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(54) Method and apparatus for forming flat ceramic products

Verfahren und Vorrichtung zum Herstellen von flachen keramischen Gegenständen

Procédé et appareil pour la fabrication de produits plats en céramique

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(56) References cited:
DE-A1- 3 113 661
DE-A1- 10 112 439
FR-A- 2 314 032
JP-A- 2002 052 522
US-A- 1 943 506
US-A- 3 268 637
US-A- 5 779 957

- **PATENT ABSTRACTS OF JAPAN vol. 1996, no. 02, 29 February 1996 (1996-02-29) -& JP 07 285118 A (YOSHIKAZU NAKAMURA; others: 01), 31 October 1995 (1995-10-31)**
- **PATENT ABSTRACTS OF JAPAN vol. 015, no. 501 (M-1193), 18 December 1991 (1991-12-18) -& JP 03 219918 A (MITSUBISHI MATERIALS CORP), 27 September 1991 (1991-09-27)**

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Description

[0001] This invention concerns a method of and apparatus for forming substantially flat ceramic products.

[0002] One of the known techniques for forming substantially flat ceramic products, such as, for example, tiles, is the extrusion of a ceramic paste in the form of a continuous ribbon, the thickness of which is substantially the same as the final thickness that the finished products must have. The ribbon is then chopped up into pieces to size and as per specification to obtain tiles of preset dimensions.

[0003] To make such tiles with colouring extending through each tile and using that technique, polychrome mixtures of ceramic materials that are mutually compatible are made and extruded through a die slot.

[0004] IT MO94A000027 discloses a version of this process. According to a preferred embodiment of IT MO94A000027, in a conventional extruder for extruding clay materials, a forced injection of colouring materials is made at a location along the flow of materials advancing through the extruder. The injection can be obtained by arranging at least one injector close to the extruder screw which advances the material towards a location near the extrusion mouth. The injector or the injectors may also be positioned at locations along the extrusion direction at different distances from the extrusion mouth. Depending on the desired chromatic effects, the injector or injectors may be positioned on the extruder body or on the screw shaft. In the latter case, the shaft is internally provided with at least one conduit for feeding the colouring materials. During the extrusion operation, i.e. when the material passes through the extrusion mouth, an extruded product is formed, having a central internal portion of a colour different from the colour of the external portion. In other words, the extruded product has a monochromatic external rind (having the same colour as the initial colour of the clay), and an internal portion provided with coloured veins. The extruded product so obtained, having a core of different colour, is then also cut along a plane which is not perpendicular - usually parallel - to the extrusion direction, so as to remove the monochromatic rind and make the differently coloured central portion visible. The cutting operation, when performed parallelly to the extrusion direction, is preferably carried out during the extrusion process by introducing a cutting member near the extrusion mouth. The cutting member separates the rind from the internal portion of the extruded product. Obviously the cross-section of the extruder has to be so dimensioned that the desired cross-section of the extruded product is not affected by the cutting member. For example, to obtain parallelepipedic objects, an extruder having a rectangular cross-section is used, having a thickness twice the object's thickness and provided with a central cutting wire. Therefore, two objects exit from the extruder, the two objects being separated along a central plane parallel to the extrusion direction. By performing a cut along this central plane it is possible to make visible the coloured central portion of the extruded product. According to another embodiment of the process disclosed in IT MO94A000027, the extruded product is cut, during its advancing, by inserting a stretched cutting wire, arranged near the extrusion mouth transversely with respect to the extrusion direction. The cutting wire is moved according to preset oscillating movements. For example, the cutting wire may be moved with a reciprocating motion along a plane perpendicular to the extrusion direction. The extruded product is therefore cut into two parts, each of these parts having an undulated surface. These parts are then flattened by pressing.

[0005] In another known version of the process, to highlight such veining on the visible face of the finished product, the ribbon is subjected to a process of surface stripping, i.e. a slice of extruded material that is a few millimetres thick and is still in the plastic state is removed.

[0006] The removed material is a noticeable percentage of the total material used to form the ceramic product (of the order of 10-20%) and has to be removed from the production line as waste material that can nevertheless be used in other industrial ceramic applications.

[0007] For example, US-A-4,292,359 discloses a process for the continuous production, by extrusion, of a partly finished clay product comprising a pair of parallel ribbons joined in back-to-back relation by a plurality of longitudinally extending walls in the form of frangible bridges which, when the partly finished clay product has been cut into blanks and fired to harden it, can be broken to separate the blanks into two ceramic pieces. The process comprises the steps of feeding a base material to a first screw extruder having two screw conveyors in series separated by a degassing chamber, and feeding a second, differently coloured, material to the degassing chamber, preferably through a second screw extruder.

