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(54) **METHOD AND PLANT FOR FORMING CERAMIC PLATES**

(57) Described herein is a plant and a method for fabricating ceramic plates, comprising at least the steps of: forming a preliminary layer (145) of ceramic powder on a preparatory slidable conveyor belt (140), distributing on the preliminary layer (145) of ceramic powder that advances on the preparatory conveyor belt (140) at least one ceramic dye, making the preliminary layer (145) of ceramic powder fall from one end (150) of the preparatory conveyor belt (140) on a collecting conveyor belt (165),

which is positioned below the preparatory conveyor belt (140) and is slidable at a lower speed than the speed of the preparatory conveyor belt (140), so as to form on said collecting conveyor belt (165) an increased layer (170) of ceramic powder having a greater thickness than the thickness of the preliminary layer (145) of ceramic powder, and pressing the increased layer (170) of ceramic powder, so as to obtain a plate (305) of pressed ceramic powder.

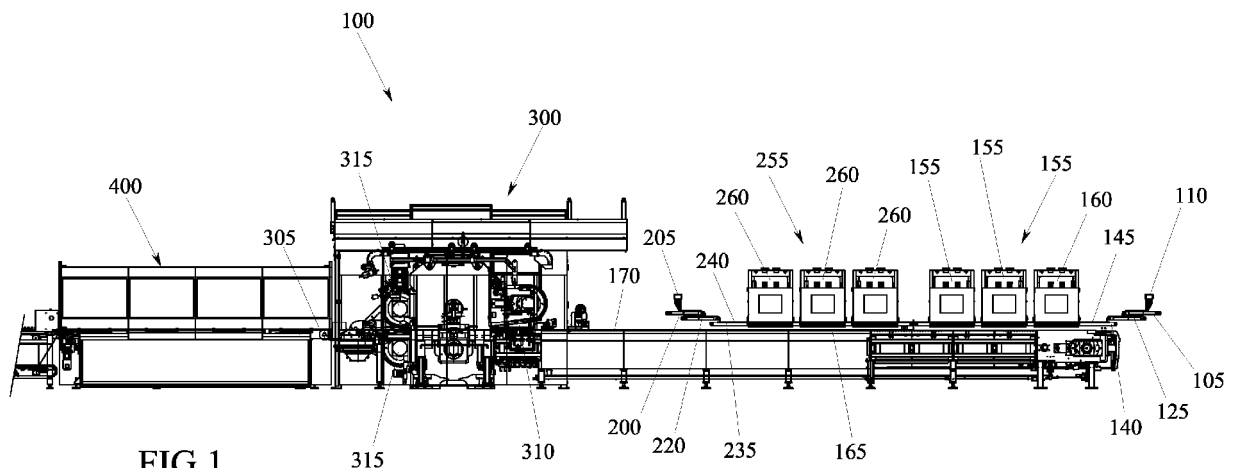


FIG.1

Description

Technical field

[0001] The present invention relates to a method and a plant for fabricating ceramic plates. In particular, the invention relates to a method and a plant that allow to fabric ceramic plates provided with particular graphic characteristics, for example veins reproducing the veins of marbles or of natural stones.

State of the art

[0002] One of the methodologies currently most widely used to fabricate ceramic plates, especially ceramic plates of large sizes, is the one according to which a continuous ceramic press is used.

[0003] The continuous ceramic press generally comprises a lower slidable belt, on which is provided a soft layer of ceramic powders, typically of atomised ceramic powder, to an upper slidable belt that is superposed to the soft layer.

[0004] These slidable belts are made to pass through two compactor rollers, or through two sets of compactor rollers, which push the upper slidable belt towards the lower slidable belt and allow it to press the soft layer of ceramic powder, obtaining at the output a continuous plate of pressed ceramic powder.

[0005] The continuous plate is then divided, by means of appropriate cutting members, into individual plates of defined dimensions, which are subsequently subjected to the usual steps of drying, decorating and lastly firing inside a ceramic kiln.

[0006] Instead of a continuous press it is also possible to use special discontinuous presses, for example the ones commercially known as GEA System or Supera Siti B&T, which are able to press a sequence of individual soft layers of ceramic powders that advance on a conveyor belt, so as to obtain at the output already separated plates of compacted ceramic powder that, after a possible step of trimming the edges, are dried, decorated and lastly fired inside the ceramic kiln.

[0007] In both cases, during the decorating step, which can be carried out with the aid of appropriate digital printing machines, it is possible to create on the surface of the ceramic plates graphic effect that reproduce the veins of marble or of other valuable natural stones.

[0008] However, unlike the veins of natural stones, those obtained with this decorative technique do not penetrate inside the thickness of the material but remain confined exclusively on the outer surface of the ceramic plate.

[0009] This entails that, if the ceramic plate is polished or superficially abraded, the veins are irremediably erased or otherwise compromised.

[0010] Moreover, while the veins of natural stones sometimes have faded borders, due also to a certain transparency effect that allows to glimpse the lower lay-

ers of the veins, those obtained with the current decorative techniques stand out more markedly on the surface and do not allow to obtain the same faded effect.

[0011] A technique to create graphic effects that also extend inside the thickness of the ceramic plates is the one wherein coloured ceramic powders are used in forming the soft layer, before carrying out the pressing phase.

[0012] However, this technique requires the use of generally very complicated and costly machinery, which is rather rigid and does not allow to obtain a large variety of graphic patterns.

Description of the invention

[0013] In light of the above, a purpose of the present invention is to allow a decoration of the ceramic plates even deep in the thickness of the plate, for example, but not necessarily, to obtain a veined effect more similar to that of marble or of other natural stones.

[0014] An additional purpose is achieved the aforementioned purpose within the scope of a simple, rational and relatively affordable solution.

[0015] These and other purposes are achieved thanks to the features of the invention that are set forth in the independent claims. The dependent claims outline preferred and/or particularly advantageous aspects of the invention.

[0016] In particular, an embodiment of the present invention makes available a method for fabricating ceramic plates, typically ceramic panelling plates (for example for walls and/or floors), comprising at least the steps of:

- forming a preliminary layer of ceramic powder, typically of atomised ceramic powder, on a slidable preparatory conveyor belt,
- distributing on the preliminary layer of ceramic powder that advances on the preparatory conveyor belt at least one ceramic dye,
- making the preliminary layer of ceramic powder fall from one end of the preparatory conveyor belt on a collecting conveyor belt, which is positioned below the preparatory conveyor belt and slides at a lower speed than the speed of the preparatory conveyor belt, so as to form on said collecting conveyor belt an increased layer of ceramic powder having greater thickness than the thickness of the preliminary layer of ceramic powder, and
- pressing the increased layer of ceramic powder, so as to obtain a plate of pressed ceramic powder.

[0017] Thanks to this solution it is advantageously possible to colour directly the grains of ceramic powder of the preliminary layer, which falling on the collecting conveyor belt, form an increased layer of ceramic powder in which the coloured grains are also situated inside the thickness, thus allowing to obtain mass decorated pressed plates, for example like a marble or a natural stone.

[0018] Preferably, the step of pressing the increased layer of ceramic powder is carried out when said layer is located on the collecting conveyor belt.

[0019] In this way, it is advantageously possible to realise a particularly efficient in-line process.

[0020] In particular, the pressing step can take place while the increased layer of ceramic powder advances on the collecting conveyor belt, for example by means of a continuous ceramic press.

[0021] Alternatively, the pressing step can take place during a step of arresting the collecting conveyor belt, for example by means of a discontinuous ceramic press (e.g. of the GEA System or Supera Siti B&T type).

[0022] Naturally, after the pressing step, the method can comprise at least the usual steps of:

- dividing the plate of pressed ceramic powder into individual plates of defined dimensions,
- drying said plates, and lastly
- subjecting said plates to a firing process inside a ceramic kiln.

[0023] According to an aspect of the invention, the ceramic dye can be distributed on the preliminary layer of ceramic powder in such quantity as to colour the ceramic powder for the entire thickness of the preliminary layer.

[0024] In this way, it is advantageously possible to colour completely, or almost completely, the individual grains of ceramic powder on which the ceramic dye is dispensed.

[0025] According to another aspect of the invention, the thickness of the preliminary layer of ceramic powder can be smaller than or equal to 2 mm.

[0026] Thanks to this solution, the preliminary layer of ceramic powder is very thin, facilitating the diffusion of the ceramic dye for the entire thickness thereof.

[0027] According to an additional aspect of the invention, the ceramic dye can be a liquid ceramic ink.

[0028] In this way it is possible to obtain a more uniform colouring of the grains of ceramic powder of the first layer.

[0029] However, in other embodiments, the ceramic dye can be dry.

[0030] According to another aspect of the invention the ceramic dye can be distributed on the preliminary layer of ceramic powder in a selective manner.

[0031] In other words, the ceramic dye can be dispensed only on some portions of the preliminary layer of ceramic powder, while the remaining portions are not coloured and remain of the typically neutral colour of the basic ceramic powder.

[0032] In this way, the coloured portions of the preliminary layer of ceramic powder will form, also in the subsequent increased layer of ceramic powder, corresponding coloured portions, which will have different shape and dimensions from those obtained on the preliminary layer (because of the different speed between the two conveyor belts on which said layers are obtained) but will still create a certain final graphic effect which will also be

found in the pressed ceramic plate.

[0033] In this regard, it is thus preferable for the ceramic dye to be distributed on the preliminary layer of ceramic powder to create a predetermined graphic pattern.

[0034] In this way, it is advantageously possible to obtain a corresponding graphic pattern also on the increased layer of ceramic powder.

[0035] For example, the graphic pattern created on the preliminary layer of ceramic powder can be predetermined by the steps of:

- establishing a final graphic pattern to be obtained on the increased layer of ceramic powder, and
- deforming said final graphic pattern on the basis of the speed of the preparatory conveyor belt and of the speed of the collecting conveyor belt.

[0036] In other words, starting from the graphic pattern to be obtained on the pressed ceramic plate, it is possible to establish, on the basis of the speeds of the preparatory conveyor belt and of the collecting conveyor belt, for example on the basis of the ratio between these speeds, a deformed graphic pattern that has to be effected on the preliminary layer of ceramic powder to obtain the desired result.

