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(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) for the forming of ceramic tiles or 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 direction of an underlying movable horizontal drop surface (2) and at a distance (B) substantially equal to the thickness (S) of the strip of powders (100) to be compacted, said hopper (34) being adapted to transfer onto said movable surface (2) a strip of powders (100) reproducing the same prearranged arrangement of the powders (33) present in the hopper (34), where said system comprises alteration means (11;12;13) of the prearranged arrangement of the powders (33), said alteration means (11;12;13) being arranged on the hopper (34) and adapted to operate on the powders (33) before they are transferred onto said movable surface (2).

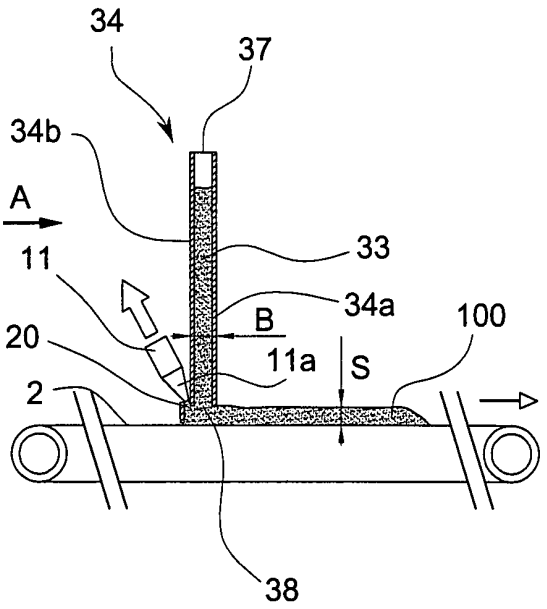

FIG. 1

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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] In the application PCT/IB2005/000025 of the same applicant, a preparation facility of coloured powders is described for the forming of ceramic tiles or slabs, comprising a vertical hopper placed above a movable horizontal drop surface. The hopper has a parallelepiped shape with a first pair of faces, called laterals, arranged parallel to the advancing direction of the movable surface and a second pair of faces, front and rear respectively, arranged perpendicular to the advancing direction of the movable surface. The distance between the front face and the rear face is equal to the thickness of the strip of powders to be compacted. The coloured powders are loaded through the opening above and unloaded from the opening below placed at a distance from the movable drop surface 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, since they are drawn from the underlying moving surface.

[0003] In such a manner, a strip of powders is formed on the movable strip 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, that between the unloading opening and the movable surface, but also the realisation of slabs which imitate natural stones, like marble and granite.

[0005] Though the aesthetic effects realised with such facility are very close to those present in the 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 the 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 a strip of powders to be compacted having an altered veining arrangement so to reproduce even the discontinuous decorative motifs caused by particular natural phenomena, such as, for example, the 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:

- Figures 1 and 2 respectively show 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 a first embodiment of the present invention;
- Figures 1A and 2A respectively show a view of the system of figure 1 and 2, from the arrows A and B of the respective figures;
- Figure 2B shows an enlarged detail of figure 2;
- Figure 3 shows a sectional view of the system in accordance with a second embodiment;
- Figure 3A shows a view of the system of figure 3 from the arrow C;
- Figure 4 shows a sectional view of the system in accordance with a third embodiment;
- Figure 4A shows a view of the system of figure 4 taken from the arrow D.

[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 movable horizontal drop surface 2. The hopper 34 has a parallelepiped conformation with a first pair of faces 34c, called laterals, arranged parallel to the advancing direction (indicated with an arrow) 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 distance "B" between the front face 34a and the rear face 34b is preferably equal to the thickness "S" of the powder strip 100 to be compacted. Nevertheless, small deviations between said thickness "S" and said distance "B" are possible. The powders 33 are loaded through an opening 37 above and unloaded from an opposite opening 38 below, the latter placed at a distance from the movable drop surface 2 equal to the thickness S of the strip 100. The powders 33 are loaded in the hopper 34 in a prearranged manner by means of appropriate feeding means, not illustrated here for display ease, and continuously descend, since they fall on the underlying moving surface 2. In such a manner, a strip 100 of powders can form on the movable surface 2, reproducing the same prearrangement of the powders 33 present in the hopper 34.

