

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

(22) Date of filing: 27.11.2007

(72) Inventors:

- **Chamrasamee, Therdwong**
Pathumthanee (TH)
- **Chenvitteesuk, Sayan**
Ratchaburi (TH)

(74) Representative: **Forsthuber, Martin**
Patentanwaltskanzlei Matschnig & Forsthuber
OG
Siebensterngasse 54
1071 Wien (AT)

(54) **A device for making continuous veining of desired patterns extending through the entire thickness of a product and process of making thereof**

(57) A device for making continuous veining of desired patterns extending through the entire thickness of the product and the product process which are brought about by controlling distribution of materials and arranging such materials to form layers in accordance with pre-

determined patterns, comprising a material distributing tray (60) positioned above a arrangement belt (20) which is adapted to distribute a succession of adequate quantity of material in reciprocity with a material control cartridge (10).

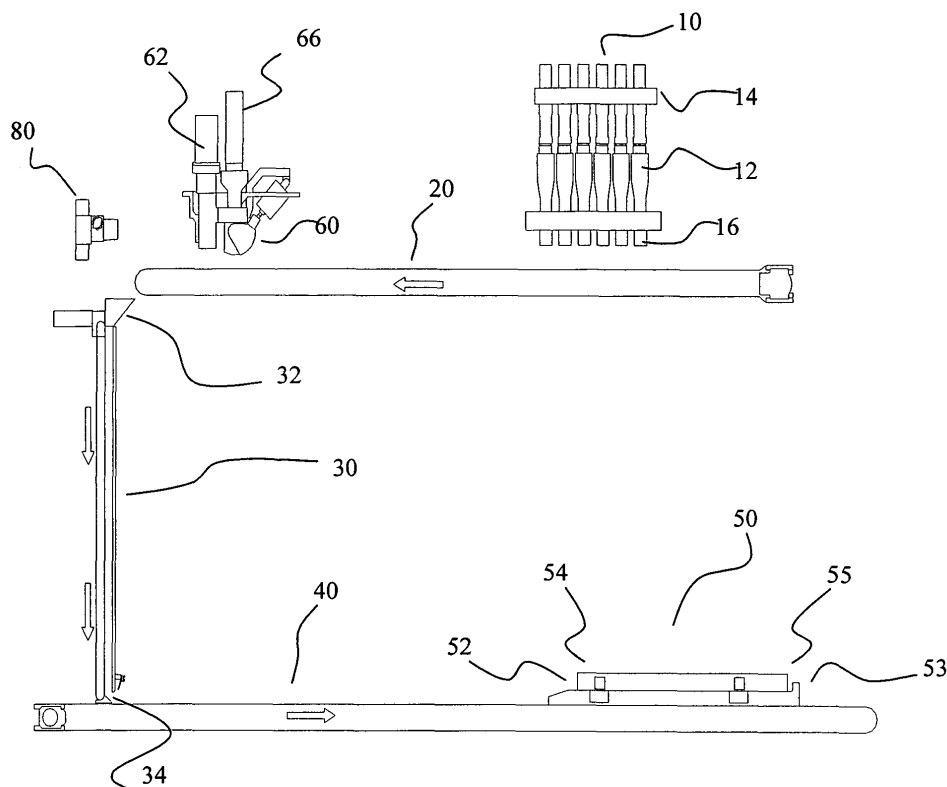


Fig. 1

Description

Field of the Invention

[0001] This invention relates to mechanical, electrical, and electronics engineering, more specifically, a device for making a continuous veining of desired pattern in a ceramic tile using powdery or granular material as described in the preamble of claim 1, as well as a corresponding method.

Background of the Invention

[0002] Research in the ceramic tile production sector is currently aimed at obtaining tiles that closely resemble natural stones by using many different technologies. Natural stones, such as marble, sandstones, and other kinds of stones, possess a natural beauty that is highly appreciated by consumers. Not only does the production of ceramic tiles for achieving the resemblance of natural stones have benefits in terms of beauty, but also it is advantageous in terms of properties of hardness and durability, technically much better than natural stones. The traditional art relating to techniques of the production of patterned ceramic tiles involved only a thin layer on the surface of the tiles, such as pattern printings, depositing desired patterns before or after pressing by using either wet or dry powder application method. In the described traditional techniques, the desired patterns only appear on the surface of the tiles. However, abrasion from weathering and use cause deterioration on the surface of the desired patterned ceramic tiles, which results in deviations from the original pattern. Due to this limitation of the techniques that patterns appear only on the surface of the tiles, there are considerable requirements for technological development of the production of ceramic tiles, enabling the tiles to possess a continuous veining of desired pattern extending through their entire thickness. Typical examples of said development are referred to hereinafter.