[0037] In general, since the collecting conveyor belt is slower than the preparatory conveyor belt, the graphic pattern to be effected on the preliminary layer of ceramic powder will be "stretched" relative to the final graphic pattern to be obtained in the increased layer of ceramic powder.

[0038] For example to obtain in the increased layer of ceramic powder a rectilinear line that extends transversely with respect to the direction of advance of the collecting conveyor belt, it will be necessary to colour an entire transverse band of the preliminary layer having greater width than the width of the aforesaid rectilinear line.

[0039] To obtain a graphic pattern of circular shape in the increased layer of ceramic powder, it will be necessary to effect a graphic pattern of generally elliptic shape on the preliminary layer of ceramic powder.

[0040] To obtain in the increased layer of ceramic powder a rectilinear line that extends parallel to the direction of advance of the collecting conveyor belt, it will be sufficient to colour on the preliminary layer of ceramic powder a corresponding rectilinear line of equal width.

[0041] In this latter case, the "deformation" of a rectilinear line in the direction of its own length remains a rectilinear line.

[0042] In any case, for any graphic pattern to be effected on the increased layer of ceramic powder, or otherwise for a very high number of graphic patterns, for example various types of more or less regular veins, it is possible to determine, for example with computerised calculation system (e.g. appropriate software), the corresponding "deformed" graphic patterns to be effected on the preliminary layer of ceramic powder.

[0043] According to another aspect of the present invention, the ceramic dye can be distributed only on the preliminary layer of ceramic powder by means of at least one digital printing machine.

[0044] Machines of this kind have great versatility of use and, with appropriate programming, they allow to effect substantially any graphic pattern.

[0045] According to another aspect of the invention, the method can comprise the step of distributing on the preliminary layer of ceramic powder that advances on the preparatory conveyor belt a plurality of ceramic dyes having mutually different colours.

[0046] Thanks to this solution it is advantageously possible to create, with the same procedures outlined above, multicoloured graphic patterns, significantly increasing the range of decorations that can be effected on the final ceramic plate.

[0047] In particular, it is preferable to distribute on the preliminary layer of ceramic powder at least two or three, more preferably four or five, ceramic dyes of different colours, for examples selected in the group (CMYKW) consisting of: Cyan, Magenta, Yellow, Black and White.

[0048] In this way, combining and possibly superposing these ceramic dyes on the same areas of the preliminary layer of ceramic powder, it is advantageously possible to obtain polychromatic graphic patterns, without excessively increasing the number of dyes to be used.

[0049] According to another aspect of the invention, the speed of the collecting conveyor belt can be between 5% and 10% of the speed of the preparatory conveyor belt, for example the preparatory conveyor belt can slide at a speed of 50 m/min (meters per minute) and the collecting conveyor belt can slide at a speed between 3 m/min and 5 m/min.

[0050] Thanks to this solution, starting from a very thin preliminary layer of ceramic powder, which is advantageous to obtain an optimal coloration of the grains, it is possible to obtain on the collecting conveyor belt an increased layer of ceramic powder having far greater thickness, sufficiently high to obtain, following pressing, a ceramic plate with optimal mechanical characteristics of strength and stability.

[0051] According to another aspect of the invention, the step of forming the preliminary layer of ceramic powder can comprise the steps of:

- pouring ceramic powder on a starting conveyor belt, sliding at a lower speed than the speed of the preparatory conveyor belt, so as to form on this starting conveyor belt an initial layer of ceramic powder,
- making the initial layer of ceramic powder fall from an end of the starting conveyor belt on the preparatory conveyor belt.

[0052] Thanks to this solution, it is possible to form on the starting conveyor belt an initial layer of ceramic powder having relatively high thickness, hence obtainable by means of hoppers or conventional dispensing devices,

which is then duly thinned passing on the preparatory conveyor belt that slides at higher speed.

[0053] Possibly, the step of forming the preliminary layer of ceramic powder may comprise the additional step of:

- providing at least one intermediate conveyor belt, positioned below the starting conveyor belt and above the preparatory conveyor belt, which collects the initial layer of ceramic powder that falls from the starting conveyor belt and makes it advance to an end of the intermediate conveyor belt from which it falls on the preparatory conveyor belt, said intermediate conveyor belt sliding at a speed higher than the speed of the starting conveyor belt and lower than the speed of the preparatory conveyor belt.

[0054] Thanks to this solution, before reaching the preparatory conveyor belt, the initial layer of ceramic material that is poured first on the intermediate conveyor belt, thus carrying out at least two speed shifts that allow to reduce its thickness in a more regular, uniform and secure way.

[0055] According to an additional aspect of the invention, the method can comprise the step of guiding the preparatory layer of ceramic powder that falls from the preparatory conveyor belt on the collecting conveyor belt by means of a guiding hopper, preferably a guiding hopper having an inlet mouth with width at least equal to the width of the preliminary layer of ceramic powder.

[0056] In this way, the ceramic powder that falls on the collecting conveyor belt is contained in a stable manner, allowing the coloured grains of powder to be compacted and accumulate on the collecting conveyor belt, maintaining, however, their relative position.

[0057] According to another aspect of the invention, the method can comprise the additional steps of:

- forming a second preparatory layer of ceramic powder on a second sliding preparatory conveyor belt,
- distributing on said second preliminary layer of ceramic powder that advances on said second preparatory conveyor belt at least one ceramic dye, typically a ceramic dye having the same characteristics mentioned above for the first preliminary layer of ceramic powder, and
- making said second preliminary layer of ceramic powder fall from one end of said second preparatory conveyor belt on the collecting conveyor belt, so as to contribute to form the increased layer.

[0058] Thanks to this solution, it is advantageously possible to increase the quantity of ceramic powder that is loaded on the collecting conveyor belt, forming the increased layer of ceramic powder more rapidly.

[0059] According to an aspect of the invention, said second preparatory conveyor belt can be coplanar to the first preparatory conveyor belt and can slide in the same direction but in opposite sense with respect to the first

preparatory conveyor belt.

[0060] In practice, the second preparatory conveyor belt can be arranged in mirror-like fashion to the first preparatory conveyor belt with respect to an orthogonal plane to the common direction of advance, with the respective ends that are positioned adjacent and separated by a gap.

[0061] In this way, the first preliminary layer of ceramic powder and the second preliminary layer of ceramic powder proceed towards each other and, coming from opposite sides, they are joined at the gap that separates the respective preparatory conveyor belts, obtaining a single flow of ceramic powder that falls on the collecting conveyor belt.

[0062] In this context, according to an aspect of the invention the ceramic dye can be distributed on said second preliminary layer of ceramic powder selectively to create a specular graphic pattern to the graphic pattern effected on the first preliminary layer of ceramic powder.

[0063] Thanks to this solution, in the point of confluence of the two preliminary layers of ceramic powder, the graphic patterns effected on the first preliminary layer and on the second preliminary layer match and fit side by side in a substantially perfect manner, allowing to effect in the increased layer of ceramic powder exactly the same graphic pattern that would be had with only of them but with higher thickness.

[0064] According to an aspect of the invention, the first preliminary layer of ceramic powder and the second preliminary layer of ceramic powder can both fall in the guiding hopper.

[0065] In this way, the transfer of the coloured powders on the collecting conveyor belt is guided and hence more stable and secure.

[0066] In this case, the method can also comprise the step of providing a dividing wall able to divide an inlet mouth of the guiding hopper in two access ports, of which an access port able to receive the first preliminary layer of ceramic powder and a second access port able to receive the second preliminary layer of ceramic powder.

[0067] In this way, the dividing layer serves as a diaphragm that prevents the two preliminary layers of ceramic powder from mixing in a disorderly manner before entering into the guiding hopper.

[0068] Preferably, the position of said dividing wall can be regulated in vertical direction.

[0069] Thanks to this solution, it is possible to adjust the position of the hopper, for example as a function of the speeds of the two preliminary layers of ceramic powder, so as to obtain a better final result.

[0070] Another embodiment of the present invention makes available a plant for fabricating ceramic plates, comprising at least:

- a sliding preparatory conveyor belt,
- means for forming on said preparatory conveyor belt a preliminary layer of ceramic powder,
- means for distributing on the preliminary layer of ce-

ramic powder that advances on the preparatory conveyor belt at least one ceramic dye,

- a collecting conveyor belt sliding at a lower speed than the preparatory conveyor belt, which is positioned below the preparatory conveyor belt to receive the preliminary layer of ceramic powder that, advancing on the preparatory conveyor belt, falls from one end of the preparatory conveyor belt itself, allowing the formation of an increased layer of ceramic powder, and
- means for pressing the increased layer of ceramic powder, so as to obtain a plate of pressed ceramic powder.

[0071] This plant allows to implement the method described above and thus substantially accomplishes the same effects.

[0072] All the auxiliary aspects of the invention that have been described with reference to the method are understood to be naturally applicable, *mutatis mutandis*, also to the corresponding plant.

Brief description of the drawings

[0073] Further features and advantages of the invention will be more apparent after reading the following description provided by way of a non-limiting example, with the aid of the accompanying drawings.

Figure 1 is a schematic lateral view of a plant for fabricating ceramic plates according to an embodiment of the present invention.

Figure 2 is a plan view of the plant of figure 1.

Figure 3 is an enlarged detail of figure 1.

Figure 4 is a plan view of figure 3.

Figure 5 is an enlarged detail of figure 3.

Figure 6 is the detail VI indicated in figure 3 shown in enlarged scale.

Figure 7 is an enlarged detail of figure 1.

Detailed description

[0074] The aforementioned figures represent a plant 100 for fabricating ceramic plates, typically ceramic plates of large dimensions.

[0075] The ceramic plates obtained with the plant 100 can be destined to line floors, walls or any other architectural and non-architectural surface.

[0076] As shown in figure 5, the plant 100 can comprise a starting conveyor belt 105, which is able to slide in a predetermined direction of advance A, preferably horizontal and rectilinear.

[0077] Along the direction of advance A, the starting conveyor belt 105 can slide at a predetermined speed, for example but not necessarily at the speed of 5 m/min (metres per minute).

