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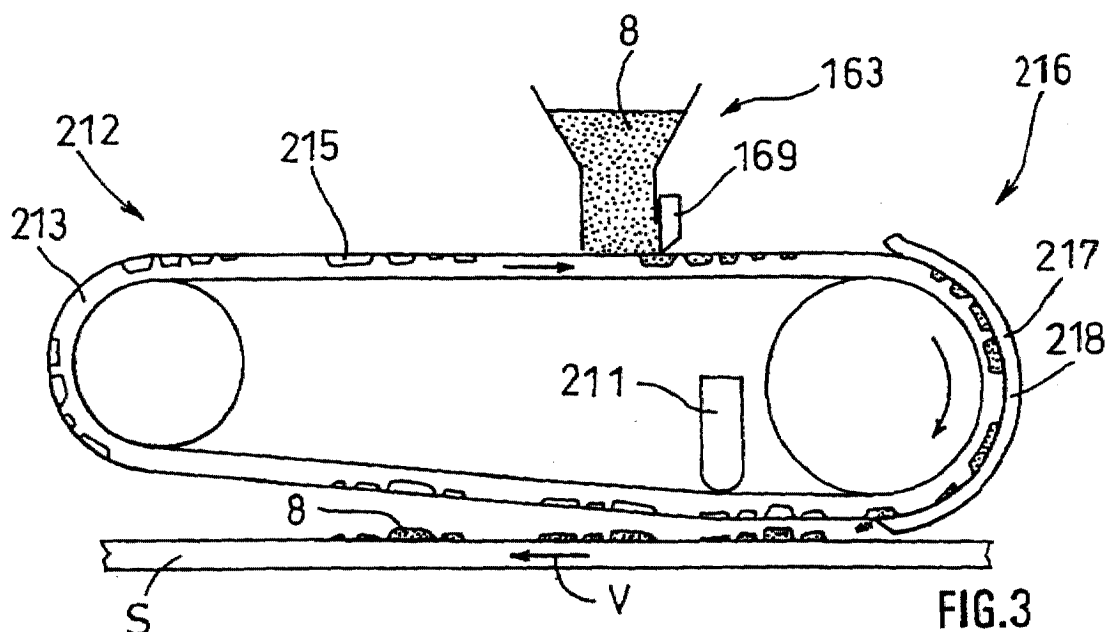
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(54) **Manufacturing of powdered material**

(57) Distributing means for distributing powdered product (6, 8, 8a) to decorate ceramic tiles comprises conveyor means (212, 213, 214) provided with hollow means (210, 215) which is open outwardly to contain parts of said product (6, 8, 8a) and closing means (3c,

6, 208, 208a, 217, 218a, 220) for closing said hollow means (210, 215) arranged to prevent said parts from exiting out of said hollow means (210, 215) along a pre-determined portion of said conveyor means (212, 213, 214).



Description

[0001] The present invention relates to a system for manufacturing powder material, in particular for the production of ceramic tiles.

[0002] PCT/EP95/04560 discloses a system for pressing ceramic tiles, wherein a continuous strip of powders having a predetermined thickness and width is formed, predetermined areas of said strip being compacted to obtain tiles, or pre-compacted semi-manufactured products which are precursors of the tiles to be formed. In the latter case there is provided pressing semi-manufactured products in a die to obtain corresponding tiles ready to be subsequently dried and fired.

[0003] US-A-3,540,093 describes an apparatus for manufacturing ceramic tiles, having substantially uniform compactness, homogeneity, density and thickness, wherein from a bottom end of a hopper, in which powders of ceramic material are contained, a vertical strip of compacted powders is formed by action of opposed pressing rolls, from said strip some pre-compacted products being subsequently severed by cutting and distributed on a horizontal conveyor from which the severed products are transferred to a die to obtain tile bodies.

[0004] GB-A-880,892 describes an apparatus for forming clay material in which a mass of clay, humidified in such a way as to result at a plastic state, is laminated between a pair of rolls to obtain a layer of plastic material and subsequently the layer is formed by a forming die, without substantial alteration of the volume, in such a way as to obtain a plurality of tiles interconnected by webs which are subsequently cut by rotating disks.