[0003] System S.p.A., an Italian machinery manufacturer, developed a tile forming press for a large format, capable of producing ceramic tiles of up to 3 meters in length. System S.p.A. has detailed its technique for making patterns throughout the mass of the ceramic tiles in EP 1334811. The technique is characterized by a double-pressing that comprises first a low pressure compacting. The compacted ceramic tiles are subsequently decorated by an ink-jet system to apply, according to the design, special ceramic colors which can penetrate into the tile mass. By this technique, however, appearance of the patterns in the tile mass is somewhat partial and the level of depth of pattern penetration is not deep enough to provide the pattern to the lowest layer of the tile mass.

[0004] CMF S.r.l of Italy has introduced a technique of filling tubes with a mixture of powdery materials of different characteristics and then distributing the powdery materials through openings which are of two sizes, small

and large. The powder distribution technique creates a continuous veining of patterns stored in a compartment which is in a position perpendicular to the plane. Once the powdery materials are fully filled and arranged in layers of the continuous veining of patterns inside the compartment, the compartment is rotated 90 degrees in order to lie parallel to the plane. The powdery materials in the desired patterns are then transferred into the mold. From this technique, the transfer of powdery materials into the mold is also problematic. It has been found that the powder mass is mixed on the tile surface, requiring the ceramic tiles to be polished after firing in order to obtain the visible veining effect of the patterns. A still further disadvantage of the technique is that the veining pattern is not continuous and appears to zigzag. Since the tubes used for holding materials have openings on only two sizes, it is impossible to control the quantity of the material relative to the changes either in dimension or width of the veining patterns.

[0005] Sacmi of Italy, the world's leading machinery company in the ceramic tile industry, has tried to develop a technique to make continuous veining of patterns extending through the entire thickness of tiles or slabs, as mentioned in EP 1273408 and WO 2004/071733. However, there remains the possibility that materials on the surface layer have been mixed, causing the desired pattern to be distorted. There has been, therefore, a necessity to remove those mixed materials at the surface layer by suction before pressing in order to obtain patterns that are visible without having to polish the upper surfaces of ceramic tiles after firing.

Related Application

[0006] This application is a development of EP 1717 000 A1. The device according to the mentioned European application comprises a material distributing control cartridge which consists of multiple tubes which act as a container for holding the powder or granulated materials for making the tiles. All of the tubes are fixed but movable reciprocally on an axle having the course of movement on the horizontal direction, perpendicular to the movement direction of the arrangement belt. The materials are then released through open-closed valves fitted at the end of the tubes on the arrangement belt and subsequently into the vertical material receiving-distributing cartridge to form the desired pattern. Once the vertical material receiving-distributing cartridge is filled, the vertical material receiving-distributing cartridge is rotated 90 degrees to horizontally discharge the patterned materials onto the conveyer belts. The discharged patterned materials are then guide-fed into the horizontal material receiving-distributing unit bringing the patterned materials toward the pressing station to press the patterned materials into a tile.

[0007] The disadvantages of the mentioned prior application were the fact that the tubes are fixed and the materials are released from the open-closed valves

which are fixed to said tubes, which limits the patterns produced thereby. In addition, in the prior application, the amount of different colors and different characteristics of the materials are controlled-released using the valves, thus making it very time consuming for the materials to fill the vertical materials receiving-distributing cartridge. Consequently, the production volume is very low. Further, there are still irregularities in the pattern once the patterned materials were transferred from the vertical material receiving-distributing cartridge onto the conveyor belt. Therefore, further improvement to the device is needed.