[0078] Above the starting conveyor belt 105 is positioned a dispenser device 110, for example a hopper or

any other device suitable for the purpose, which is able to pour a ceramic powder on the starting conveyor belt 105.

[0079] The ceramic powder can be obtained from grinding a mixture of ceramic raw materials, for example clays, talc, silica, feldspathic minerals, carbonates, micas, glassy materials, etc.

[0080] The mixture of ceramic raw materials can be dry ground, directly obtaining the ceramic powder, or it can be wet ground and then be subjected to a drying process inside an atomiser.

[0081] In the present description, the ceramic powder is preferably obtained with the second procedure outlined above and hence it takes the name of "atomised powder".

[0082] The ceramic powder is preferably "neutral", i.e. obtained without the addition of pigments or other dyes, so that its colour (generally light grey) is the natural one of the mixture of ceramic raw materials that have been ground and atomised.

[0083] The dispenser device 110 is controlled to dispense the ceramic powder on the starting conveyor belt 105 while the latter is sliding, so as to obtain thereon an initial layer 115 of ceramic powder having a given thickness and that progressively advances towards a terminal edge 120 of the starting conveyor belt 105.

[0084] The width of the initial layer 115 of ceramic powder, i.e. its dimension orthogonally to the direction of advance A and to its thickness, can be smaller than or equal to the width of the starting conveyor belt 105 and clearly also depends on the transverse extension of the dispenser device 110.

[0085] Below the starting conveyor belt 105, the plant 100 can comprise an intermediate conveyor belt 125, which is able to slide in a predetermined direction of advance B that is preferably parallel to the direction of advance A of the starting conveyor belt 105.

[0086] The sliding direction of the intermediate conveyor belt 125 is the same as that of the starting conveyor belt 105 but, in other embodiments, it could be opposite.

[0087] Along the direction of advance B, the intermediate conveyor belt 125 can slide at a predetermined speed, which is higher than the speed of the starting conveyor belt 105.

[0088] The ratio between the speed of the starting conveyor belt 105 and that of the intermediate conveyor belt 125 can be between 0.15 and 0.25, for example substantially equal to 0.2.

[0089] In the case at hand, the speed of the intermediate conveyor belt 125 can for example be equal to 25 m/min.

[0090] The intermediate conveyor belt 125 is positioned below the starting conveyor belt 105, so as to receive and collect on itself the ceramic powder of the initial layer 115 that progressively falls from the terminal edge 120, as the starting conveyor belt 105 slides in the direction of advance A.

[0091] This progressive fall of the ceramic powder takes place while the intermediate conveyor belt 125 is

also sliding, so as to obtain thereon an intermediate layer 130 of ceramic powder that progressively advances towards a terminal edge 135 of the intermediate conveyor belt 125.

[0092] By virtue of the higher sliding speed of the intermediate conveyor belt 125 relative to the starting conveyor belt 105, the intermediate layer 130 of ceramic powder has a lower thickness than that of the initial layer 115.

[0093] The width of the intermediate layer 130 of ceramic powder is instead substantially equal to that of the initial layer 115.

[0094] Below the intermediate conveyor belt 125, the plant 100 can comprise a preparatory conveyor belt 140, which is able to slide in a predetermined direction of advance C that is preferably parallel to the direction of advance A of the starting conveyor belt 105.

[0095] The sliding direction of the preparatory conveyor belt 140 is the same as that of the starting conveyor belt 105 but, in other embodiments, it could be opposite.

[0096] Along the direction of advance C, the preparatory conveyor belt 140 can slide at a predetermined speed, which is higher than the speed of the starting conveyor belt 105 and is preferably also higher than the speed of the intermediate conveyor belt 125.

[0097] The ratio between the speed of the starting conveyor belt 105 and that of the preparatory conveyor belt 140 can be between 0.05 and 0.15, for example substantially equal to 0.1.

[0098] In the case at hand, the speed of the preparatory conveyor belt 140 can for example be 50 m/min.

[0099] The preparatory conveyor belt 140 is positioned below the intermediate conveyor belt 125, so as to receive and collect on itself the ceramic powder of the intermediate layer 130 that progressively falls from the terminal edge 135, as the intermediate conveyor belt 125 slides in the direction of advance B.

[0100] This progressive fall of the ceramic powder takes place while the preparatory conveyor belt 140 is also sliding, so as to obtain thereon a preliminary layer 145 of ceramic powder that progressively advances towards a terminal edge 150 of the preparatory conveyor belt 140 (see figure 6).

[0101] By virtue of the higher sliding speed of the preparatory conveyor belt 140 relative to the starting conveyor belt 105 and to the intermediate layer 125, the preliminary layer 145 of ceramic powder has a lower thickness than that of the initial layer 115 and than that of the intermediate layer 130.

[0102] The width of the preliminary layer 145 of ceramic powder instead remains substantially equal to that of the initial layer 115 and to that of the intermediate layer 130.

[0103] In particular, thanks to these speed shifts, it is possible to obtain a preliminary layer 145 of ceramic powder having a rather thin thickness, for example smaller than or equal to 2 mm (millimetres) and preferably between 1 mm and 2 mm.

[0104] In this regard it should be noted that, in some embodiments, the intermediate conveyor belt 125 could be absent and the preparatory conveyor belt 140 could receive and collect directly on itself the ceramic powder of the initial layer 115 that progressively falls from the terminal edge 120 of the starting conveyor belt 105.

[0105] In other embodiments, the starting conveyor belt 105 could also be absent and the preparatory conveyor belt 140 could receive and directly collect the ceramic powder poured by the dispenser device 110, provided the latter is able to realise thereon a preliminary layer 145 of thin ceramic powder as outlined above.

[0106] Above the preparatory conveyor belt 140, the plant 100 comprises a printing apparatus 155, which is able to distribute at least one ceramic dye on the preliminary layer 145 of ceramic powder.

[0107] This ceramic dye can be a dry ceramic dye, for example comprising ceramic pigments able to adhere directly to the grains of the ceramic powder.

[0108] More preferably, however, the ceramic dye is a wet or liquid ceramic ink, which can be obtained as a dispersion of ceramic pigments inside a liquid vehicle, for example water, glycol and/or other organic liquids.

[0109] In this way, the ceramic ink wets the grains of ceramic powder, colouring them.

[0110] In any case, the quantity of ceramic dye that is dispensed per unit of surface area on the preliminary layer 145 of ceramic powder is preferably selected so as to colour the grains of ceramic powder throughout the thickness of the preliminary layer 145 itself.

[0111] In other words, the quantity of ceramic ink that is dispensed (i.e. sprayed) on a unit area of the surface of the preliminary layer 145 of ceramic powder where preferably to be able to penetrate the thickness of said preliminary layer 145 and colouring, completely or at least partially, all or nearly all the grains of ceramic powder that underlie the aforesaid unit surface area.

[0112] This penetration of the ceramic dye in the thickness of the preliminary layer 145 of ceramic powder is clearly promoted by the very small thickness of said preliminary layer 145.

[0113] To distribute the ceramic dye on the preliminary layer 145 of ceramic powder, the printing apparatus can comprise at least one digital printing machine 160.

[0114] Said digital printing machine 160 can comprise for example a print head positioned above the preparatory conveyor belt 140 and movable along a horizontal direction, orthogonal to the direction of advance C of the preparatory conveyor belt 140, which bears one or more dispensing nozzles able to spray the ceramic dye on the preliminary layer 145 of ceramic powder.

[0115] Alternatively, the digital printing machine 160 can comprise a structure that surmounts the preparatory conveyor belt 140 and that bears a plurality of fixed dispensing nozzles, which can be distributed transversely relative to the direction of advance C of the preparatory conveyor belt 140, so as to globally dispense the ceramic ink throughout the width of the preliminary layer 145 of

ceramic powder.

[0116] According to the embodiment illustrated in the figures, the printing apparatus 155 can comprise a plurality of digital printing machines 160, which can be arranged in succession along the direction of advance C of the preparatory conveyor belt 140, so as to be all individually able to dispense a respective ceramic dye on the preliminary layer 145 of ceramic powder, as the latter advances on the preparatory conveyor belt 140.

[0117] Preferably, the ceramic dye dispensed by each digital printing machine 160 has a different colour from the one dispensed by all the other digital printing machine 160 of the printing apparatus 155.

[0118] For example, the printing apparatus 155 can comprise digital printing machines 160 (e.g. three such machines), which can be able to dispense ceramic dyes of cyan, magenta, yellow, black and white (CMYKW).

[0119] The printing apparatus can also comprise an electronic control unit (not shown), which can be connected and configured to control the digital printing machine(s) 160, so as to dispense the ceramic dye selectively, for example to effect a predetermined monochromatic or polychromatic graphic pattern.

[0120] In other words, the electronic control unit can be configured to control the digital printing machine(s) 160 to dispense the ceramic dye only on some portions of the preliminary layer 145 of ceramic powder, while the remaining portions are not coloured and remain of the typically neutral colour of the basic ceramic powder.

[0121] As shown in Figure 6, below the preparatory conveyor belt 140, the plant 100 comprises a collecting conveyor belt 165, which is able to slide in a predetermined direction of advance D that is preferably parallel to the direction of advance C of the overlying preparatory conveyor belt 140.

[0122] The sliding direction of the collecting conveyor belt 165 is the same as that of the preparatory conveyor belt 140 but, in other embodiments, it could be opposite.

[0123] Along the direction of advance D, the collecting conveyor belt 165 can slide at a predetermined speed, which is lower than the speed of the preparatory conveyor belt 140.

[0124] The speed of the collecting conveyor belt 165 can for example be between 5% and 10% of the speed of the preparatory conveyor belt 140.

[0125] In the case at hand, the speed of the collecting conveyor belt 165 can for example be between 3 m/min and 5 m/min (extremes included).

[0126] The collecting conveyor belt 165 is positioned below the preparatory conveyor belt 140, so as to receive and collect on itself the ceramic powder of the preliminary layer 145 that progressively falls from the terminal edge 150, as the preparatory conveyor belt 140 slides in the direction of advance C.