[0008] Downstream of the degassing chamber the screw conveyor imparts a rotary mixing motion to the two-coloured clays to swirl these and then the mixture is pressed through a vertically extending die plate of suitable shape, which also strips the extruded, partly finished, clay product to expose faces having a wood grain effect. To this end, the die plate is provided with a pair of vertical knives each of which strips a lateral portion from the extruded strip.

[0009] According to one aspect of the present invention, there is provided a method of forming substantially flat ceramic products, comprising preparing a ceramic paste, extruding the ceramic paste through an extrusion die and over a cutter to obtain a substantially continuous multiple ribbon of paste with first and second ribbons of the multiple ribbon not being joined together but having a separation plane that is substantially parallel to the faces of the multiple ribbon, and severing the first and second ribbons transversely to provide the products, characterised in that said extruding is performed substantially horizontally.

[0010] According to a second aspect of the present invention, there is provided apparatus for forming sub-

stantially flat ceramic products, comprising an extruder having an extrusion die slot, a cutter extending substantially parallelly to the die slot, and a severing device to provide the products downstream of the extruder, the arrangement being such that ceramic paste can be extruded from the die slot and cut by the cutter to obtain a substantially continuous multiple ribbon of paste with first and second ribbons of the multiple ribbon not being joined together but having a separation plane that is substantially parallel to the faces of the multiple ribbon, and the first and second ribbons can be severed transversely by the severing device to provide the products, characterized in that the die slot is directed substantially horizontally.

[0011] Owing to these two aspects of the invention, because the extruding is performed substantially horizontally, i.e. the die slot is directed substantially horizontally, we have found it to be possible readily to displace the products apart without any significant distortion of them.

[0012] According to the present invention, there is provided a method of forming substantially flat ceramic products according to claim 1 and an apparatus for performing such method according to claim 5.

[0013] In order that the invention may be clearly and completely disclosed, reference will now be made, by way of example, to the accompanying drawings, in which:

- Figure 1 shows schematically in two parts a vertical, longitudinal section through a portion of a system for forming flat ceramic products with colouring throughout substantially the whole of their bodies;
- Figure 2 illustrates schematically a side elevation of the system;
- Figure 3 illustrates very diagrammatically and in side elevation an overturning device for top unfinished products in the system; and
- Figure 4 is a diagrammatic perspective view of a squashing device of the system, but illustrating a modified version of a trimming device of the system.

[0014] In Figure 1, 1 indicates an end portion of a batching/mixing device 101 shown in Figure 2, which is provided with an extrusion die slot 2 and wherein a ceramic paste IP with at least two chromatic components is prepared.

[0015] The extrusion die slot 2 is provided with a transverse blade 3 that cuts longitudinally, thereby minimising attrition phenomena, as extrusion progresses, the continuously extruded ceramic paste IP, on a horizontal plane, subdividing it into two ribbons 4a, 4b, the cut faces 104 and 204 of which are in substantial contact with one another, although, solely for the sake of clarity, in Figure 1 they are shown slightly separated from one another.

[0016] The continuous multiple ribbon 4 at the outlet of the extrusion die slot 2 is collected and supported by a mobile conveying surface 5, for example consisting of an endless conveyor belt on motor-driven and idle rollers 105, and conveyed to a transverse cutting station where cutting-to-size with a suitable means 6 occurs.

[0017] Subsequently, the conveying surface 5 carries the unfinished products 4a and 4b to an overturning station where, by a means 108 (Figure 2) known per se to those skilled in the art, turning over of the top product 4a in relation to the bottom product 4b occurs; the product 4a is thus placed next to the bottom product 4b with its cut face 104 upwards, as is the cut face 204 of the bottom product 4b.

[0018] Further along, the products 4a and 4b reach a presser unit 7 whereat a squashing of the products 4a and 4b is performed under a preset force, so that their thickness is reduced to a set amount.

[0019] The compressing action causes the raw paste that makes up the unfinished products 4a and 4b to become homogenous and stable, thereby greatly reducing any internal stresses generated during the extrusion and therefore any consequential defects induced during firing of the ceramic products.

[0020] The flattening phase is followed by a phase of trimming of the products 4a and 4b, and possibly a phase of dividing each product according to preset sizes, as indicated by the cut lines 19 in Figure 4, with a suitable apparatus 8, to obtain the perimeter dimensions required of the products P which are sent for firing.

[0021] The trimming device 8 shown in Figure 1 includes a vertically reciprocable rectangular cutting ring 8a.

[0022] In the version shown in Figure 4, the device 8 includes a pair of cutting wheels 8b mounted on a shaft 8c reciprocable by a piston-and-cylinder drive 8d. The device 8 also includes another pair of cutting wheels 8e mounted upon a transverse shaft 8f.