[0005] Prior art comprises also some apparatuses for making tiles in which powders are distributed in two superimposed layers during distinct strokes of a distributing trolley or distinct phases of the same stroke of a distributing trolley, the trolley being generally provided with grids and each one leading the powders of a determined layer to the matrix of the press. An example of such a kind of apparatuses is described in IT-A-1,069,458.

[0006] Moreover, in such apparatuses there is a productivity much lower than the productivity obtainable loading in just one layer, since providing distinct strokes for each trolley, or distinct phases of the stroke of loading, is time consuming, since the various layers are loaded into a matrix of a respective die in different steps and in a certain interval of time.

[0007] An object of the present invention is to improve the existent apparatuses for working ceramic tiles.

[0008] According to the present invention, there is provided distributing means for distributing powdered product to decorate ceramic tiles comprising conveyor means provided with hollow means which is open outwardly to contain parts of said product and closing means for closing said hollow means arranged to prevent said parts from exiting out of said hollow means along a predetermined portion of said conveyor means.

[0009] This allows to decorate ceramic tiles by distributing thereon a decorating product which is dropped on the respective front side, or to decorate a layer of non-pressed powders, or to prepare dosed quantities of product to pour on a layer of non-pressed powders.

[0010] The invention will be better understood and carried into effect referring to the attached drawings, wherein:

Figure 1 is a schematic, partially sectioned, interrupted side view of an apparatus for distributing ceramic powders on belt conveyor means;

Figure 2 is a schematic, partially sectioned side view of belt means for distributing powders of decorating material for ceramic tiles;

Figure 3 is a view as in Figure 2 in a modified embodiment;

Figure 4 is a view as in Figure 3 in a further version; Figure 5 is a partially sectioned schematic view of an embodiment wherein roll means substitutes the belt conveyor means.

Figure 6 is a longitudinal, schematic section of an embodiment of a pressing apparatus with belt conveyor means;

Figure 7 is a schematic side view, partially sectioned, of a pressing apparatus for pressing powders on belt conveyor means, in a phase of pressing;

Figure 8 is a plan view of Figure 7.

[0011] In the context of the following description, with the reference V is indicated the longitudinal direction of advance of loose or compacted powders on belt conveyor means. With the term "powders", each movable material at the solid state, including granular materials, ceramic glazes and clay compounds is indicated.

[0012] Figure 1 shows an apparatus for forming, on belt conveyor means 3, a layer of powders composed of base powders 6 and decorating powders 8. The powders 6 are contained in hopper distributing means 200 provided, along a wall area 202a, with an inlet 201 into which powders 8 are poured, said powders 8 having been distributed on distributing belt means 213 forming a predetermined design, as will be better explained below.

[0013] When the belt means 3 and 213 is advanced along the respective advancing directions V and V1, the powders 8 are progressively poured into the inlet 201 where a deflector 203 of the hopper distributing means 200 incorporates them into the powders 6. When the speed of the belt conveyor means 3 is substantially equal to the speed of the distributing belt means 213 the design is reproduced on the base powders 6 substantially corresponding to the one which has been defined on the distributing belt means 213.

[0014] To avoid alterations of the conformation of the layer 6, 8 before the respective powders are left on the belt conveyor means 3, it is suitable that the hopper dis-

tributing means 200 is provided with a section 204 for discharging on the belt conveyor means 3 with section which is substantially uniform.

[0015] Figure 2 shows an apparatus for distributing powders on belt conveyor means 3 wherein the hopper distributing means 200 has a shape comprising a section converging downward and an outlet section 205 which pours the powders 6 into collecting means 206 defined by an end 207 of the distributing belt means 213 and by wall means 208 which defines together a conduit 209 wherein powders 6, 8 flow towards the belt conveyor means 3.

[0016] Preferably, the conduit 209 has a section with constant width to prevent the powders from being altered when passing therethrough.