[0127] This progressive fall of the ceramic powder takes place while the collecting conveyor belt 165 is sliding, so as to obtain thereon an increased layer 170 of ceramic powder that progressively advances in the di-

rection of advance D.

[0128] By virtue of the higher sliding speed of the collecting conveyor belt 165 relative to the preparatory conveyor belt 140, the increased layer 170 of ceramic powder has a greater thickness than that of the preliminary layer 145.

[0129] The width of the increase layer 170 of ceramic powder instead remains substantially equal to that of the preliminary layer 145.

[0130] In passing from the preparatory conveyor belt 140 to the collecting conveyor belt 165, the graphic pattern that was effected with the ceramic dye on the preliminary layer 145 of ceramic powder, may undergo a deformation during the descent but will still effect, in the increased layer 170 of ceramic powder, a corresponding graphic pattern that may also extend in the thickness of said increased layer 170.

[0131] For example, if on the preliminary layer 145 of ceramic powder one were to colour longitudinal rectilinear stripes, i.e. parallel to the direction of advance C of the preparatory conveyor belt 140, these stripes would equally be reproduced also on the increased layer 170 and would extend with equal width throughout the thickness thereof.

[0132] If on the preliminary layer 145 of ceramic powder one were to colour a transverse rectilinear stripe, i.e. orthogonal to the direction of advance C of the preparatory conveyor belt 140, this line would realise, in the increased layer 170 of ceramic powder, a corresponding transverse line that would extend throughout the thickness of the increased layer 170 but with a reduced width with respect to that of the initial layer.

[0133] If on the preliminary layer 145 of ceramic powder one were to colour an ellipse with its major axis parallel to the direction of advance C of the preparatory conveyor belt 140, such an ellipse would effect, in the increased layer 170 of ceramic powder, a corresponding deformed ellipse having smaller major axis than that of the initial ellipse and hence potentially more similar to a circle.

[0134] In any case, for each graphic pattern effected with the ceramic dye on the preliminary layer 145 of ceramic powder there will always be a corresponding graphic pattern resulting on the increased layer 170, whose shape shall be a "deformation" of the initial graphic pattern that clearly depends on the speeds of the preparatory conveyor belt 140 and of the collecting conveyor belt 165, for example on their ratio.

[0135] Consequently, knowing these speeds and selecting a graphic pattern to be obtained in the increased layer 170 of ceramic powder, it will always be possible to determine backwards the deformed graphic pattern to be effected in the preliminary layer 145 of ceramic powder, to obtain the desired result.

[0136] This determination or transformation may be executed for example by means of a software that receives at its input the graphic pattern to be obtained in the increased layer 170 and that, based on the speed of

the preparatory conveyor belt 140 and of the collecting conveyor belt 165, determines/calculates the graphic pattern to be effected on the preliminary layer 145.

[0137] This software can be executed by an external processing unit or directly by the electronic control unit that governs the operation of the printing apparatus 155.

[0138] In any case, the printing apparatus 155 will subsequently be commanded and controlled so that it effects on the preliminary layer 145 of ceramic powder exactly the "deformed" graphic pattern that was determined.

[0139] To guide more precisely the ceramic powder that falls from the preparatory conveyor belt 140, and thus assure a better and more secure transfer of the graphic pattern, the plant 100 can comprise a guiding hopper 175 (see fig. 6).

[0140] This guiding hopper 175 can be positioned above the collecting conveyor belt 165, so as to define a vertical channel that extends upwards to an inlet mouth 180, possibly having widened shape, which is set side by side to the terminal edge 150 of the preparatory conveyor belt 140, so as to receive and collect the ceramic powder of the preliminary layer 145.

[0141] In particular, the vertical channel of the guiding hopper 175 can be shaped as a gap defined between two planar, vertical walls, mutually opposite and oriented perpendicularly to the direction of advance C of the preparatory conveyor belt 140, of which a first wall 185 and a second wall 190 positioned downstream of the first wall 185 relative to said direction of advance D of the collecting conveyor belt 165.

[0142] The width of the gap, i.e. the width of the first and of the second wall 185 and 190, in the horizontal direction, orthogonal to the direction of advance C of the preparatory conveyor belt 140, is preferably equal to or greater than the width, in the same direction, of the preliminary layer 145 of ceramic powder, for example equal to or greater than the width, in the same direction, of the preparatory conveyor belt 140.

[0143] The first wall 185 of the guiding hopper 175 can be shaped so that its lower edge is substantially in contact with the collecting conveyor belt 165, while the lower edge of the second wall 190 remains raised, so as to allow the ceramic powder to escape and thus form the increased layer 170 that extends towards the direction of advance D of the collecting conveyor belt 165.

[0144] As shown in figures 1 and 7, in some embodiments the plant 100 can comprise a second starting conveyor belt 200, which is able to slide in a predetermined direction of advance A', preferably horizontal and rectilinear.

[0145] Along the direction of advance A', said second starting conveyor belt 200 can slide at a predetermined speed, for example but not necessarily at the speed of 5 m/min (metres per minute).

[0146] Above the second starting conveyor belt 200 is positioned a dispenser device 205, for example a hopper or any other device suitable for the purpose, which is able to pour a ceramic powder on the second starting convey-

or belt 200.

[0147] The ceramic powder can be "neutral" and it can have the same characteristics described above with reference to the formation of the preliminary layer 145.

[0148] The dispenser device 205 is controlled to dispense the ceramic powder on the second starting conveyor belt 200 while the latter is sliding, so as to obtain thereon a second initial layer 210 of ceramic powder having a given thickness and that progressively advances towards a terminal edge 215 of the second starting conveyor belt 200.

[0149] The width of the initial layer 210 of ceramic powder, i.e. its dimension orthogonally to the direction of advance A' and to its thickness, can be smaller than or equal to the width of the second starting conveyor belt 200 and clearly also depends on the transverse extension of the dispenser device 205.

[0150] Below the second starting conveyor belt 200, the plant 100 can comprise a second intermediate conveyor belt 220, which is able to slide in a predetermined direction of advance B' that is preferably parallel to the direction of advance A' of the second starting conveyor belt 200.

[0151] The sliding direction of the second intermediate conveyor belt 220 is the same as that of the second starting conveyor belt 200 but, in other embodiments, it could be opposite.

[0152] Along the direction of advance B', the second intermediate conveyor belt 220 can slide at a predetermined speed, which is higher than the speed of the second starting conveyor belt 200.

[0153] The ratio between the speed of the starting conveyor belt 200 and that of the intermediate conveyor belt 220 can be between 0.15 and 0.25, for example substantially equal to 0.2.

[0154] In the case at hand, the speed of the second intermediate conveyor belt 220 can for example be equal to 25 m/min.

[0155] The second intermediate conveyor belt 220 is positioned below the second starting conveyor belt 200, so as to receive and collect on itself the ceramic powder of the second initial layer 210 that progressively falls from the terminal edge 215, as the second starting conveyor belt 200 slides in the direction of advance A'.

[0156] This progressive fall of the ceramic powder takes place while the second intermediate conveyor belt 220 is also sliding, so as to obtain thereon an intermediate layer 225 of ceramic powder that progressively advances towards a terminal edge 230 of the second intermediate conveyor belt 220.

[0157] By virtue of the higher sliding speed of the second intermediate conveyor belt 220 relative to the second starting conveyor belt 200, the second intermediate layer 225 of ceramic powder has a lower thickness than that of the second initial layer 210.

[0158] The width of the second intermediate layer 225 of ceramic powder is instead substantially equal to that of the second initial layer 210.

[0159] Below the second starting conveyor belt 220, the plant 100 can comprise a second intermediate conveyor belt 235, which is able to slide in a predetermined direction of advance C' that is preferably parallel to the direction of advance A' of the second starting conveyor belt 200.

[0160] The sliding direction of the second preparatory conveyor belt 235 is the same as that of the second starting conveyor belt 200 but, in other embodiments, it could be opposite.

[0161] Along the direction of advance C', the second preparatory conveyor belt 235 can slide at a predetermined speed, which is higher than the speed of the second starting conveyor belt 200 and is preferably also higher than the speed of the second intermediate conveyor belt 220.

[0162] The ratio between the speed of the second starting conveyor belt 200 and that of the second preparatory conveyor belt 235 can be between 0.05 and 0.15, for example substantially equal to 0.1.

[0163] In the case at hand, the speed of the second preparatory conveyor belt 235 can for example be 50 m/min.

[0164] The second preparatory conveyor belt 235 is positioned below the second starting conveyor belt 220, so as to receive and collect on itself the ceramic powder of the second intermediate layer 225 that progressively falls from the terminal edge 230, as the second intermediate conveyor belt 220 slides in the direction of advance B'.

[0165] This progressive fall of the ceramic powder takes place while the second preparatory conveyor belt 235 is sliding, so as to obtain thereon a second preliminary layer 240 of ceramic powder that progressively advances towards a terminal edge 245 of the second preparatory conveyor belt 235 (see figure 6).

[0166] By virtue of the higher sliding speed of the second preparatory conveyor belt 235 relative to the second starting conveyor belt 200 and to the second intermediate conveyor belt 220, the second preliminary layer 240 of ceramic powder has a lower thickness than that of the second initial layer 210 and of the second intermediate layer 225.

[0167] The width of the second preliminary layer 240 of ceramic powder instead remains substantially equal to that of the second initial layer 210 and to that of the second intermediate layer 225.

[0168] In particular, thanks to these speed shifts, it is possible to obtain, on the second preparatory conveyor belt 235, a second preliminary layer 240 of ceramic powder having a rather thin thickness, for example smaller than or equal to 2 mm (millimetres) and preferably between 1 mm and 2 mm.

[0169] In this regard it should be noted that, in some embodiments, the second intermediate conveyor belt 220 could be absent and the second preparatory conveyor belt 235 could receive and collect directly on itself the ceramic powder of the second initial layer 210 that

progressively falls from the terminal edge 215 of the second starting conveyor belt 200.