[0008] The present invention relates to a device and a process of making continuous veining of desired patterns extending through the entire thickness of the products from powdery materials or granulated powders employing a device developed therefor. The powdery materials or granulated powders can be either organic or inorganic substances which possess a continuous and uniform flow. The process is to bring about the continuous veining of desired patterns by varying the width of veining of patterns which can be done continuously, smoothly, and successfully without appreciable mixing of the powdery materials of different colors at the surface layer of the products. Therefore, the products obtained from this process are well defined and meet with the desired patterns. However, if desired, the product may objectively be subjected to further beautifying or decorating processes to enhance the beauty or value of the product.

Characteristics and Objectives of the Invention

[0009] The invention is an improved process and device for making patterns from powdery materials or granulated powders which have the quality of a continuous flow in order to bring about the making of continuous veining of patterns extending through the entire thickness of products in a desired format and to be able to adjust or change the patterns easily during production. The invention aims to obviate the limitations of the pattern created by the materials distributing control cartridge and drawbacks of irregularities of the pattern while transferring the patterned material from the vertical.

[0010] This aim is achieved by a device and a corresponding method according to the present invention as described in the dependent claims.

Brief Discussion of the Drawings

[0011] The characteristics and outstanding features of the invention as described above will become more apparent from the discussion of a nonrestrictive preferred embodiment of the invention which is illustrated in the attached figures.

Figure 1 shows an overall view of an embodiment of the present invention, including the material distributing control cartridge (10), the material distributing

tray (60), the arrangement belt (20), the vertical material receiving-distributing cartridge (30), the conveyor belt (40), and the horizontal receiving-distributing cartridge (50);

Figure 2 shows a perspective view of the material distributing control cartridge (10) indicating its ability to move in multi directions;

Figure 3 shows a perspective view of the material distributing tray (60);

Figure 4 shows a side view of the material distributing tray (60);

Figure 5 shows an operation of the material distributing tray (60), the arrangement belt (20), and the vertical material receiving-distributing cartridge (30);

Figure 6 shows an example of the formation of the pattern and the relationship of the material distribution tray (60), the sensor (80), the arrangement belt (20), the vertical material receiving-distributing cartridge (30), and the conveyor belt (40);

Figure 7 shows a side view of the configuration and mechanism of the vertical material receiving-distributing cartridge (30);

Figure 8 shows the operation of the vertical material receiving-distributing cartridge (30), the conveyor belt (40), and the horizontal receiving-distributing cartridge (50) inside of which the materials are contained until full moving toward a pressing unit;

Figure 9 shows a side view detail of the horizontal material receiving-distributing cartridge (50).

Detailed Discussion of an Embodiment

[0012] According to one exemplary embodiment, as shown in Fig. 1, the device and method for making continuous veining of patterns throughout the entire thickness of the products comprises a material distributing control cartridge (10) which is installed to be driven with reciprocating motion above an arrangement belt (20), a vertical material receiving-distributing cartridge (30) which is installed at the farthest end position of and under the arrangement belt (20), but situated above a conveyor belt (40), and a horizontal material receiving-distributing cartridge (50) which is installed on the conveyor belt (40). A detailed description of the apparatus follows:

1. The material distributing control cartridge (10)

[0013] The material distributing control cartridge (10) consists of more than one tube (12), which are containers for holding the material of different characteristics and different colors. There can be more than one tube (12) depending on the different characteristics and different colors of the materials used. The material distributing control cartridge is capable of moving in multi-directions as shown in Fig. 2. All of the tubes (12) are movable reciprocally on an axle (14) (support beam) that is able to rotate in multi-directions, having the course of movement perpendicular to the movement direction of the ar-

rangement belt (20). Open-close valves (16) are located at the end of each tube (12). The fact that the material distributing control cartridge (10) is able to rotate will increase the range of pattern as the tubes (12) will now be able to form veins with curved, circular, diagonal, or free-form characters. The material distributing control cartridge (10) is further equipped with a material distributing tray (60).

[0014] Within this disclosure, the term "open-close" is meant to describe devices which can be controlled (switched) between an open and closed state, such as a shutter. An open-close means will open or close in accordance with the stored data, i.e., in response to the control program.