[0023] In a possible alternative embodiment, upstream of the flattening phase there may be an additional phase of spreading, on the cut faces 104 and 204, decorative materials that are suitable for being incorporated in the faces 104, 204 during the flattening phase, in particular dissolved or inconsistent decorating materials such as, for example, oxides, powder or granular glazes, or also materials in flakes or three-dimensional bodies that are distributed over the faces 104 and 204 with distribution devices or decorating machines that are per se known and are indicated in Figure 2 with the overall reference numeral 110. The length of the section of mobile conveying surface 5 under the apparatus 110 may vary according to the number of chromatic applications that are to be performed and the type of apparatus 110 to be used.

[0024] During the flattening phase high- or low-relief decorations are printed on the cut faces 104 and 204, by providing suitable dies on the presser unit 7.

[0025] In a further possible embodiment, the flattening phase can be performed by using a suitable roller device 9 shown in Figures 1 and 2 instead of the presser unit 7 or in combination therewith.

Claims

1. A method of forming substantially flat ceramic products (F), comprising preparing a ceramic paste (IF) wherein the ceramic paste (IP) is prepared with at least two chromatic components, extruding the ceramic paste (IP) through an extrusion die (2) and over a cutter (3) to obtain a substantially continuous multiple ribbon (4) of paste with first and second ribbons (4a, 4b) of the multiple ribbon (4) not being joined together but having a separation plane that is substantially parallel to the faces of the multiple ribbon (4), said extruding being performed substantially horizontally, and severing the first and second ribbons (4a, 4b) transversely to provide the products (P)arranged in upper and lower rows, turning-over the products (P) of the upper row, so that those surfaces of the products (P) of the upper and lower rows initially adjacent the separation plane all face upwards, **characterised in that** after said turning-over, squashing the products (P) to reduce their thicknesses and to increase their plan areas, during said squashing, relief decoration being produced on the products (P), **in that** after said squashing, trimming the products (P) to size around their peripheries.

2. A method according to claim 1, wherein the multiple ribbon (4) has a width dimension which is substantially horizontal and a thickness dimension which is substantially vertical.

3. A method according to claim 2, wherein said turning-over causes the products (P) of the upper row to be placed side-by-side with the products (P) of the lower row.

4. A method according to claim 2 or 3, and further comprising, after said turning-over, applying decorative material to said surfaces (104, 204).

5. Apparatus for forming substantially flat ceramic products (P), comprising an extruder (1) having an extrusion die slot (2), the die slot (2) being directed substantially horizontally, a cutter (3) extending substantially parallelly to the die slot (2), and a severing device (6) to provide the products (P) downstream of the extruder (1), the arrangement being such that ceramic paste (IP) wherein the ceramic paste (IP) is prepared with at least two chromatic components can be extruded from the die slot and cut by the cutter to obtain a substantially continuous multiple ribbon (4) of paste with first and second ribbons (4a, 4b) of the multiple ribbon (4) not being joined together but having a separation plane that is substantially parallel to the faces of the multiple ribbon (4), and the first and second ribbons (4a, 4b) can be severed transversely by the severing device (6) to provide the products (P) arranged in upper and lower rows, a turning-over device (108) for turning-over the upper row of products (P), **characterized in that** comprises a squashing arrangement (7; 9) downstream of the turning-over device (108) for squashing the products (P), the squashing arrangement (7; 9) being provided with a squashing surface having relief ornamentation thereon for producing relief decoration on the products (P), a trimming device (8) downstream of the squashing arrangement (7; 9) for cuttings the products (P) to size around their peripheries.

6. Apparatus according to claim 5, wherein the squashing arrangement (7, 9) comprises a pressing plate (7) reciprocable substantially perpendicularly to the products (P) .

7. Apparatus according to claim 5, wherein the squashing arrangement (7; 9) comprises at least one squashing roller (9) .

8. Apparatus according to claim 5 to 7, wherein the trimming device (8) comprises a first pair of cutting elements (8b) reciprocable in a first direction and a second pair of cutting elements (8e) reciprocable in a second direction substantially perpendicular to the first direction.

9. Apparatus according to any one of claims 5 to 8, wherein the die slot (2) has a width dimension which is substantially horizontal and a thickness dimension which is substantially vertical, the cutter (3) extends substantially horizontally, and the severing device (6) severs the first and second ribbons (4a,4b) into an upper row of products (P) and a lower row of products (P).

10. Apparatus according to claim 9, and further comprising a distribution device (110) between the turning-over device (108) and the squashing arrangement (7; 9) for distributing decorative material over the products (P).

11. Apparatus according to any one of claims 5 to 10, and further comprising a horizontal conveyor (5) for receiving the multiple ribbon (4) as it leaves the die slot (2).

12. Apparatus according to any one of claims 5 to 11, wherein the cutter (3) is provided with cutting surfaces having a coating thereon with low-friction characteristics.