[0170] In other embodiments, the second starting conveyor belt 200 could also be absent and the second preparatory conveyor belt 235 could receive and directly collect the ceramic powder poured by the second dispenser device 205, provided the latter is able to realise a second preliminary layer 240 of thin ceramic powder as outlined above.

[0171] In any case, it is preferable for the second preliminary layer 240 of ceramic powder can have the same thickness and the same width of the first preliminary layer 145.

[0172] The second preparatory conveyor belt 235 can be arranged coplanar with the first preparatory conveyor belt 140 and aligned therewith, so that the direction of advance C of the first preparatory conveyor belt 140 coincides with the direction of advance C' of the second preparatory conveyor belt 235.

[0173] The direction of sliding of the second preparatory conveyor belt 235, however, is opposite to the direction of sliding of the first preparatory conveyor belt 140, so that the terminal edges 150 and 245 of these two conveyor belts are adjacent to each other and separated solely by a narrow gap, from which the first preliminary layer 145 of ceramic powder and the second preliminary layer 240 of ceramic powder, coming from opposite parts, can both fall simultaneously on the underlying collecting conveyor belt 165.

[0174] In particular, the first preliminary layer 145 of ceramic powder and the second preliminary layer 240 of ceramic powder can both fall inside the inlet mouth 180 of the guiding hopper 175.

[0175] To prevent the first 145 and the second preliminary layer 240 of ceramic powder can mix in a disorderly manner before entering into the guiding hopper 175, said hopper can be provided with a dividing wall 250.

[0176] This dividing wall 250, which is preferably planar, vertical and orthogonal to the direction of advance C and C', is able to divide the inlet mouth 180 of the guiding hopper 175 in two access ports, of which an access port able to receive the first preliminary layer 145 of ceramic powder and a second access port able to receive the second preliminary layer 240 of ceramic powder.

[0177] The position of said dividing wall 250 can be regulated in vertical direction, for example to adapt it to different speeds of the first and/or of the second preparatory conveyor belt 140 and 235.

[0178] In this way, both the first 145 and the second preliminary layer 240 of ceramic powder contribute to the formation of the increased layer 170 of ceramic powder on the collecting conveyor belt 165.

[0179] As shown in figure 1, above the second preparatory conveyor belt 235, the plant 100 comprises a second printing apparatus 255, which is able to distribute at least one ceramic dye on the second preliminary layer 240 of ceramic powder.

[0180] In this case, as well, the quantity of ceramic dye that is dispensed per unit of surface area on the second preliminary layer 240 of ceramic powder is preferably selected so as to colour the grains of ceramic powder throughout the thickness of the preliminary layer 240.

[0181] The second printing apparatus 255, as well as the type of ceramic dye used, can have the same characteristics as those described above with reference to the first printing apparatus 155.

[0182] For example, the second printing apparatus 255 too can comprise one or more digital printing machines 260 arranged in succession along the direction of advance C' of the second preparatory conveyor belt 235, so as to be all individually able to dispense a respective ceramic dye (preferably of different colours) on the second preliminary layer 240 of ceramic powder, as the second preliminary layer advances on the second preparatory conveyor belt 235.

[0183] The second printing apparatus 255 can be connected to an electronic control unit (not shown), which can be configured to control the digital printing machine(s) 260, so as to dispense the ceramic dye selectively, for example to effect with the ceramic dye a predetermined monochromatic or polychromatic graphic pattern.

[0184] In this regard, it is preferable for the graphic pattern effected on the second preliminary layer 240 of ceramic powder is specular to the graphic pattern effected on the first preliminary layer 145 of ceramic powder, with respect to a hypothetical vertical plane, orthogonal to the directions of advance C and C' and passing through the centre of the gap that separates the first preparatory conveyor belt 140 from the second one 235.

[0185] Thanks to this solution, in the confluence point of the two preliminary layers 145 and 240 of ceramic powder, or at the gap that separates the terminal edges 150 and 245 of the first and of the second preparatory conveyor belt 140 and 235, or at the inlet of the guiding hopper 175, the graphic patterns effected on the first preliminary layer 145 and on the second preliminary layer 240 match are set side by side in a substantially perfect manner, allowing to effect on the increased layer 170 of ceramic powder exactly the same graphic pattern that would be obtained only with the first preliminary layer 145 but with a higher thickness.

[0186] It should be specified that all the layers of ceramic powder mentioned hitherto can be defined, in the language of ceramics, as "soft" layers, i.e. formed by non-pressed ceramic powder.

[0187] Above the collecting conveyor belt 165, the plant can comprise one or more levelling devices 265, for example of the aspirating type, which are able to level the surface of the increased layer 170 of ceramic powder, making its thickness uniform.

[0188] Advancing on the collecting conveyor belt 165, the increased layer 170 of ceramic powder is then transferred to a ceramic press 300 (see fig. 1), which is able to press the increased layer 170 so as to obtain a con-

tinuous plate 305 of compacted ceramic powder. The ceramic press 300 can be a continuous press able to press the increased layer 170 directly on the collecting conveyor belt 165, during its advance.

[0189] In practice, the ceramic press 300 can comprise a sliding compactor belt 310, which is superposed to the increase layer 170 of ceramic powder and advances in the same direction and at the same speed as the collecting conveyor belt 165.

[0190] The collecting conveyor belt 165 and the compactor belt 310 are made to pass through two compactor rollers 315, or through two sets of compactor rollers, which push the compactor belt 310 towards the collecting conveyor belt 165 and thus allow it to press the increased layer 170 of ceramic powder, obtaining at the output the continuous plate 305 of pressed ceramic powder.

[0191] The pressure with which the increased layer 170 is pressed can vary depending on the materials used, from a minimum of 150 kg/cm² (kilograms per square centimetre) to a maximum of 600 kg/cm².

[0192] For example, in the case of porcelain stoneware, the pressure exercised by the ceramic press 300 on the increased layer 170 of ceramic powder can be between 300 kg/cm² and 450 kg/cm², more preferably between 350 kg/cm² and 450 kg/cm² (including the extremes).

[0193] Downstream of the ceramic press 300, the plant 100 can further comprise a cutting device 400 able to divide the continuous plate 305 of ceramic powder pressed in individual plates of defined dimensions.

[0194] In conclusion, it should be stressed that the operation of the plant 100 outlined above preferably takes place continuously, or that the various conveyor belts described above slide continuously, thus obtaining a continuous formation of the different "soft" layers of ceramic powder, a continuous colouring and lastly a continuous pressing.

[0195] In some embodiments, the ceramic press 300 could, however, be a discontinuous press, for example of the type commercially known as GEA System or Supera Siti B&T.

[0196] In this case, on the collecting conveyor belt 165, instead of a continuous increased layer 170, a plurality of individual increased layers 170, having predetermined length and separated from each other by a certain distance, can be provided, with the same procedures described above.

[0197] The collecting conveyor belt 165 can then advance by discrete steps, making each advancing step be followed by an arrest step, during which each increased layer 170 of ceramic powder is stopped at the ceramic press 300.

[0198] The ceramic powder 300 can comprise pressing means that, while the increased layer 170 of ceramic powder is stopped, are able to press it directly on the collecting belt 165. These pressing means can comprise for example an abutment plate, positioned above the increased layer 170 of ceramic powder, and appropriate

hydraulic systems, which are able to lift the portion of the collecting conveyor belt 165 on which the increased layer 170 is located, pressing the latter against the abutment plate.

[0199] Subsequently, the conveyor belt 165 is lowered again and made to advance to move away the compacted ceramic powder plate and bring a new increased layer 170 of ceramic powder at the ceramic press 200.

[0200] Regardless of the type of ceramic press 300 used, the plates of pressed ceramic powder can then be sent to additional operating stations (not shown) where they are subjected to additional steps of the production process, for example a drying step, a possible decoration and/or enamelling and lastly to a firing step inside a ceramic kiln.

[0201] All process steps can also be managed automatically by an electronic processor configured to control all the various components of the plant 100 according to the procedures described above.

[0202] In addition, it should be specified that each of the conveyor belts mentioned above should be understood as the operating segment of said conveyor belts. Each conveyor belt is generally wound around a plurality of idler rollers or wheels with horizontal axis (at least one of which is motorised), which engage it to slide in a closed path that generally comprises an operating segment, in which the conveyor belt is oriented upwards to be able to support the ceramic powder, and a return segment, in which the conveyor belt is oriented downwards. For the sake of brevity, in the above description, every conveyor belt was identified with its operating segment and, consequently, the direction of advance and the speed that have been indicated refer to the sliding direction and to the speed of the conveyor belt in said operating segment.

[0203] Obviously, a person versed in the art may make numerous changes of a technical and applicative nature to the plant 100 and to its operating method, without thereby departing from the scope of the invention as claimed below.