[0015] Referring to Figs. 3 and 4, the material distributing tray (60) is located away from (i.e., at a distance to) the tubes (12) but above the arrangement belts (20) as with the tubes (12). The material distributing tray (60) is situated between two arms (62) of an axle (not shown). Each arm (62) has an outer sleeve (64) which is capable of moving up and down along the arm (62) and relative to the arrangement belt (20). The material distributing tray (60) is capable of holding a large quantity of the materials released from a plurality of delivering means (66) similar to the tubes (12) of the material distributing control cartridge (10), but preferably larger in size. The material distributing tray (60) comprises a first tray (68) and a second tray (70), wherein the first tray (68) is situated on top, i.e., farther above relative to the second tray (70) while its bottom region is situated within the top portion of the second tray (70). The bottom of both the first tray (68) and the second tray (70) has an open-closed flap (72, 73). The second tray (70) is connected to the sleeves (64) of the arms (62) by joint members (74) enabling to second tray (70) to move up or down along the arm (62). Preferably, the sleeves (64) of the arms (62) are capable of moving up and down along the arms (62) such that the height of the second tray (70) can be altered relative to the arrangement belt (20) so as to bring the second tray (70) closer to or further away from the arrangement belt (20). The movement of each of the sleeves (64) can be adjusted independently from each other as required allowing the second tray (70) to move closer to or further away from the arrangement belt (20) and/or to be positioned level and/or tilted left or right as required.

[0016] Referring again to Fig. 1, a pattern regulating sensor (80) is also provided. Preferably, the pattern regulating sensor (80) ("the sensor") is positioned such that it can scan the pattern forming inside the vertical material receiving-distributing cartridge (30) to read the pattern values (pre-coded values which are predetermined in order to produce a desired pattern). More preferably, it is positioned above the vertical material receiving-distributing cartridge (30). The sensor (80) is linked to the software application which records pre-coded values of the desired pattern which in turn control the operation mechanism of the material distributing control cartridge (10) as well as the material distributing tray (60). In general,

the material distributing control cartridge (10) as well as the material distributing tray (60) dispense the materials in accordance with the pre-coded values to form the desired pattern. However, deviation of the pattern may be experienced due to inconsistency of factors such as flow rate of the materials, amount of material being dispensed, the degree of tilting of the second tray (70), etc. Accordingly, once the materials are layered inside the vertical material receiving-distributing cartridge (30), the sensor (80) would scan for values, for example, the slope, or curve values of the pattern being formed against the set values. If discrepancies are detected, the sensor (80) will transmit the information to the control unit which will cause the material distributing control cartridge (10) and/or the material distributing tray (60) to recalibrate to bring the values back to the set values.

[0017] Fig. 6 shows an example of the pattern being formed inside the vertical material receiving-distributing cartridge (30) which is made of layers of various sizes of curvy sloped veins arranged in an alternating manner. If the value of the slope detected by the sensor (80) does not match with the set value, the sensor (80) will send the detected value to the control unit to recalibrate or adjust the degree of tilting of the second tray (70) accordingly to meet the set value. The degree of tilting should always correspond to the pre-coded values of the desired pattern design as well as the slope of the last batch of materials forming a pattern inside the vertical material receiving-distributing cartridge (30). This feature will ensure the consistency of the pattern.

[0018] As mentioned, the present invention further comprises the material distributing tray (60). The material distributing tray (60) will shorten the time required for the materials to fill the vertical material receiving-distributing cartridge (30), in comparison to the device with a material distributing control cartridge (10) alone and without the material distributing tray (60) because the material distributing tray (60) will be able to dispense a load faster and with larger quantity of the material onto the arrangement belt (20). Thus, production volume over time is higher. The feature of having material distributing tray (60) is also particularly useful when a pattern with one single color and/or characteristic of large area of single color alternated with smaller vein(s) of color(s) is desired. The material distributing tray (60) may be located before or after the material control cartridge (10).