Patentansprüche

1. Verfahren zum Ausbilden von im Wesentlichen flachen Keramikerzeugnissen, umfassend das Zube-

reiten einer Keramikpaste (IP), wobei die Keramikpaste (IP) mit mindestens zwei farbigen Komponenten zubereitet wird, das Extrudieren der Keramikpaste (IP) durch eine Extrusionsdüse (2) und über einem Schneidwerkzeug (3), um ein im Wesentlichen ununterbrochenes Mehrfachband (4) aus Paste zu erhalten, wobei erste und zweite Bänder (4a, 4b) des Mehrfachbands (4) nicht miteinander verbunden sind, sondern eine Trennebene aufweisen, die im Wesentlichen parallel zu den Oberflächen des Mehrfachbands (4) ist, wobei dieses Extrudieren im Wesentlichen horizontal ausgeführt wird, und Trennen der ersten und zweiten Bänder (4a, 4b) in Querrichtung, um die Erzeugnisse (P) angeordnet in oberen und unteren Reihen bereitzustellen, wobei die Erzeugnisse (P) der oberen Reihe umgedreht werden, so dass diese anfänglich an die Trennebene angrenzenden Oberflächen der Erzeugnisse (P) der oberen und der unteren Reihe alle nach oben zeigen, **dadurch gekennzeichnet, dass** die Erzeugnisse (P) nach dem Umdrehen zusammengepresst werden, um ihre Dicken zu verringern und ihre Grundrissflächen zu vergrößern, wobei während dieses Zusammenpressens ein Reliefdekor auf den Erzeugnissen (P) erzeugt wird, und dass die Erzeugnisse (P) nach dem Zusammenpressen um ihre Ränder herum zugeschnitten werden.

2. Verfahren nach Anspruch 1, bei dem das Mehrfachband (4) eine Breitendimension, die im Wesentlichen horizontal ist, und eine Dickendimension aufweist, die im Wesentlichen vertikal ist.

3. Verfahren nach Anspruch 2, bei dem das Umdrehen bewirkt, dass die Erzeugnisse (P) der oberen Reihe Seite an Seite mit den Erzeugnissen (P) der unteren Reihe angeordnet sind.

4. Verfahren nach Anspruch 2 oder 3 und ferner umfassend das Anbringen von Dekormaterial an der Oberfläche (104, 204) nach dem Umdrehen.

5. Vorrichtung zum Ausbilden von im Wesentlichen flachen Keramikerzeugnisse (P), umfassend einen Extruder (1) mit einem Extrusionsdüsenschlitz (2), wobei der Düsenschlitz (2) im Wesentlichen horizontal ausgerichtet ist, ein im Wesentlichen parallel zum Düsenschlitz (2) verlaufendes Schneidwerkzeug (3) und eine Trennvorrichtung (6) zum Bereitstellen der Erzeugnisse (P) nach dem Extruder (1), wobei die Anordnung derart ist, dass Keramikpaste (IP), wobei die Keramikpaste (IP) mit mindestens zwei farbigen Komponenten zubereitet ist, vom Düsenschlitz extrudiert und vom Schneidwerkzeug durchgeschnitten werden kann, um ein im Wesentlichen ununterbrochenes Mehrfachband (4) aus Paste zu erhalten, wobei erste und zweite Bänder (4a, 4b) des Mehrfachbands (4) nicht miteinander verbunden sind, sondern eine Trennebene aufweisen, die im Wesentlichen parallel zu den Oberflächen des Mehrfachbands ist, und wobei die ersten und zweiten Bänder (4a, 4b) durch die Trennvorrichtung (6) in Querrichtung getrennt werden können, um die Erzeugnisse (P) angeordnet in oberen und unteren Reihen bereitzustellen, und eine Umdrehvorrichtung (108) zum Umdrehen der oberen Reihe von Erzeugnissen (P), **dadurch gekennzeichnet, dass** sie eine Pressanordnung (7; 9) nach der Umdrehvorrichtung (108) zum Zusammenpressen der Erzeugnisse (P), wobei die Pressanordnung (7; 9) mit einer Pressoberfläche mit einer darauf befindlichen Reliefornamentik zum Erzeugen eines Reliefdekors auf den Erzeugnissen (P) versehen ist, und eine Schneidvorrichtung (8) nach der Pressanordnung (7; 9) zum Zuschneiden der Erzeugnisse (P) um ihre Ränder herum umfasst.

6. Vorrichtung nach Anspruch 5, bei der die Pressanordnung (7; 9) eine im Wesentlichen perpendikular zu den Erzeugnissen (P) hin- und herbewegbare Pressplatte (7) umfasst.

7. Vorrichtung nach Anspruch 5, bei der die Pressanordnung (7; 9) mindestens eine Presswalze (9) umfasst.

8. Vorrichtung nach Anspruch 5 bis 7, bei der die Schneidvorrichtung (8) ein erstes Paar von in einer ersten Richtung hin- und herbewegbaren Schneidelementen (8b) und ein zweites Paar von in einer im Wesentlichen zur ersten Richtung perpendikularen zweiten Richtung hin- und herbewegbaren Schneidelementen (8e) umfasst.