[0013] In particular, the prearranged arrangement of the strip 100 reproduces the typical veining of the natural stones.

[0014] In accordance with the present invention, the

system further comprises alteration means of the prearranged arrangement of the powders 33 present in the hopper 34 adapted to operate on the powders 33 before these are transferred onto the movable surface 2.

[0015] Said alteration means are illustrated in figures 1 and 2 in a first embodiment of the present invention, with an aspirator 11 arranged on the hopper 34 adapted to draw a certain quantity of powder 33 through an opening 20, preferably made on the rear face 34b of the hopper 34. Alternatively, it is possible to make the opening 20 on the front face 34a.

[0016] The opening 20 is a slit which extends horizontally for the entire width "L" of the rear face 34b of the hopper 34 and can be realised in any position, for example in the lower part (Figs. 1, 1A) or at an intermediate height (Figs. 2,2A) of the hopper 34.

[0017] Said opening 20 has a height preferably from 5-30 mm and is realised so to prevent the powder 33 from exiting the same.

[0018] Essentially, the opening 20 permits the mouth 11a of the aspirator 11 to access the powders 33.

[0019] For example, and as illustrated in figure 2B, such opening 20 is realised as a tilted channel having the lowest part placed inside the hopper 34 and the highest part placed outside the hopper 34.

[0020] The mouth 11a of the aspirator has a width preferably comprised between 1/3 and 1/10 of the width L of the hopper 34.

[0021] Sucking a certain amount of powder 33 through the opening 20, an increase of the fall velocity of the powders 33 is caused above the suction zone, with respect to the surrounding powders 33 which continue to fall at the same speed, thus generating, exiting from the hopper 34, a strip 100 having, at the point wherein it was operated, a clean fracture of the veining very similar to the fault separation.

[0022] In order to obtain variations of the desired effect, it is necessary to modify the point wherein the alteration is carried out and/or the mode of suction. For example, it is possible to make the aspirator 11 slidable along the opening 20, as well as to vary the suction time, the suction power and the width of the suction mouth 11a and therefore of the zone subjected to suction.

[0023] In a second embodiment, illustrated in figures 3,3A, the alteration means are a drawing bar 12 shaped to be moved into an opening 20' between an external position wherein the opening 20' is closed, preventing the release of the powders 33, and an internal position, represented in figure 3, wherein said opening 20' opens and diverts a certain amount of powder 33 exiting from the hopper 34, through the opening 20' itself.

[0024] Therefore, unlike the opening 20 of the first embodiment which does not allow the powders to freely exit the hopper 34, the opening 20' of this second embodiment, realised in any position, permits the free release of the powders 33, which is blocked by the drawing bar 12.

[0025] The drawing bar 12 has a width preferably comprised between 1/3 and 1/10 of the width L of the hopper 34 and the opening 20' has an identical width. Placing the drawing bar 12 in the internal position (Fig. 3), a vacuum is created immediately below it which attracts the powders 33, which descend the sides of the drawing bars 12 and join together below it. This generates, at the exit of the hopper 34, a strip 100 having, at the point wherein it was operated, a clean fracture of the veining which is very similar to the fault separation.

[0026] In order to obtain variations of the desired effect, it is necessary to modify the point wherein the alteration is carried out and/or the insertion mode of the drawing bars 12. For example, it is possible to foresee the use of several drawing bars 12 arranged aligned (Fig.3A), each operable in an independent manner in the corresponding opening 20', as well to vary the permanence time and/or insertion depth of the drawing bars 12 inside the hopper 34, or to vary the width of the drawing bar 12 and therefore of the corresponding opening 20'.

[0027] In a third embodiment, illustrated in figures 4,4A, the alteration means are an interception bar 13 shaped to be inserted in an opening 20 made in the same manner as the opening 20 described in the first embodiment, and i.e. so to not freely allow the exit of the powders 33. Said interception bar 13, when it is inserted in the opening 20 (Fig. 4), at least partially obstructs the fall of the powders 33.

[0028] In this inserted position, the interception bar 13 creates a vacuum immediately below it which attracts the powders 33 which descend the sides of the interception bar 13 and join together below it. This generates, upon exiting the hopper 34, a strip 100 having, at the point wherein it was operated, a clean fracture of the veining which is very similar to the fault separation.