2. The vertical material receiving-distributing cartridge (30)

[0019] Referring to Figs. 6 and 7, the vertical material receiving-distributing cartridge (30) is a flat rectangular box installed under the farthest end position of the movement of the arrangement belt (20) but situated above the conveyor belt (40) by being placed perpendicular to both the arrangement belt (20) and the conveyor belt (40), as well as perpendicular to movement directions of both belts. This vertical material receiving-distributing unit (30)

has two connected ridges forming first opening (32) and second opening (34). The mouth of first opening (32) is formed into a slant lip wherein its upper part is wider than its lower part so as to facilitate receiving of the materials from the arrangement belt (20). The mouth of the second opening (34) also has a lip slightly bent forward to allow that the material easily glides onto the conveyor belt (40). In the present invention, the vertical material receiving-distributing unit (30) is configured such that at least one of its sidewalls, preferably the sidewall with large surface area, is able to move in a loop, similar to a conveyor. The moveable sidewall is set to drive in the same direction with the movement of the materials discharging from the vertical material receiving-distributing cartridge (30). If tiles or slabs with greater thickness are desired, it is desirable to provide the vertical material receiving-distributing cartridge (30) with two opposing movable walls. The movable sidewall helps to reduce friction between the material granules and the wall surface, thus discharging the patterned materials onto the conveyor belt (40) is easier and with minimal dispersion of patterned materials. Thus, the formed pattern is maintained. Accordingly, with the use of the vertical material receiving-distributing cartridge (30) having movable sidewalls, a 90-degree turn of the material receiving unit is no longer necessary. Consequently, irregularities or damages to the pattern are reduced.

3. The horizontal material receiving-distributing cartridge (50)

[0020] Referring to Figs. 8 and 9, the horizontal material receiving-distributing cartridge (50) consists of a flat rectangular cover sheet (51) with two ridges on opposite sides forming first exit (52) and second exit (53). An open-close member (54) is positioned at the mouth of the first exit (52), while an open-close and excess material removal flap (55) is positioned at the second exit (53). Inside the cover sheet (51), a pressing sheet (56) is positioned. The horizontal material receiving-distributing cartridge (50) is laid prone on the conveyor belt (40). The direction of the in-and-out path of materials from the horizontal material receiving-distributing cartridge (50) is the same as the movement direction of the conveyor belt (40).

[0021] The process for making continuous veining of desired patterns extending throughout the entire thickness of the products according to the invention comprises the following three main stages:

First Stage. Distributing the materials onto the arrangement belt (20). The materials are to be distributed from the tubes (12) as well as from the material distributing tray (60) onto the arrangement belt (20) which is moving forward in order to control a succession of materials, the quantity of the material, and the position at which the materials are released onto the vertical material receiving-distributing cartridge

(30) in accordance with the predetermined patterns. Preferably, the materials distributed from the tubes (12) are for producing smaller veins or finer patterns while the materials distributed from the material distributing tray (60) will form larger veins wherein alternation of small with large veins forms into a desired pattern. The apparatus which control the work in this procedure are the material distributing control cartridge (10), the material distributing tray (60), and the arrangement belt (20).

Second Stage. Allowing the material which is already distributed onto the arrangement belt (20) to flow into the vertical material receiving-distributing cartridge (30) to bring about the patterns. The materials will be allowed to fall down in such a manner as to form layered patterns inside the vertical material receiving-distributing cartridge (30) in accordance with the predetermined patterns, quantity, and position of the materials to form the desired patterns. From then on, the movable sidewalls will activate and drive the materials which have formed into the desired pattern inside the vertical material receiving-distributing cartridge (30) through the second opening (34) transferring the patterned materials onto the conveyor belt (40) which will move forward in order to transfer said materials from the vertical material receiving-distributing cartridge (30). The apparatus which control the work in this procedure are the vertical material receiving-distributing cartridge (30), the arrangement belt (20), and the conveyor belt (40).

Third Stage. Relocating the patterned materials from the conveyor belt (40) to the pressing machine by having the cover sheet (51) protect against damage to the patterns during the relocation. The apparatus which control the work in this procedure are the horizontal material receiving-distributing cartridge (50) and the conveyor belt (40).