9. Vorrichtung nach einem der Ansprüche 5 bis 8, bei welcher der Düsenschlitz (2) eine Breitendimension, die im Wesentlichen horizontal ist, und eine Dickendimension aufweist, die im Wesentlichen vertikal ist, das Schneidwerkzeug (3) im Wesentlichen horizontal verläuft und die Trennvorrichtung (6) die ersten und zweiten Bänder (4a, 4b) in eine obere Reihe von Erzeugnissen (P) und eine untere Reihe von Erzeugnissen (P) trennt.

10. Vorrichtung nach Anspruch 9 und ferner umfassend eine Verteilvorrichtung (110) zwischen der Umdrehvorrichtung (108) und der Pressanordnung (7; 9) zum Verteilen von Dekormaterial über den Erzeugnissen (P).

11. Vorrichtung nach einem der Ansprüche 5 bis 10 und ferner umfassend einen horizontalen Förderer (5) zum Aufnehmen des Mehrfachbands (4), wenn es den Düsenschlitz (2) verlässt.

12. Vorrichtung nach einem der Ansprüche 5 bis 11, bei

der das Schneidwerkzeug (3) mit Schneidflächen mit einer Beschichtung mit reibungsmindernden Eigenschaften darauf versehen ist.

Revendications

1. Procédé pour la formation de produits en céramique sensiblement plats, comprenant la préparation d'une pâte céramique (IP), la pâte céramique (IP) étant préparée avec au moins deux composants chromatiques, l'extrusion de la pâte céramique (IP) à travers une filière d'extrusion (2) et au-dessus d'un coupeur (3) pour obtenir un ruban multiple de pâte sensiblement continu (4) avec des premier et deuxième rubans (4a, 4b) du ruban multiple (4) qui ne sont pas unis l'un à l'autre, mais ont un plan de séparation qui est sensiblement parallèle aux faces du ruban multiple (4), ladite extrusion étant effectuée sensiblement horizontalement, et la séparation des premier et deuxième rubans (4a, 4b) transversalement pour fournir les produits (P) disposés dans des rangées supérieure et inférieure, le retournement des produits (P) de la rangée supérieure, de manière que ces surfaces des produits (P) des rangées supérieure et inférieure initialement adjacentes au plan de séparation soient toutes orientées vers le haut, **caractérisé par**, après ledit retournement, l'écrasement des produits (P) pour réduire leurs épaisseurs et pour augmenter leurs surfaces planes, durant ledit écrasement, une décoration en relief étant réalisée sur les produits (P), et par, après ledit écrasement, l'ébarbage des produits (P) pour dimensionner leurs périphéries.

2. Procédé selon la revendication 1, dans lequel le ruban multiple (4) a une dimension en largeur qui est sensiblement horizontale et une dimension en épaisseur qui est sensiblement verticale.

3. Procédé selon la revendication 2, dans lequel ledit retournement force les produits (P) de la rangée supérieure à se placer côte à côte avec les produits (P) de la rangée inférieure.

4. Procédé selon la revendication 2 ou 3, comprenant en outre, après ledit retournement, l'application de matériau décoratif sur ladite surface (104, 204).

5. Appareil pour la formation de produits en céramique sensiblement plats (P), comprenant une extrudeuse (1) comportant une filière plate d'extrusion (2), la filière plate (2) étant orientée sensiblement horizontalement, un coupeur (3) s'étendant sensiblement parallèlement à la filière plate (2), et un dispositif de séparation (6) pour fournir les produits (P) en aval de l'extrudeuse (1), l'agencement étant tel que la pâte céramique (IP), dans lequel la pâte céramique (IP) est préparée avec au moins deux composants chromatiques, peut être extrudée à partir de la filière plate et coupée par le coupeur pour obtenir un ruban multiple de pâte sensiblement continu (4) avec des premier et deuxième rubans (4a, 4b) du ruban multiple (4) qui ne sont pas unis l'un à l'autre, mais ayant un plan de séparation qui est sensiblement parallèle aux faces du ruban multiple (4), et les premier et deuxième rubans (4a, 4b) peuvent être sectionnés transversalement par le dispositif de séparation (6) pour fournir les produits (P) disposés dans les rangées supérieure et inférieure, un dispositif de retournement (108) pour retourner 1 a rangée supérieure de produits (P), **caractérisé en ce qu'**il comprend un agencement d'écrasement (7; 9) en aval du dispositif de retournement (108) pour écraser les produits (P), l'agencement d'écrasement (7; 9) étant muni d'une surface d'écrasement comportant un motif en relief sur celle-ci pour produire une décoration en relief sur les produits (P), un dispositif d'ébarbage (8) en aval de l'agencement d'écrasement (7; 9) pour découper les produits (P) pour dimensionner leurs périphéries.