Claims

1. A method for fabricating ceramic plates, comprising at least the steps of:

- forming a preliminary layer (145) of ceramic powder on a sliding preparatory conveyor belt (140),
- distributing on the preliminary layer (145) of ceramic powder that advances on the preparatory conveyor belt (140) at least one ceramic dye,
- making the preliminary layer (145) of ceramic powder fall from one end (150) of the preparatory conveyor belt (140) on a collecting conveyor belt (165), which is positioned below the preparatory conveyor belt (140) and slides at a lower

- speed than the speed of the preparatory conveyor belt (140), so as to form on said collecting conveyor belt (165) an increased layer (170) of ceramic powder having greater thickness than the thickness of the preliminary layer (145) of ceramic powder, and
- pressing the increased layer (170) of ceramic powder, so as to obtain a plate (305) of pressed ceramic powder.
2. A method according to claim 1, wherein the ceramic dye is distributed on the preliminary layer (145) of ceramic powder in such quantity as to colour the ceramic powder for the entire thickness of the preliminary layer (145).
 3. A method according to any of the preceding claims, wherein the thickness of the preliminary layer (145) of ceramic powder is smaller than or equal to 2 mm.
 4. A method according to any of the preceding claims, wherein the ceramic dye is a liquid ceramic ink.
 5. A method according to any of the preceding claims, wherein the ceramic dye is distributed on the preliminary layer (145) of ceramic powder in a selective manner.
 6. A method according to claim 5, wherein the ceramic dye is distributed on the preliminary layer (145) of ceramic powder to create a predetermined graphic pattern.
 7. A method according to claim 6, wherein the graphic pattern is predetermined by the steps of:
 - establishing a final graphic pattern to be obtained on the increased layer (170) of ceramic powder, and
 - deforming said final graphic pattern on the basis of the speed of the preparatory conveyor belt (140) and of the speed of the collecting conveyor belt (165).
 8. A method according to any of the preceding claims, wherein the ceramic dye is distributed on the preliminary layer (145) of ceramic powder by means of at least one digital printing machine (160).
 9. A method according to any of the preceding claims, comprising the step of distributing on the preliminary layer (145) of ceramic powder that advances on the preparatory conveyor belt (140) a plurality of ceramic dyes having mutually different colours.
 10. A method according to claim 9, wherein said dyes have respectively colour selected in the group consisting of: cyan, magenta, yellow, black and white.
 11. A method according to any of the preceding claims, wherein the speed of the collecting conveyor belt (165) is between 5% and 10% of the speed of the preparatory conveyor belt (140).
 12. A method according to any of the preceding claims, wherein the step of forming the preliminary layer (145) of ceramic powder comprises the steps of:
 - pouring ceramic powder on a starting conveyor belt (105), sliding at a lower speed than the speed of the preparatory conveyor belt (140), so as to form on this starting conveyor belt (105) an initial layer (115) of ceramic powder,
 - making the initial layer (115) of ceramic powder fall from an end (120) of the starting conveyor belt (105) on the preparatory conveyor belt (140).
 13. A method according to claim 12, wherein the step of forming the preliminary layer (145) of ceramic powder comprises the additional step of:
 - providing at least one intermediate conveyor belt (125), positioned below the starting conveyor belt (105) and above the preparatory conveyor belt (140), which collects the initial layer (115) of ceramic powder that falls from the starting conveyor belt (105) and makes it advance to an end (135) of the intermediate conveyor belt (125) from which it falls on the preparatory conveyor belt (140), said intermediate conveyor belt (125) sliding at a speed higher than the speed of the starting conveyor belt (105) and lower than the speed of the preparatory conveyor belt (140).
 14. A method according to any of the preceding claims, comprising the step of guiding the preliminary layer (145) of ceramic powder which falls from the preparatory conveyor belt (140) on the collecting conveyor belt (165) by means of a guiding hopper (175).
 15. A method according to any of the preceding claims, comprising the additional steps of:
 - forming a second preliminary layer (240) of ceramic powder on a second sliding preparatory conveyor belt (235),
 - distributing on said second preliminary layer (240) of ceramic powder that advances on said second preparatory conveyor belt (235) at least one ceramic dye, and
 - making said second preliminary layer (240) of ceramic powder fall from one end (245) of said second preparatory conveyor belt (235) on the collecting conveyor belt (165), so as to contribute to form the increased layer (170).

16. A method according to claim 15, wherein said second preparatory conveyor belt (235) is coplanar to the first preparatory conveyor belt (140) and slides in the same direction but in opposite sense with respect to the first preparatory conveyor belt (140). 5
17. A method according to claims 16 and 6, wherein the ceramic dye is distributed on said second preliminary layer (240) of ceramic powder selectively to create a specular graphic pattern to the graphic pattern effected on the first preliminary layer (145) of ceramic powder. 10
18. A method according to claim 14 and 15, wherein the first preliminary layer (145) of ceramic powder and the second preliminary layer (240) of ceramic powder both fall in the guiding hopper (175). 15
19. A method according to claim 18, comprising the step of providing a dividing wall (250) able to divide an inlet mouth (180) of the guiding hopper (175) in two access ports, of which an access port able to receive the first preliminary layer (145) of ceramic powder and a second access port able to receive the second preliminary layer (240) of ceramic powder. 20
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20. A method according to claim 19, wherein the position of said dividing wall (250) is adjustable in vertical direction. 30
21. A plant (100) for fabricating ceramic plates, comprising at least:
- a sliding preparatory conveyor belt (140),
 - means for forming on said preparatory conveyor belt (140) a preliminary layer (145) of ceramic powder, 35
 - means for distributing on the preliminary layer (145) of ceramic powder that advances on the preparatory conveyor belt (140) at least one ceramic dye, 40
 - a collecting conveyor belt (165) sliding at a lower speed than the preparatory conveyor belt (140), which is positioned below the preparatory conveyor belt (140) to receive the preliminary layer (145) of ceramic powder that, advancing on the preparatory conveyor belt (140), falls from one end (150) of the preparatory conveyor belt (140) itself, allowing the formation of an increased layer (170) of ceramic powder, and 45
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 - means (300) for pressing the increased layer (170) of ceramic powder, so as to obtain a plate (300) of pressed ceramic powder. 55

