingent and specific needs, may make numerous modifications and variations to the system described above, all moreover contained in the protective scope of the invention as defined by the following claims.

Claims

1. System for altering the arrangement of the powders (33) forming a strip (100) of coloured powders on a base layer (200) which continuously advances, for the forming of ceramic tiles and slabs, comprising a hopper (34) having a prismatic conformation with a front face (34a) and a rear face (34b) placed transverse with respect to the advancing direction of the underlying and horizontally movable base layer (200), said hopper (34) being adapted to transfer onto said base layer (200) a strip of powders (100) having a prearranged arrangement, **characterised in that** it comprises means (10) adapted to create grooves (20) on the base layer (200) before said strip of powders (100) is transferred on top of said base layer (200).

2. System according to claim 1, wherein said means adapted to create grooves (20) comprise a groove maker element (10), vertically movable between a raised position, wherein it does not interfere with the advancing base layer (200), and a lowered position, wherein it intercepts a portion of the powders forming the base layer, creating said groove (20).

3. System according to claim 2, wherein said groove maker element (10) operates over a space preferably comprised between 1/3 and 1/10 of the width (L) of the hopper (34).

4. System according to claim 3, wherein said groove maker element (10) is horizontally slidable along a direction perpendicular to the advancing direction of the base layer (200).

5. System according to claim 1, wherein said means adapted to create grooves (20) comprise an aspirator.

6. System according to claim 1, wherein said base layer (200) is advanced by means of a movable surface (2).

7. System according to claim 1, wherein said base layer (200) comprises monochromatic ceramic powder.

8. System according to claim 1, wherein said hopper (34) has the distance (B) between the front face (34a) and the rear face (34b) equal to the thickness (S) of the strip of powders (100) to be transferred onto the base layer (200).

9. System according to claim 7, wherein the distance between the unloading opening (38) of the hopper (34) and the base layer (200) is equal to the thickness (S) of the strip of powders (100) to be transferred onto the base layer (200).

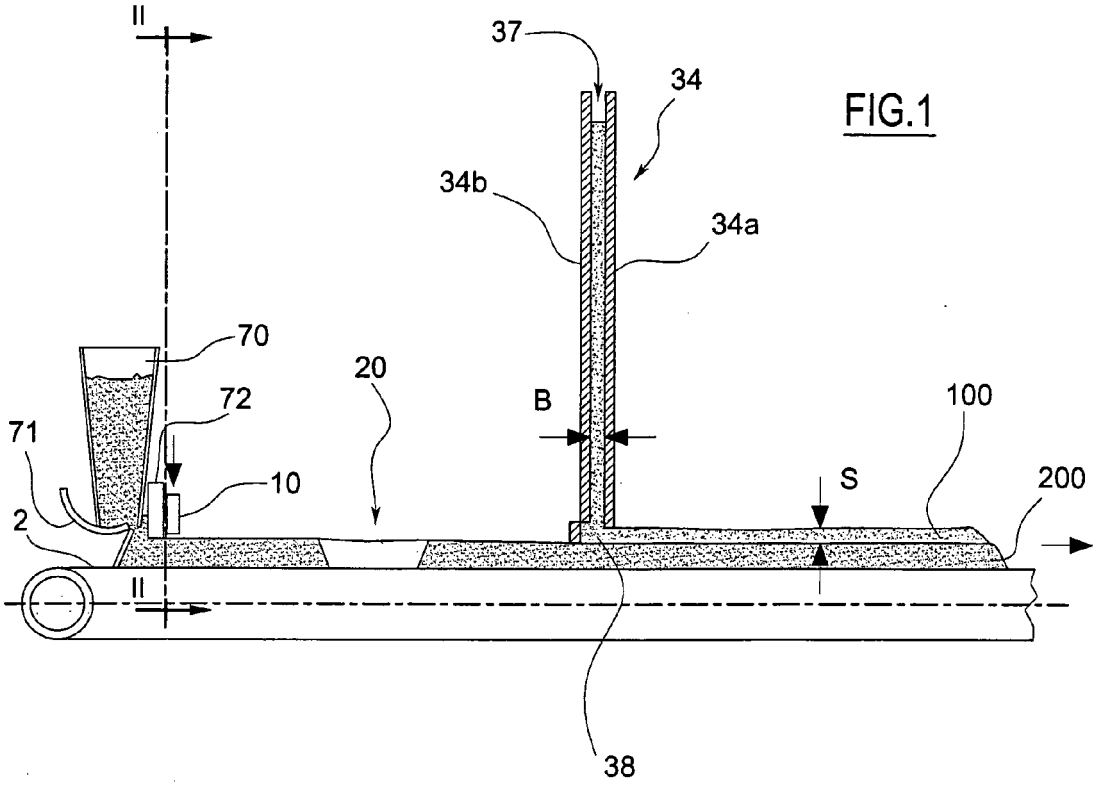
II
37
34
34b
34a
70
72
71
10
20
B
100
S
200
2
II
38

FIG.1

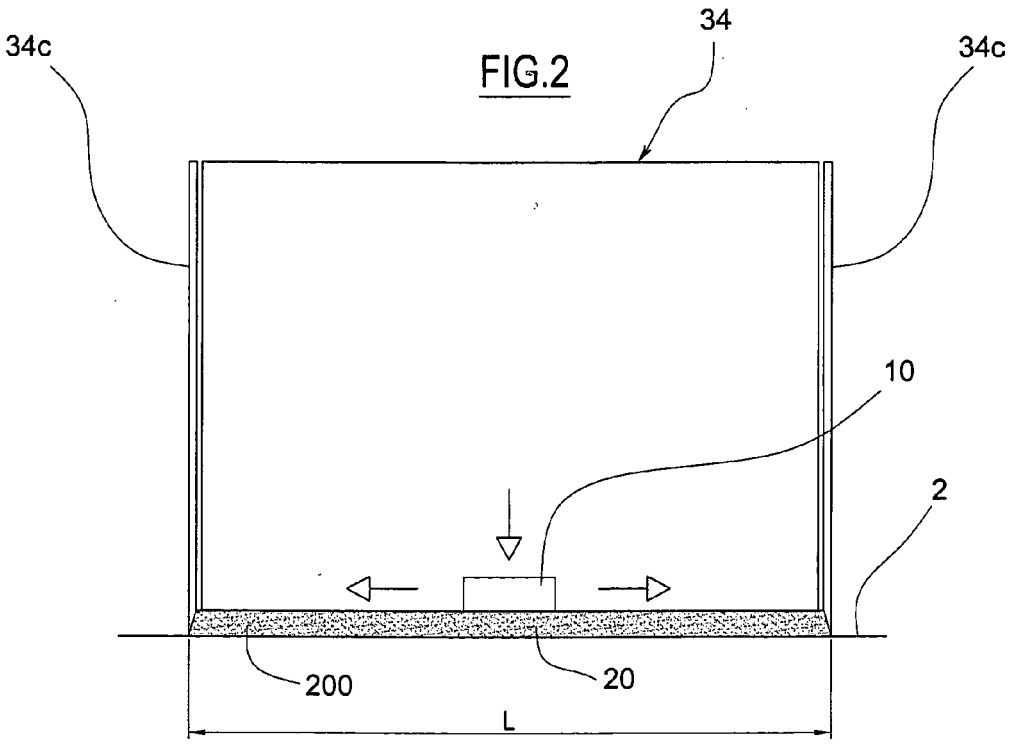
34c
34
34c
10
2
200
20
L

FIG.2