6. Appareil selon la revendication 5, dans lequel l'agencement d'écrasement (7; 9) comprend une plaque de pression (7) avec mouvement alternatif sensiblement perpendiculairement aux produits (P).

7. Appareil selon la revendication 5, dans lequel l'agencement d'écrasement (7; 9) comprend au moins un rouleau d'écrasement (9).

8. Appareil selon les revendications 5 à 7, dans lequel le dispositif d'ébarbage (8) comprend une première paire d'éléments de coupe (8b) avec mouvement alternatif dans une première direction et une deuxième paire d'éléments de coupe (8e) avec mouvement alternatif dans une deuxième direction sensiblement perpendiculai r e à la première direction.

9. Appareil selon l'une quelconque des revendications 5 à 8, dans lequel la filière plate (2) a une dimension en largeur qui est sensiblement horizontale et une dimension en épaisseur qui est sensiblement verticale, le coupeur (3) s'étend sensiblement horizontalement, et le dispositif de séparation (6) sépare les premier et deuxième rubans (4a, 4b) dans une rangée supérieure de produits (P) et une rangée inférieure de produits (P).

10. Appareil selon la revendication 9, et comprenant en outre un dispositif de distribution (110) entre le dispositif de retournement (108) et l'agencement d'écrasement (7; 9) pour distribuer le matériau décoratif sur les produits (P).

11. Appareil selon l'une quelconque des revendications

5 à 10, comprenant en outre un convoyeur horizontal (5) pour recevoir le ruban multiple (4) lorsqu'il quitte la filière plate (2).

12. Appareil selon l'une quelconque des revendications 5 à 11, dans lequel le coupeur (3) est muni de surfaces de coupe ayant dessus un revêtement avec des caractéristiques de faible frottement.