[0029] In order to obtain variations of the desired effect, it is necessary to modify the point wherein the alteration was carried out and/or the insertion mode of the interception bar 13. For example, it is possible to insert the interception bar in any point along the opening 20, as well as to vary the permanence time and/or the insertion depth of the same inside the hopper 34, or vary the width of the interception bar 13.

[0030] As may be appreciated from that described above, 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 introduction of the present invention.

[0031] In fact, the system of the present invention permits obtaining a strip of powders to be compacted for forming a slab reproducing the typical motifs of the natural stones, including the "defects" caused by some natural phenomena such as fault slips.

[0032] 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) for the forming of ceramic tiles or 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 direction of an underlying movable horizontal drop surface (2) and at a distance (B) substantially equal to the thickness (S) of the strip of powders (100) to be compacted, said hopper (34) being adapted to transfer onto said movable surface (2) a strip of powders (100) reproducing the same prearranged arrangement of the powders (33) present in the hopper (34), **characterised in that** it comprises alteration (11; 12;13) means of the prearranged arrangement of the powders (33), said alteration means (11;12;13) being arranged on the hopper (34) and adapted to operate on the powders (33) before they are transferred onto said movable surface (2).

2. System according to claim 1, wherein said alteration means (11;12;13) operate on the powders (33) through at least one opening (20;20') made on one of the faces (34a,34b) of the hopper (34).

3. System according to claim 1, wherein said alteration means (11;12;13) operate on the powders (33) through at least one opening (20;20') made on the rear face (34b) of the hopper (34).

4. System according to claim 2, wherein said at least one opening (20;20') is placed at an intermediate height.

5. System according to claim 2, wherein said at least one opening (20;20') is placed in proximity to the movable

6. System according to claim 2, wherein said at least one opening (20) extends horizontally for the entire width (L) of the rear face (34b) of the hopper (34).

7. System according to claim 6, wherein said at least one opening (20) has a conformation such to prevent the undesired exit of the powders (33) from the hopper (34).

8. System according to claim 7, wherein said alteration means comprise suction means (11) adapted to draw a certain amount of powder (33) through said at least one opening (20).

9. System according to claim 8, wherein said suction means (11) operate over a space preferably comprised between 1/3 and 1/10 of the width (L) of the rear face (34b) of the hopper (34).

10. System according to claim 8, wherein said suction means (11) are horizontally slidable.

11. System according to claim 7, wherein said alteration means comprise an interception bar (13) shaped to be inserted in said at least one opening (20) so to at least partially obstruct the fall of the powders (33).

12. System according to claim 11, wherein said interception bar (13) operates over a space comprised between 1/3 and 1/10 of the width (L) of the rear face (34b) of the hopper (34).

13. System according to claim 2, wherein said at least one opening (20') extends horizontally for a length equal to the length on which said alteration means (12) operate.

14. System according to claim 13, wherein said alteration means comprise a drawing bar (12) shaped to be moved in said opening (20') between an external position wherein said opening closes (20') and an internal position wherein said opening (20') opens and diverts a certain amount of powder (33) exiting from the hopper (34) through said opening (20').

15. System according to claim 14, wherein said drawing bar (12) operates over a space comprised between 1/3 and 1/10 of the width (L) of the rear face (34b) of the hopper (34).

16. System according to claim 14, comprising a plurality of drawing bars (12) arranged horizontally aligned and independently operable.