[0017] The distributing belt means 213 may have recesses, or cavities, 210 arranged to contain decorating powders 8a.

[0018] When the belt means 3, 213 is driven, the powders 8, 8a are poured into the conduit 209 and amalgamated on a side of the powders 6, in such a way as to result incorporated into, or resting on, said powders when the latter are poured on the belt conveyor means 3.

[0019] The disposition of the belt means 3 and 213 is such that the powders 8, due to gravity, tend to detach from the cavities 210. However, if a tendency to adherence of the powders 8, 8a to the belt means 213 would occur, there may be provided, near to the initial portion of the return part of the belt means 213, detaching means 211, formed for example by a vibrating body, which shakes the belt means 213 and support the detaching of the powders 8, 8a therefrom.

[0020] Figures 3 to 5 show embodiments of rotating distributing means 212 arranged to pour powders 8 on a support S, which may comprise indifferently, depending on the cases, belt conveyor means 3, ceramic supports, one or more layers of powders 6, 8 to be pressed.

[0021] Furthermore, scraping means 169 is provided suitable for scraping excesses of said powders 8 from the surface of the rotating distributing means 212.

[0022] The rotating distributing means 212 may be formed by distributing belt means 213, or by a cylindrical distributing body 214, and is preferably provided with recesses 215 arranged to contain the powders 8 and such as to define a predetermined design.

[0023] The powders 8 are distributed into the recesses 215 by hopper means 163 which pours said powders on an upper portion of the distributing means which moves underneath its outlet opening. The powders are maintained inside the recesses 215 by containing means 216 which covers the portion of distributing means which changes, during motion, its position bringing the recesses 215 from the initial position wherein they face upwardly, to the discharging position wherein they face downward. The containing means 216 may be formed by wall means 217, having for example the shape of a shell, which covers an end 218 of the belt

means 213, or, as shown in Figures 4, 5, by a flexible means, as belt means 218a rolled up on return means 219 in such a way as to have a part 220 which covers the portion of distributing means 212 which inverts its position with respect to a horizontal plane.

[0024] There may be provided detaching means 211 for detaching powders which may also act as an element whereon the containing belt means 218a is rolled up.

[0025] As shown in Figure 6, the conduit 209a may have a section having a width decreasing in the direction of advance of the powders along the conduit 209a in such a way that, when exiting from the conduit, the powders are already pressed in a compact layer 14a, which may be conveyed by belt conveyor means 15b, for example to feed a press, not shown.

[0026] The conduit 209a is defined between an end of belt distributing means 213 for distributing powders 8 and an active part 208a of a pressing belt 3c rolled on respective rolls 12b and 309a. The rolling roll 309a is supported near to the outlet opening of the hopper means 200, where to also the powders 8 of the conveyor belt 213 flow.