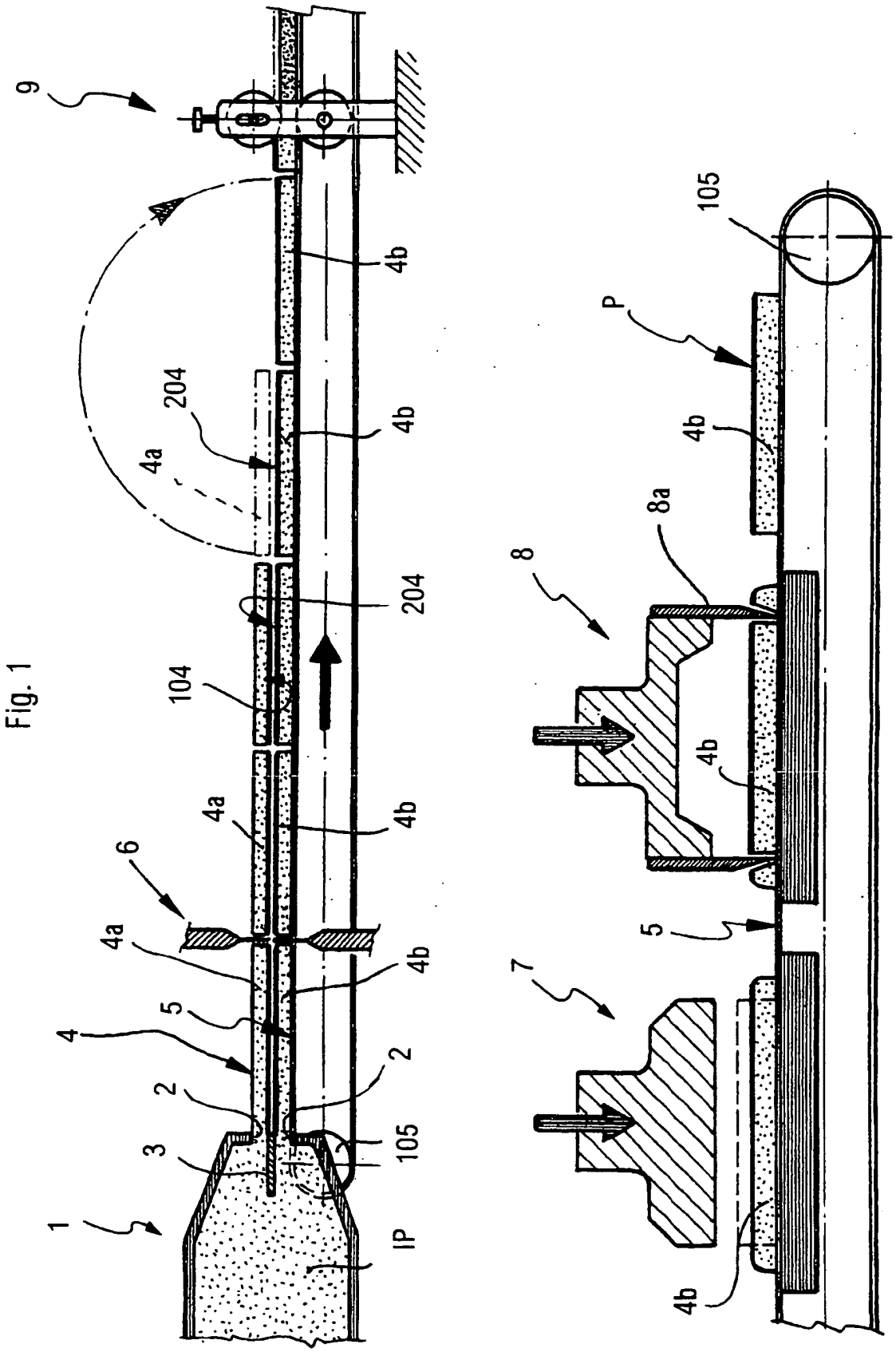

9
4b
204
4a
4b
204
104
4a
4b
6
4a
4b
5
4
2
2
3
105
1
IP
105
P
4b
8a
8
4b
5
7
4b

Fig. 1

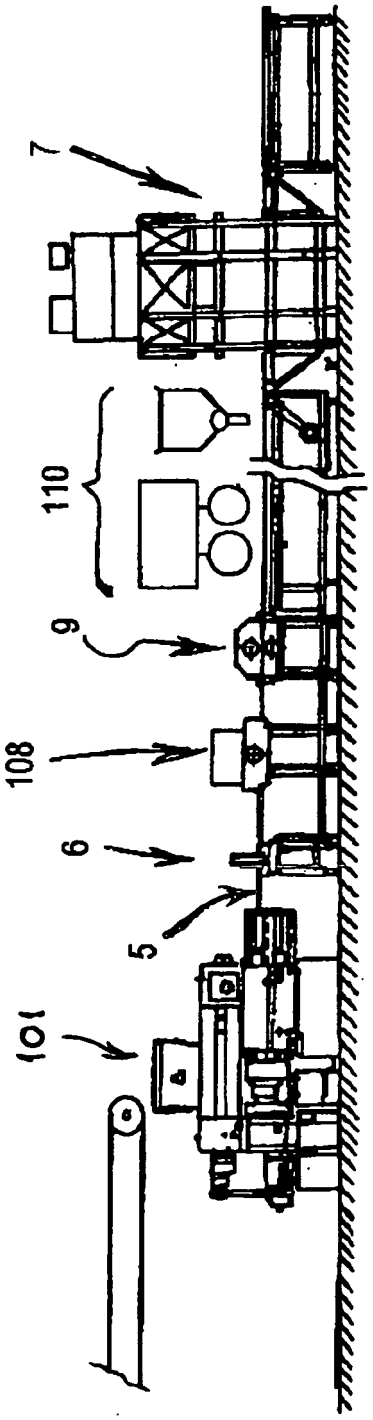


Fig. 2