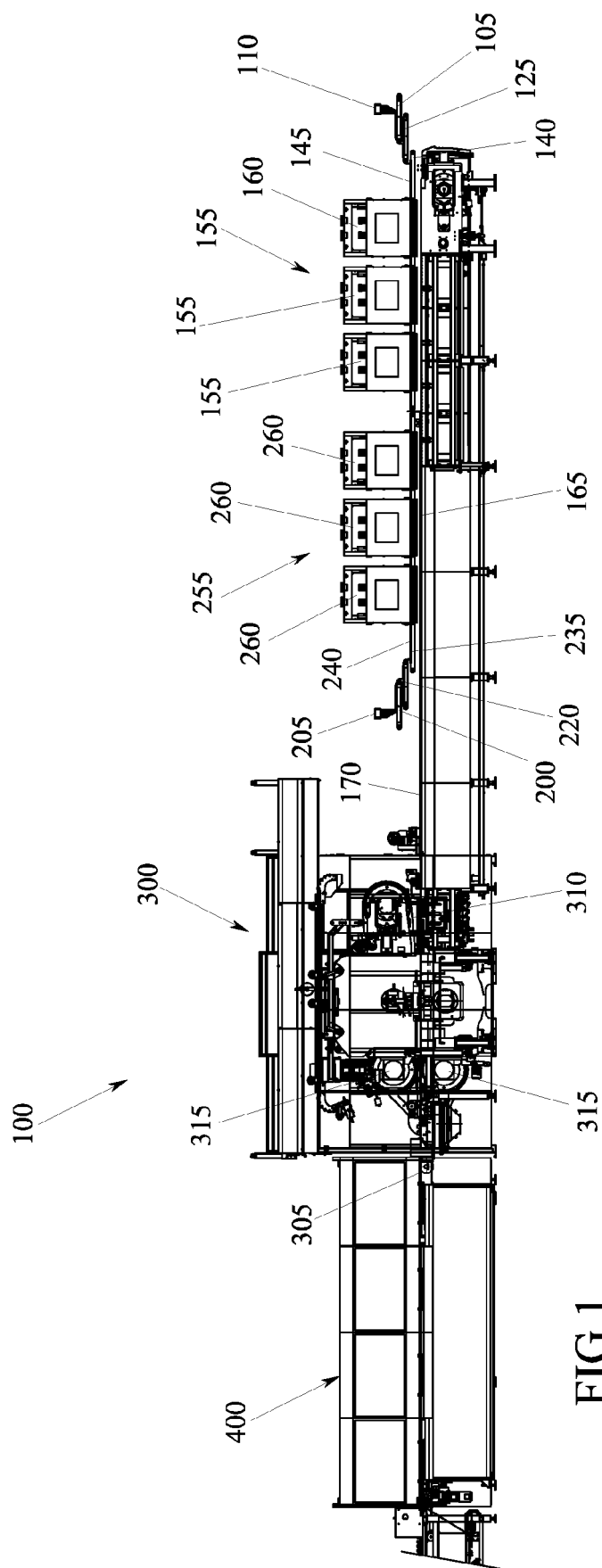


FIG. 1

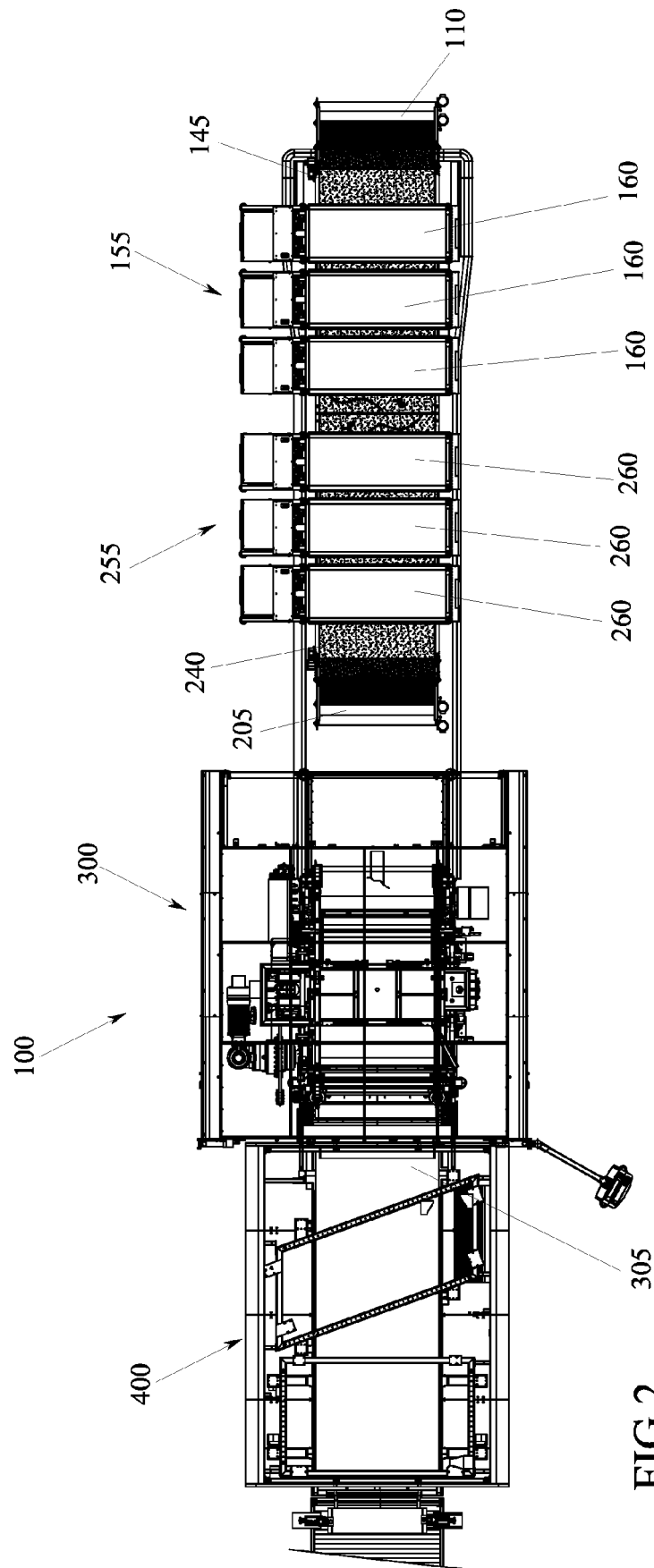
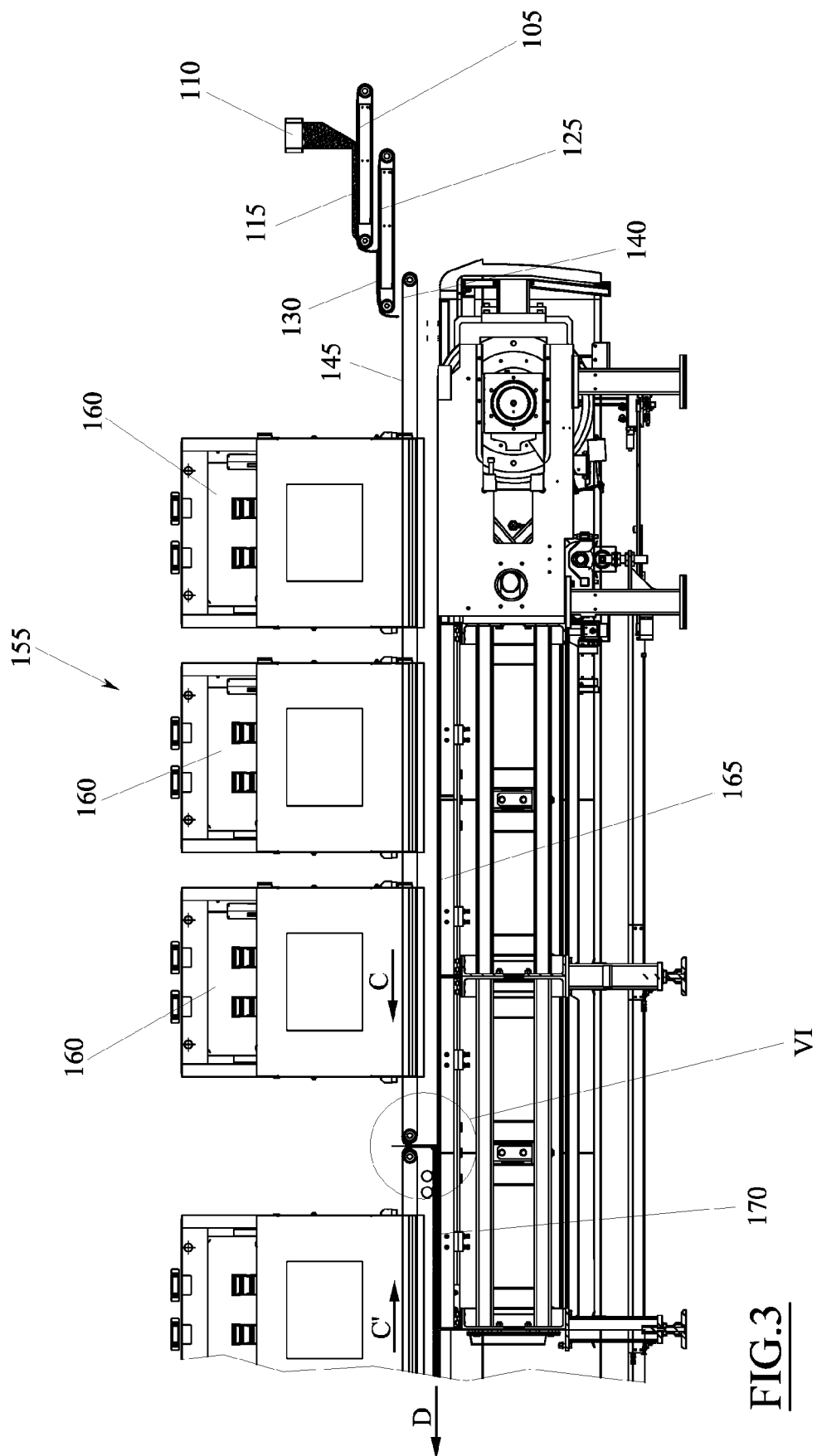