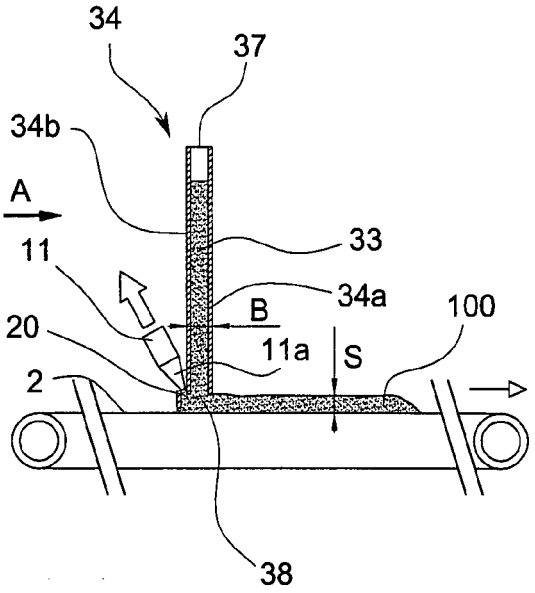

FIG. 1

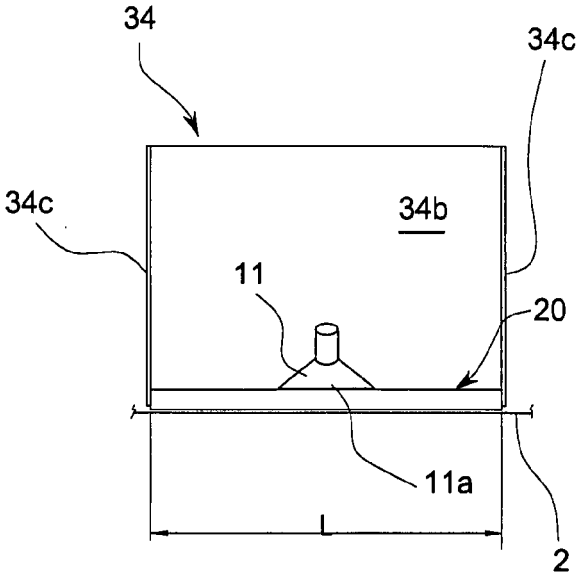

FIG. 1A

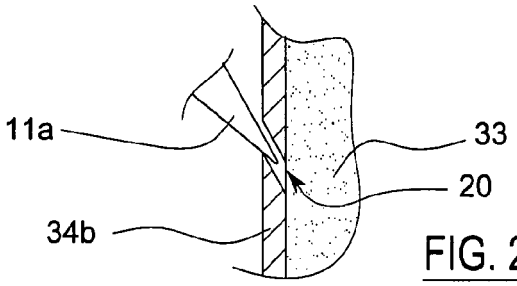

FIG. 2B

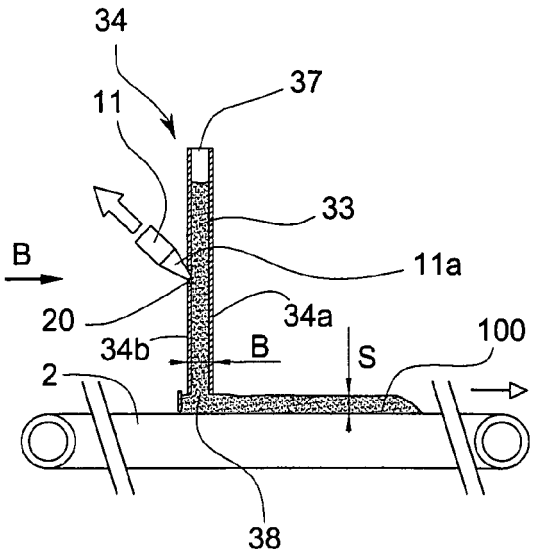

FIG. 2

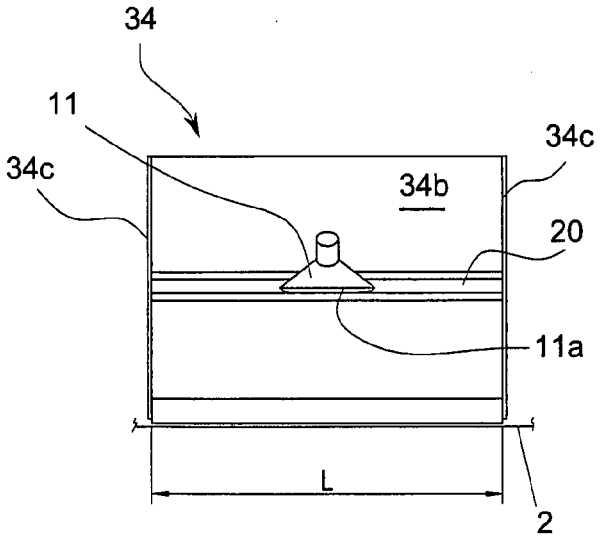