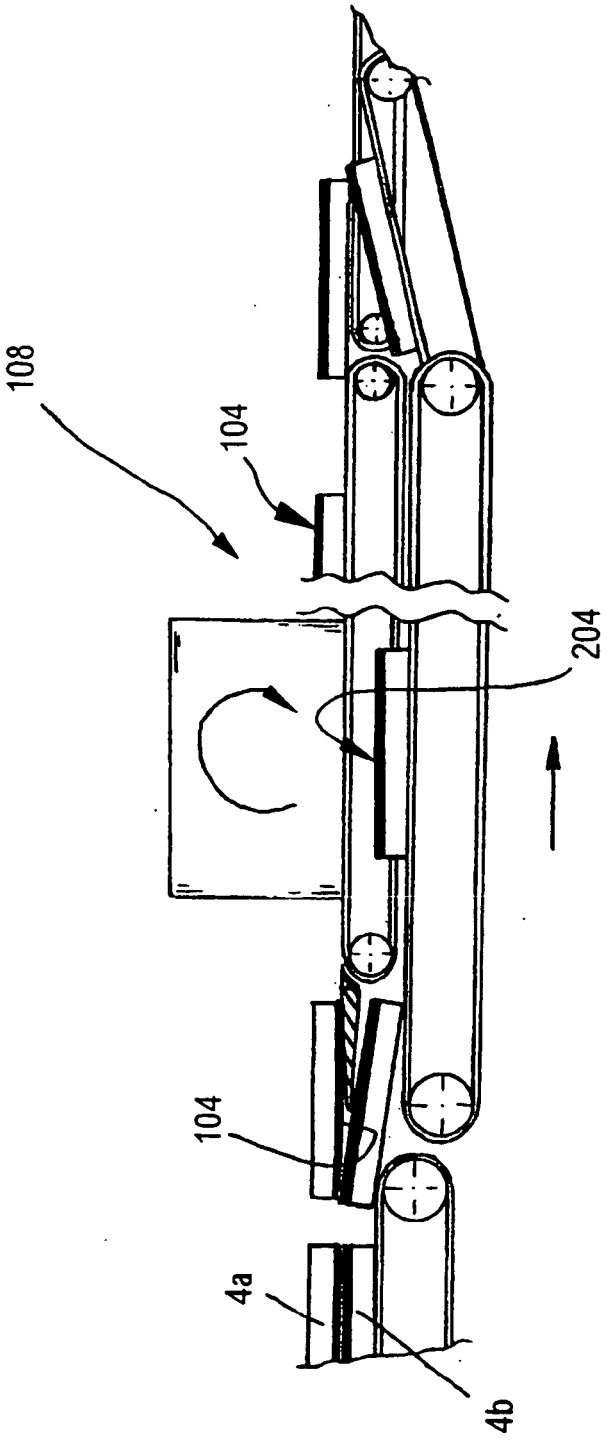


Fig. 3

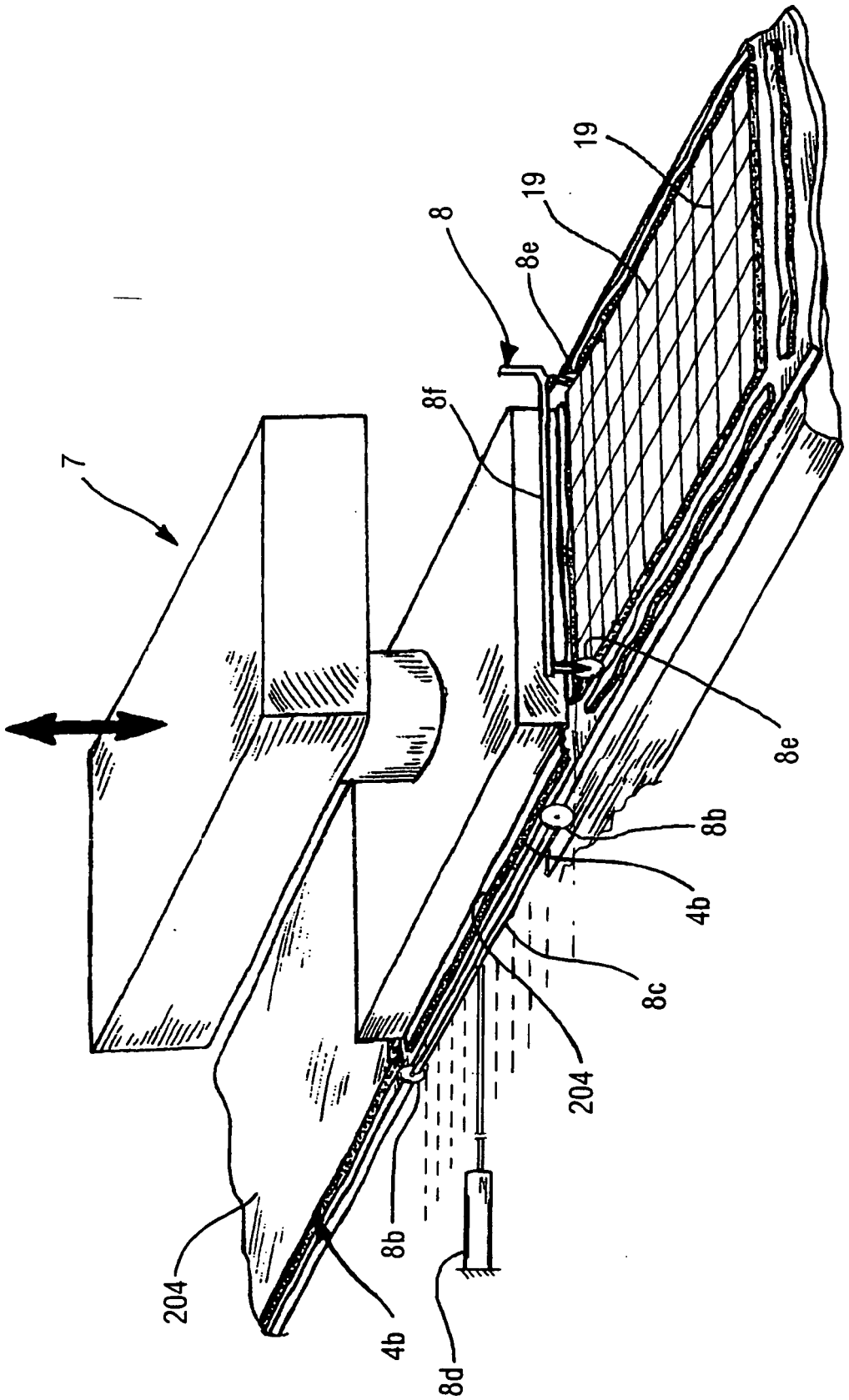


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT MO940027 A **[0004]**
- US 4292359 A **[0007]**