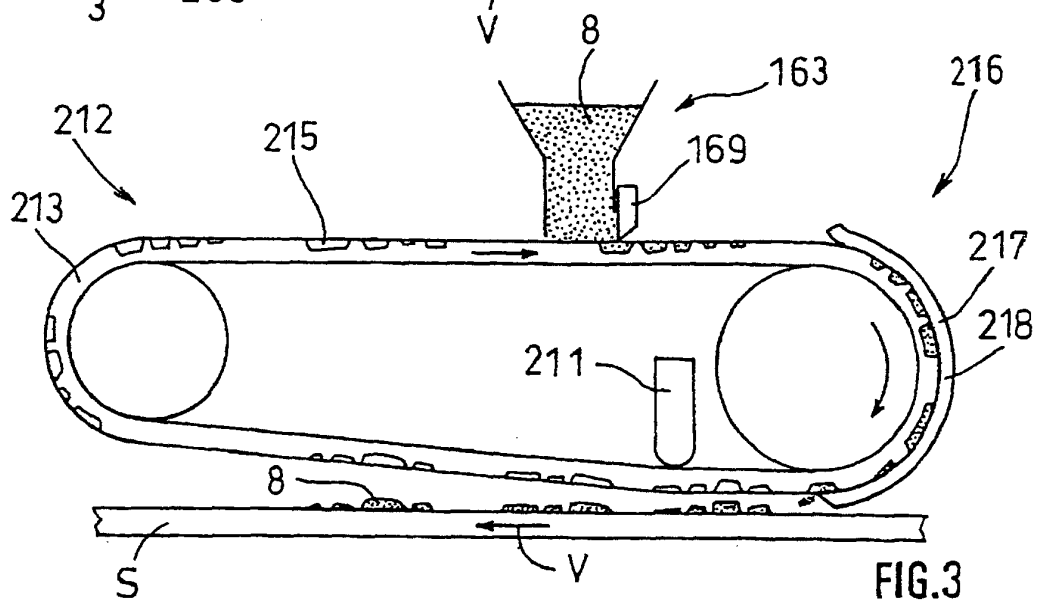
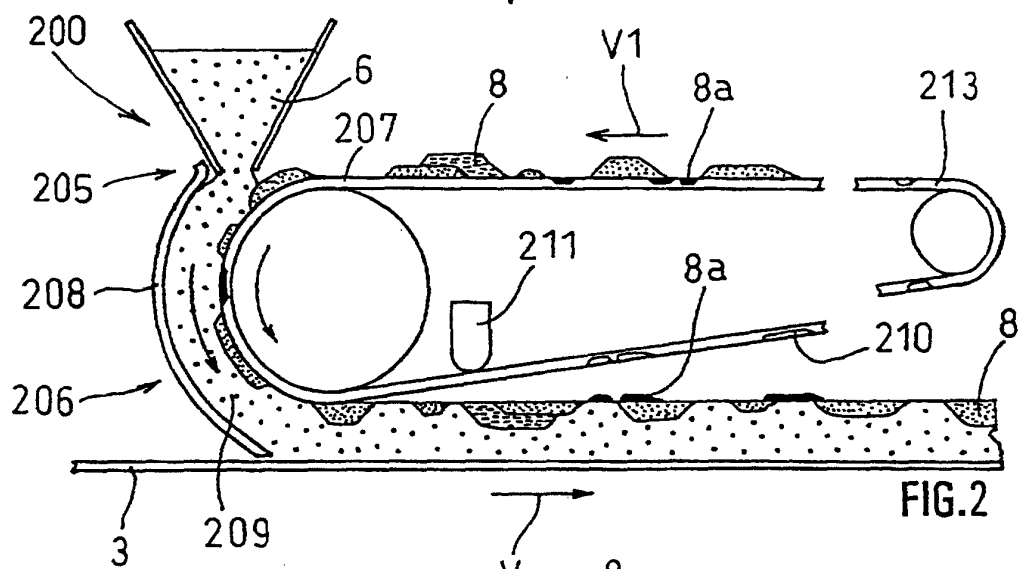
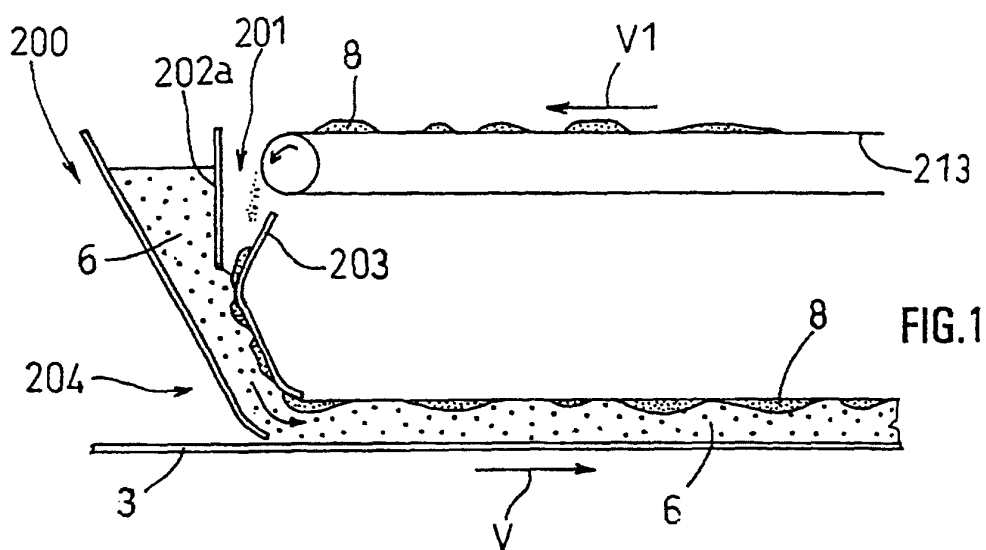
[0027] The powders 6, 8 which descend along the conduit 209a, are progressively pressed as a consequence of the decreasing of the section of the conduit 209a and are pressed at the exit from the conduit 209a between the roll 12b and the roll 13b whereon an end of the conveyor belt 213 defining a portion of the conduit 209a is rolled.