FIG. 2A

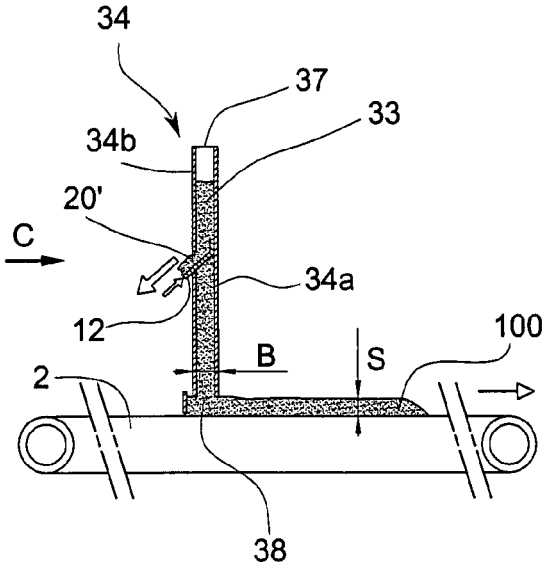

FIG. 3

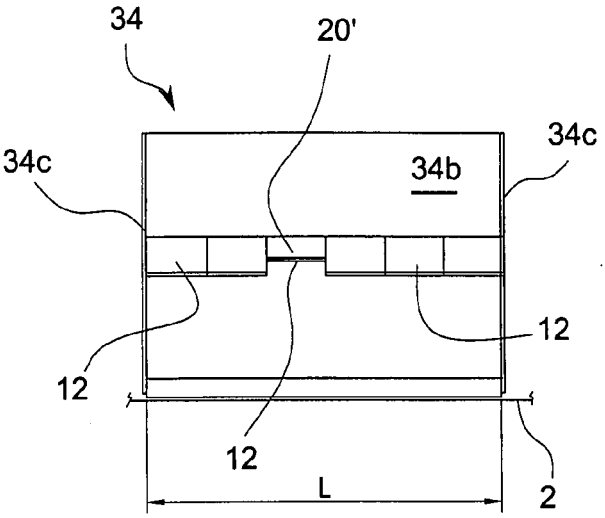

FIG. 3A

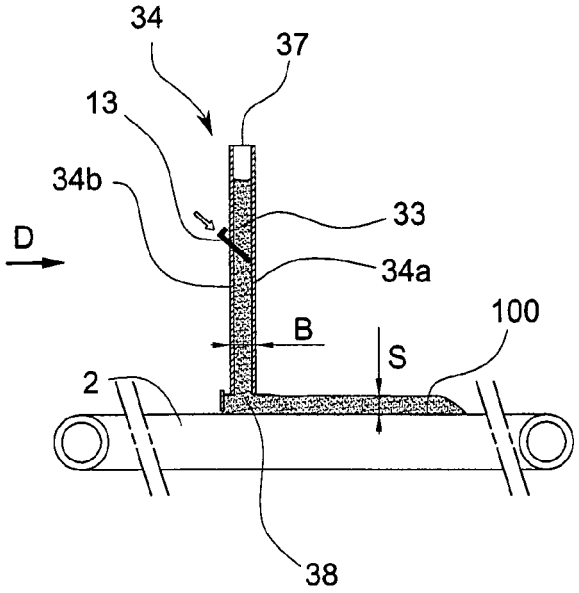

FIG. 4

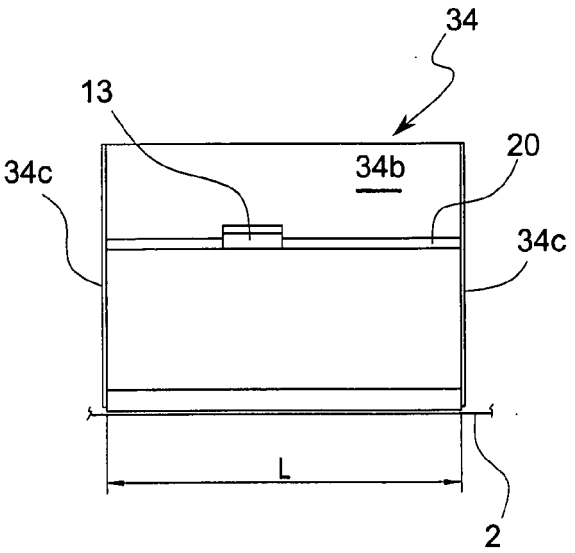

FIG. 4A