FIG. 2



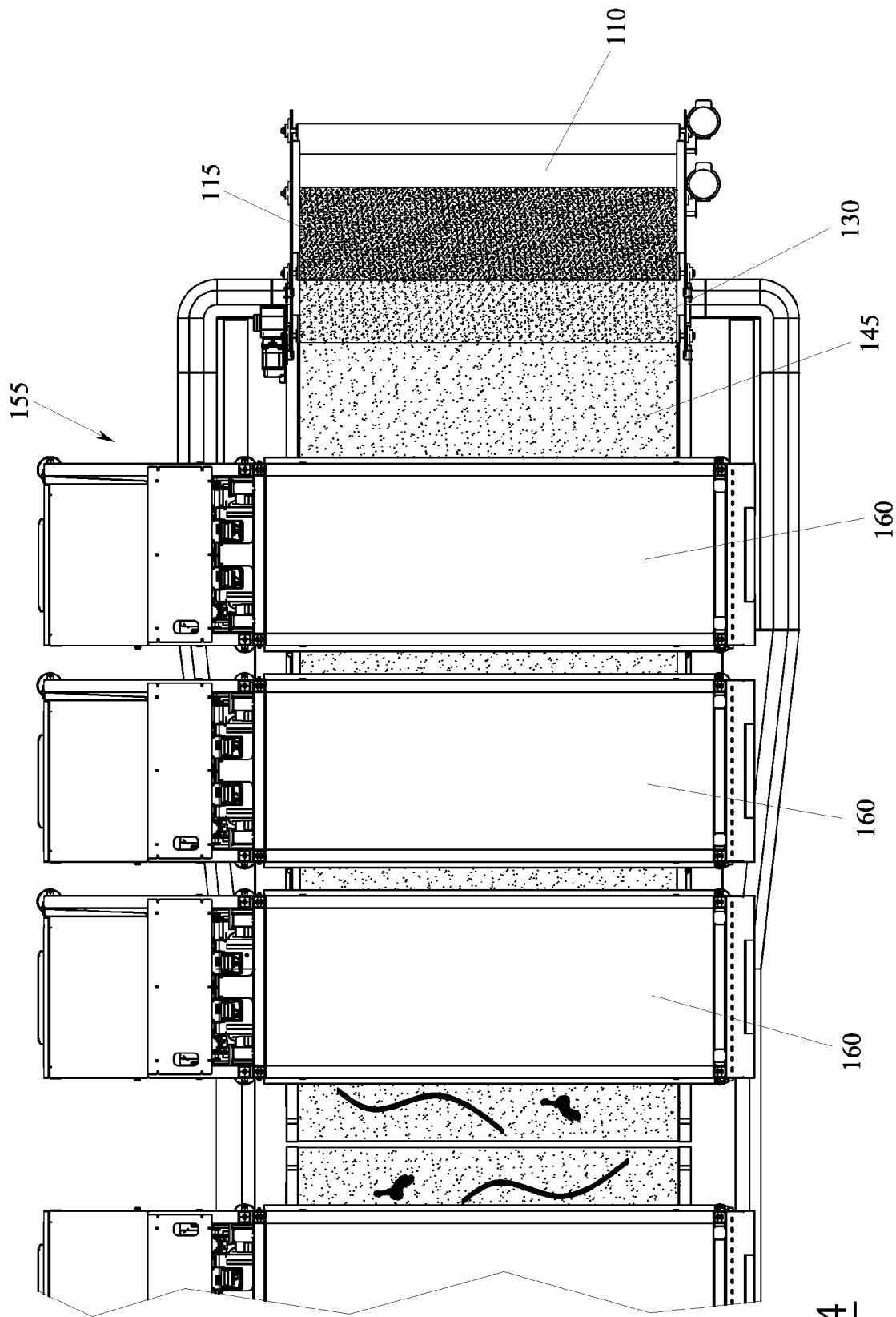
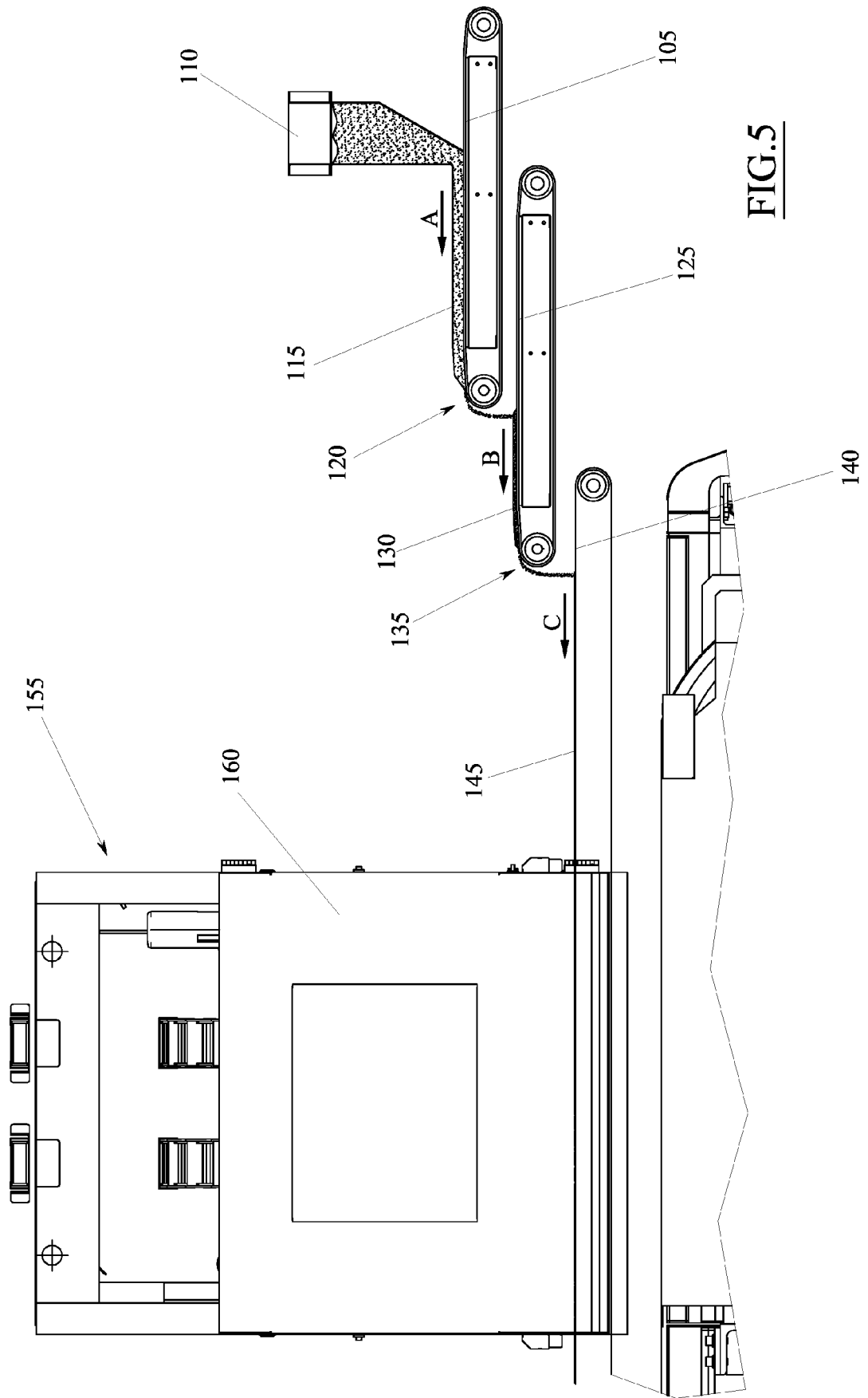
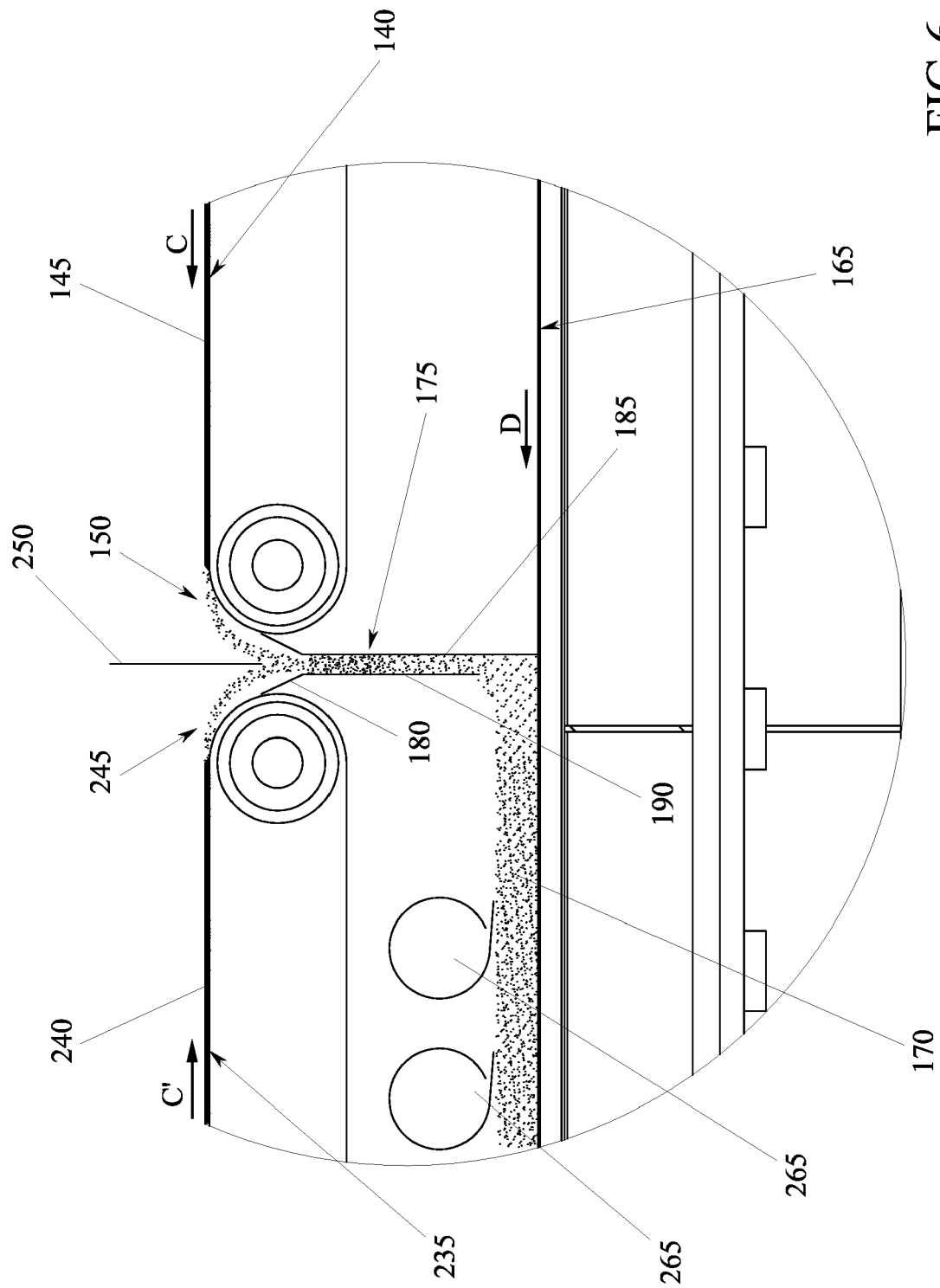
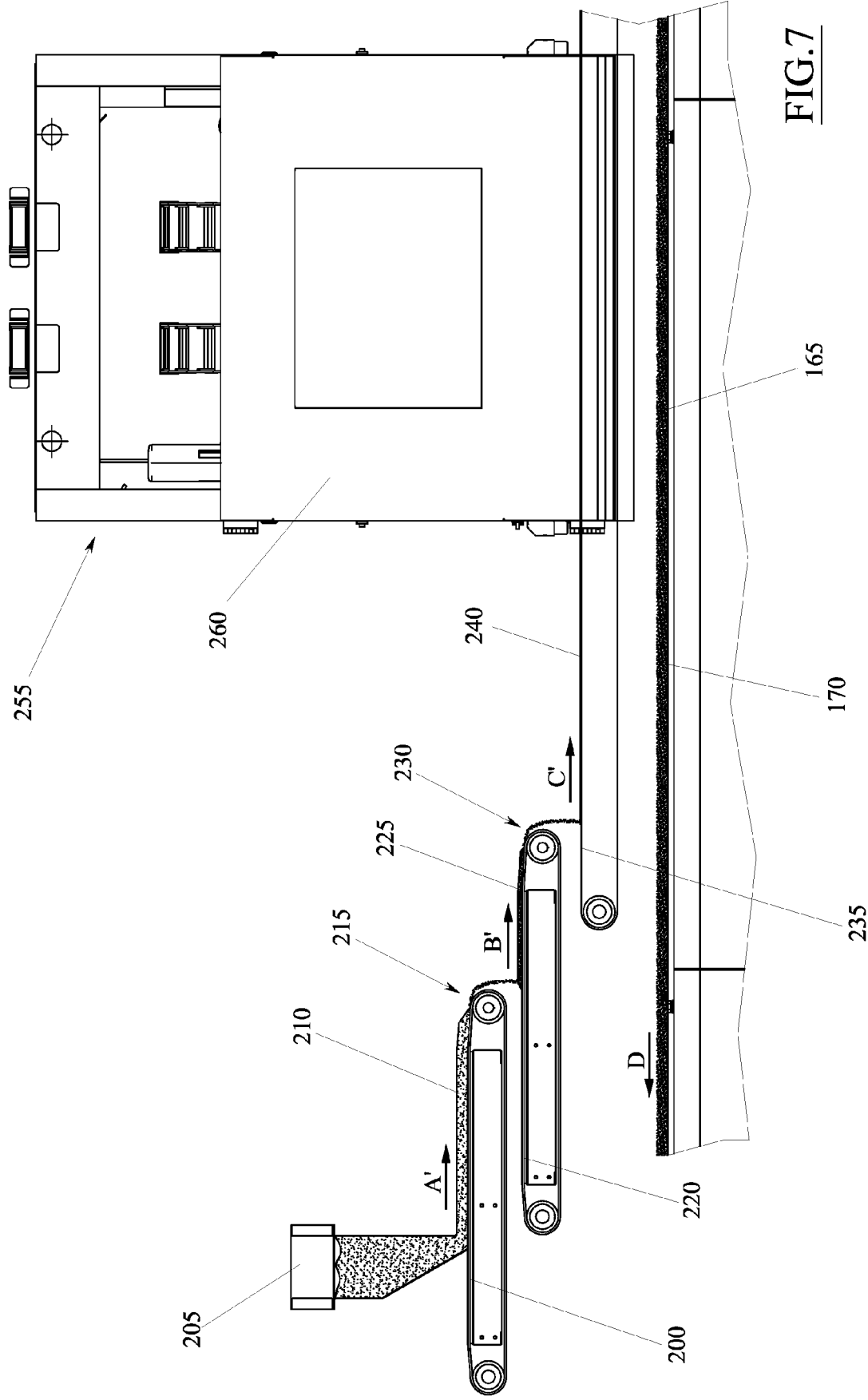


FIG.4









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