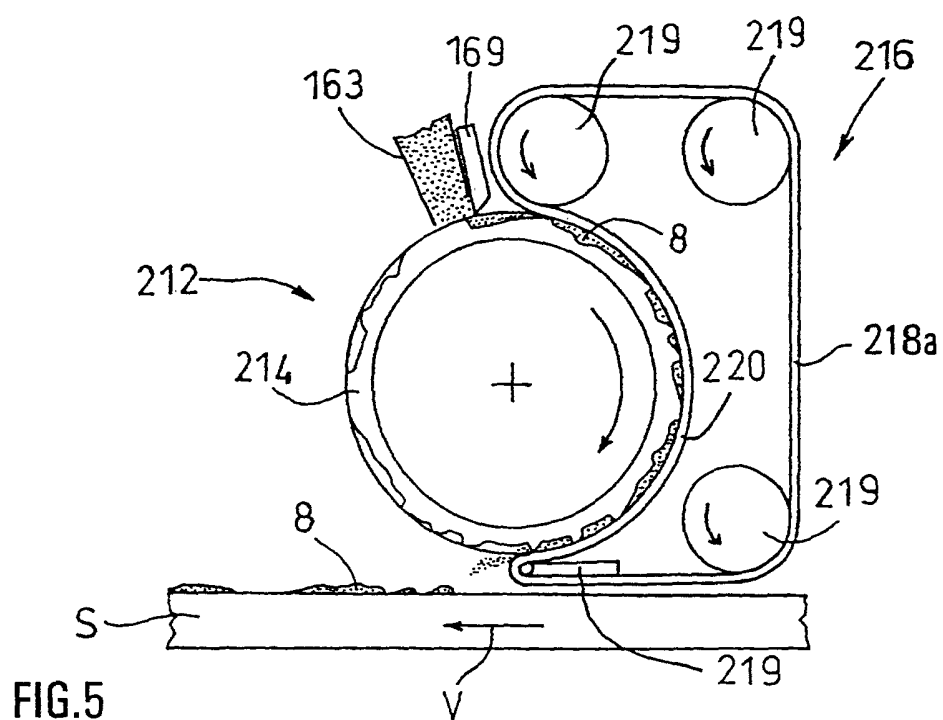
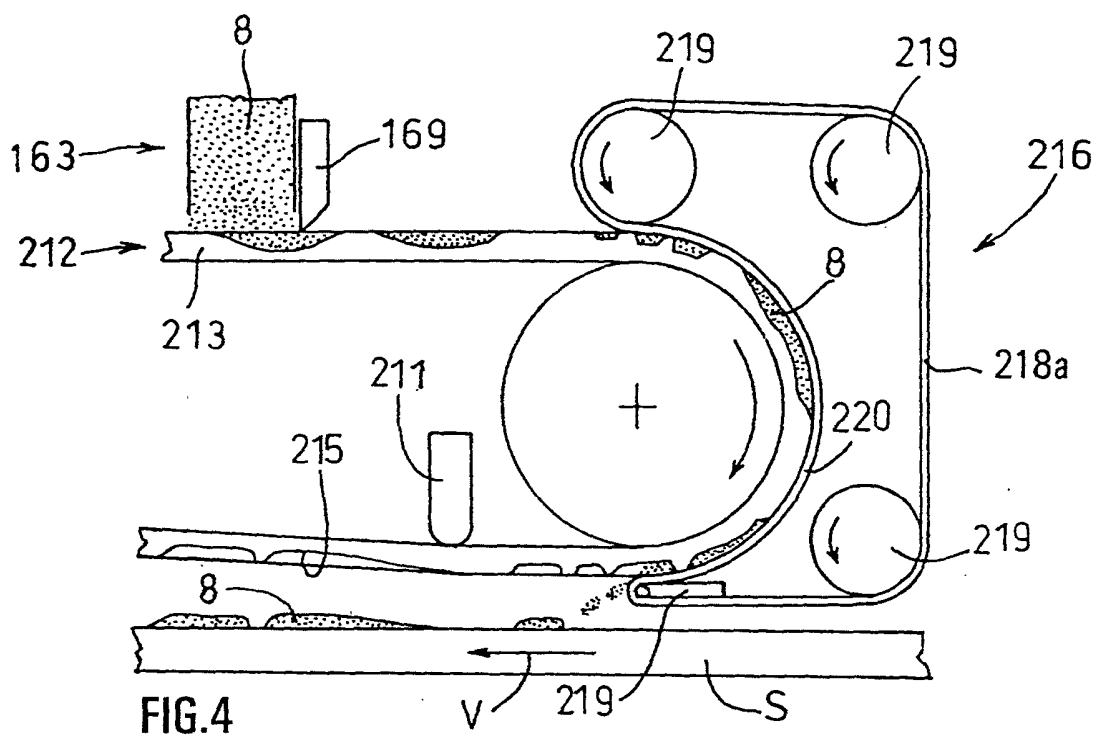
[0028] Figures 7, 8 show that the powders 6, 8 are pressed with a punch 55 while they are contained by the exceed of the powders 71. Thus, only a central portion of the powders results pressed in a homogeneous manner to obtain the product 14, while the non-pressed powders 72 are circulated again. Each product 14 is subsequently transferred at a conveyor line 73 whereon a frame punch 74 is descended, said frame punch 74 cutting, from the product, the external portion of rejection 72a, so obtaining pressed and homogeneous products 14a.