Detailed procedures of the device are mentioned hereinafter:

[0022] The work starts from the material distributing control cartridge (10) in combination with the material distributing tray (60) which performs the duty of distributing the materials onto the arrangement belt (20) in accordance with the predetermined patterns, quantity, and position of the materials. The material which will form smaller veins or finer patterns will be distributed through the operation of the open-close valves (16) of the tubes (12). The open-close valves (16) control the distribution and the quantity of the materials while the tubes (12) are moving in the reciprocating motion on the axle (14). The movement of the arrangement belt (20) determines the position at which the materials will be distributed. The material which will form larger veins or chunky patterns will be distributed by the operation of the material distributing tray (60). As shown in Fig. 5, the materials are fed into the first tray (68); at this stage the open-close flap

(72) at the bottom of the first tray (68) is in a closed state. Thereafter, the open-closed flap (72) at the bottom of the first tray (68) will open and discharge a specified amount of the materials into the second tray (70) while the open-close flap (73) at the bottom of the second tray (70) is in a closed state. As disclosed, the materials are being dispensed from the material distributing control cartridge (10) and the material distributing tray (60) in accordance with the pre-coded values. If the desired pattern involves veins of material arranged in slopes as shown in Fig. 5, the value of the slope will be pre-coded in the software application. The pre-coded slope values will correlate with the degree of tilting of the second tray (while in production, the sensor (80) will simultaneously detect the slope value of the material inside the vertical material receiving-distributing cartridge (30) as shown in Fig. 6). The detected value is checked against the set value. If there is discrepancy, the control unit will recalibrate and cause the second tray (70) to tilt to the determined value to maintain the desired pattern. This is to ensure the consistency of the pattern. The materials are dispensed from the first tray (68) (by opening the open-close flap (72) into the second tray (70) while the second tray (70) is tilted to the desired degree while the open-close flap (73) at the second tray (70) remains closed. After the specified amount of the material has been distributed into the second tray (70), the open-close flap (72) at the first tray will close. Thereafter, the second tray (70) will be adjusted to positioned parallel to the arrangement belt (20). The second tray (70) will then move toward the arrangement belt (20), while remaining parallel to the arrangement (20), through the movement of the sleeves (64) on the arms (62). Once a desired distance between the bottom of the second tray (70) and the arrangement belt (20) is reached, the open-closed flap (73) at the bottom of the second tray (70) will open and discharge the materials onto the arrangement belt (20). Lowering the second tray (70) toward the arrangement belt (20) prior to dispensing the materials will reduce dispersion of the materials. Thereafter, the empty second tray (70) will move up toward the first tray (68) and resume the position ready to receive a new batch of materials from the first tray (68).

[0023] The open-close flap (72, 73) at the bottom of the material distributing tray (60) controls the distribution and the quantity of the materials in accordance with the predetermined pattern. In one exemplary pattern, the pattern is brought about by alternating ranges of smaller veins alternated with a large vein. This is achieved by having the tubes (12) distribute the materials onto the arrangement belt (20) in the required amount and position to form the desired veins as the materials move along the arrangement belt (20). After the material has moved passed the material distributing tray (30), the open-close flap (73) at the bottom of the second tray (70) will open and discharge the materials contained therein onto the arrangement belt (20). After the predetermined materials on the arrangement belt (20) have moved to the farthest position of the arrangement belt (20), those materials fall

into the vertical material receiving-distributing cartridge (30) through the first opening (32) which remains open. The process is repeated. The materials inside the vertical material receiving-distributing cartridge (30) are formed in such a manner that one layer is placed over another in accordance with the pattern, the quantity of the materials, and the position at which the predetermined patterns is created. The results through this means are the same as when the materials are distributed directly from the tubes (12) to the material receiving unit of the earlier version except that when a desired pattern is composed of a combination of small veins and large veins, distribution of materials to form large veins by using the material distributing tray (60) increases the speed of production as the vertical material receiving-distributing cartridge (30) will be filled faster. Further, with the help of the movement of the vertical material receiving-distributing cartridge's walls, the patterned material is smoothly and continuously transferred onto the conveyer belt (40) without requiring a 90-degree rotation. The ability to transfer the patterned material onto the conveyer belt (40) without requiring a 90-degree rotation also helps to reduce separation of the pattern and irregularity of the pattern caused by dispersion of the materials during transferring.

Not only does the process according to the present invention better maintain the pattern, the time which would normally be required for the prior version of the vertical material receiving-distributing cartridge to turn and then transfer the material and resume its position is cut. Consequently, the volume of the production is increased. Since definition of the patterns and width of the veining patterns depend on the quantity of the materials deposited onto the arrangement belt (20), the use of electrical and electronic instruments with high precision and accuracy, such as a servomotor to regulate the operation of the open-close valves (16), makes the stage and degree of valve opening more continuous, precise, and accurate. Suitable use results in the capability to continuously change the width of the veining patterns, as well as to produce veining with a width of 1 millimeter or more.

[0024] After the materials are allowed to flow into the vertical material receiving-distributing cartridge (30) in the predetermined patterns, the second open-close flap (35) at the second opening (34) will open and the movable walls will activate to allow the materials with layered patterns to flow onto the conveyor belt (40). While the materials are flowing out, the first opening (32) of the vertical material receiving-distributing cartridge (30) remains open and continues to receive materials from the arrangement belts (20). The amount of the patterned materials discharging from the vertical material receiving-distributing cartridge (30), preferably, must be equal to the amount to fill the horizontal material receiving-distributing cartridge (50) and be sufficient to form into a tile ready for pressing.

[0025] The patterned materials on the conveyor belts (40) move forward to the horizontal material receiving-distributing cartridge (50) through the first exit (52). After

the patterned materials move completely inside the cover sheet (51), the open-close member (54) is closed down. Then the horizontal material receiving-distributing cartridge (50) will move forward to bring the patterned materials to the pressing machine. In order to prevent a mix-up of the veining of patterns at the surface and lower portions of the patterned materials during the movement of the horizontal material receiving-distributing cartridge (50) into the pressing machine, the pressing sheet (56) moves down to lay flat against the upper surface of the patterned materials while the patterned materials are moving towards the pressing machine so that the powdery materials around the areas are saved from dispersion which damages the surface patterns. While the horizontal material receiving-distributing cartridge (50) is moving, the conveyor belt (40) also moves in order to prevent damage to the lower layer of the patterns.

[0026] Moreover, the forward motion of the horizontal material receiving-distributing cartridge (50) creates a compaction of the materials in the direction that is opposite to its movement. This condition results in insufficient quantity of materials which are to be filled into the mold cavities of the pressing machine. Therefore, it is highly beneficial that the open-close and excess material removal flap (55) remains open while the horizontal receiving-distributing cartridge (50) is moving, so that excess materials positioned at the second exit (53) are compacted to move adequately into the horizontal material receiving-distributing cartridge (50). In addition, while the horizontal material receiving-distributing cartridge (50) moves, the patterned materials contained inside move backward causing the quantity and density of the materials to increase in the direction opposite to the direction of the horizontal material receiving-distributing cartridge (50) movement. Therefore, the quantity of the materials is unevenly transferred to the pressing machine in such a manner that the materials are more bulky and denser at the back than the front. When the materials are pressed to form the final product, the front portion is less thick than the back portion. In order to overcome such problem, the pressing sheet (56), which performs the duty of pressing the bulk of the materials in accordance with this invention, is pressed down not exactly parallel to the plane of the conveyor belt (40), but is pressed down in such a manner to make an elevated angle between 0-0.5 degrees so that the quantity of the materials in the front portion is equally compensated for. However, the exact degree of the elevation of the pressing sheet (56), whether it will be more or less, depends on the quantity of the materials needed to be compensated for.

[0027] When the horizontal material receiving-distributing cartridge (50) moves to the position which corresponds to the mold's position of the pressing machine, the pressing sheet (56) presses the materials into the mold along with the downward movement of a lower lift of the pressing machine, and the open-close and excess material removal flap (55) is closed down. After the materials have already been transferred to the mold, the

open-close and excess material removal flap (55) moves in a forward direction in order to remove the excess materials. Both the open-close flap (54) and the open-close and excess material removal flap (55) are opened and the horizontal material receiving-distributing cartridge (50) moves back away from the pressing machine to be positioned on the conveyor belt (40). The pressing sheet (56) moves upward and the horizontal material receiving-distributing cartridge (50) returns to the original position to start receiving a new batch of materials.

[0028] After having gone through the process of molding by pressing and firing, the finished product possesses the desired patterns without the necessity to polish the surface. With the characteristics and merits of the invention, each product's patterns can be adjusted and changed in order to meet the requirement.