Claims

1. Distributing means for distributing powdered product (6, 8, 8a) to decorate ceramic tiles, comprising conveyor means (212, 213, 214) provided with hollow means (210, 215) which is open outwardly to contain parts of said product (6, 8, 8a) and closing means (3c, 6, 208, 208a, 217, 218a, 220) for closing said hollow means (210, 215) arranged to prevent said parts from exiting out of said hollow means (210, 215) along a predetermined portion of said conveyor means (212, 213, 214).
2. Distributing means according to claim 1, and further comprising a support surface (S, 3, 15b) onto which said powders are distributed.

3. Distributing means according to claim 1 or 2, wherein said closing means (3c, 6, 208, 208a, 217, 218a, 220) comprises wall means (217).
4. Distributing means according to claim 1, or 2, wherein said closing means (3c, 6, 208, 208a, 217, 218a, 220) comprises belt means (3c, 208a, 218a, 220).
5. Distributing means according to claim 3, wherein said closing means (3c, 6, 208, 208a, 217, 218a, 220) comprises powders (6) interposed between said wall means (208, 217) and openings of said hollow means (210, 215).
6. Distributing means according to claim 4, wherein said closing means (3c, 6, 208, 208a, 217, 218a, 220) comprises powders (6) interposed between said belt means (3c, 208a, 218a, 220) and openings of said hollow means (210, 215).
7. Distributing means according to claim 6, wherein a conduit (209a) is defined between said belt means (3c, 208a, 218a, 220) and openings of said hollow means (210, 215), said conduit (209a) having a section progressively decreasing along a direction of advance of the powder material contained therein.
8. Distributing means according to any one of the preceding claims, wherein said conveyor means (212, 213, 214) comprises belt conveyor means (213).
9. Distributing means according to any claim 1 to 7, wherein said conveyor means (212, 213, 214) comprises a cylindrical body (214).
10. Distributing means according to any one of the preceding claims, wherein said conveyor means (212, 213, 214) cooperates with scraping means (169) for scraping said powdered products (6, 8, 8a).
11. Distributing means according to any one of the preceding claims, wherein said conveyor means (212, 213, 214) cooperates with detaching means (211) suitable for detaching said powdered product (6, 8, 8a).
12. Distributing means according to claim 11, wherein said detaching means (211) comprises vibrating means (211).
13. Distributing means according to claim 12, wherein said vibrating means (211) operates in contact with said conveyor means (212, 213, 214) at a surface opposed to the surface where openings of said hollow means (210, 215) is provided.
14. Distributing means according to claim 2, or to one of claims 3 to 13 as appended to claim 2, wherein said closing means (3c, 6, 208, 208a, 217, 218a, 220) is kept substantially in contact with said conveyor means (212, 213, 214) and extends from an upper position in which said hollow means (210, 215) is oriented upwardly to a lower position in which said hollow means (210, 215) is oriented downwardly at a location close to the support surface (S, 3, 15b).
15. Distributing means according to claim 2, or to one of claims 3 to 14 as appended to claim 2, wherein said support surface (S, 3, 15b) forms part of a pressing base for pressing said powdered product (6, 8, 8a).
16. Distributing means according to claim 15, wherein said support surface (S, 3, 15b) forms part of endless belt conveyor means.
17. Distributing means according claim 2, or to one of claims 3 to 16 as appended to claim 2, wherein said hollow means (210, 215) is provided in the surface of said conveyor means (212, 213, 214) and are so wide and deep as to define a pattern formed by said powdered product (6, 8, 8a) on said support surface (S, 3, 15b).





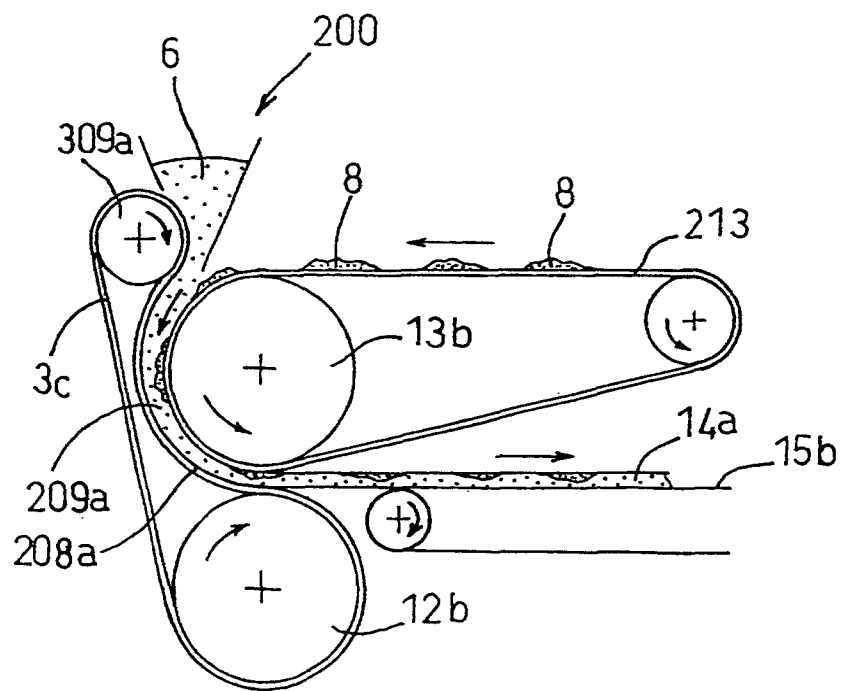


FIG.6