Claims

1. A device for making continuous veining of desired patterns extending through the entire thickness of products comprises:

- a material distributing control cartridge (10);
- an arrangement belt (20);
- a vertical material receiving-distributing cartridge (30);
- a conveyer belt (40); and
- a horizontal material receiving-distributing cartridge (50);

wherein the material distributing control cartridge (10) distributes a succession of adequate quantity of materials at a position at which the materials are released in accordance with predetermined patterns on the arrangement belt (20) interposed between said material distributing control cartridge (10) and the vertical material receiving-distributing cartridge (30), wherein said vertical material receiving-distributing cartridge (30) is positioned vertically below the arrangement belt (20) and above the conveyer belt (40); wherein the vertical material receiving-distributing cartridge (30) receives materials from the arrangement belt (20) and allows the materials to be layered inside, creating a patterned material and transferring said patterned material to the horizontal material receiving-distributing cartridge (50) positioned on the conveyer belt (40);

characterized in that the device further comprises a material distributing tray (60) positioned above the arrangement belt (20) which is adapted to distribute a succession of adequate quantity of material in reciprocity with the material control cartridge (10).

2. The device according to claim 1, wherein the material distributing control cartridge (10) is assembled to a support (14) which is capable of moving in multi-di-

rection enabling multidirectional movement of the material distributing control cartridge (10)

3. The device according to claim 1, wherein the material distributing tray (60) is mounted on a support and comprises:

- a first tray (68) having an open-closed flap (72) positioned at its bottom region;
- a second tray (70) having an open-closed flap (73) positioned at its bottom region; and
- a delivering means (66) to deliver the material to the first tray (68);

wherein the first tray (68) is adapted to receive materials from the delivering means (66) and is positioned with its bottom region being located within the second tray (70), and

wherein the second tray (70) is adapted to receive a predetermined amount of material from the first tray (68).

4. The device according to claim 3, wherein the second tray (70) is mounted to the support, which comprises movable arm members (62) permitting the second tray (70) to move up or down and position the second tray (70) closer to or further away from the arrangement belt (20), wherein said second tray (70) is coupled to said arms (62) by joint members enabling the second tray (70) to be positioned parallel to the arrangement belt (20) or tilted to a desired degree in accordance with the pre-coded values.

5. The device according to claim 1, wherein the vertical material receiving-distributing cartridge (30) is configured with at least one movable wall which moves in the direction that enables transfer of the patterned material contained in the vertical material receiving-distributing cartridge (30) to the conveyer belt (40).

6. The device according to claim 1, further comprising a pattern regulating sensor (80) which reads and checks values from the pattern being formed inside the vertical material receiving-distributing cartridge (30) against set values and transmits the read values to a control unit, enabling calibrating the operation of the material distributing control cartridge (10) and the material distributing tray (60) to maintain the set values.

7. A process for making continuous veining of desired pattern extending through the entire thickness of products obtained by pressing powdery materials or granulated materials which have the quality of a continuous flow; the process comprising the following operative steps:

- arranging the materials in accordance with the

desired pattern onto an arrangement belt (20) by having the materials released from a material distributing control cartridge (10) in combination with a material distributing tray (60) which both operate reciprocally above the arrangement belt (20) in order to make arrangement of succession of materials, adequate quantity of materials, and position at which the material are released while said arrangement belt is moving forward, in order to bring arranged materials toward the vertical material receiving-distributing cartridge (30);

- creating a bulk of the patterned materials by allowing the arranged materials to fall down in a manner to form layered pattern inside the vertical material receiving-distributing cartridge (30);

- dispensing patterned materials onto the conveyer belt (40) positioned below the vertical material receiving-distributing control cartridge (30) by means of moving the sidewalls of the vertical material receiving-distributing cartridge (30) allowing the patterned material to drop vertically through the second opening (34) at a speed corresponding to the speed of the conveyer belt (40) which is moving forward bringing said patterned material to a horizontal material receiving-distributing cartridge (50); and

- transferring the patterned material towards a mold where the patterned material will be pressed by a pressing sheet (56), protecting the patterned materials against dispersion and subsequently move the patterned materials to be pressed.

8. The process according to claim 7, wherein at the step of creating the bulk patterned material, a sensor (80) is employed to simultaneously read and check the pattern values in order to cause a control unit to calibrate the operation of the material distributing control cartridge (10) and/or the material distributing tray (60) to operate in a manner that the pattern value is conforming with the set value maintaining consistency of the pattern.

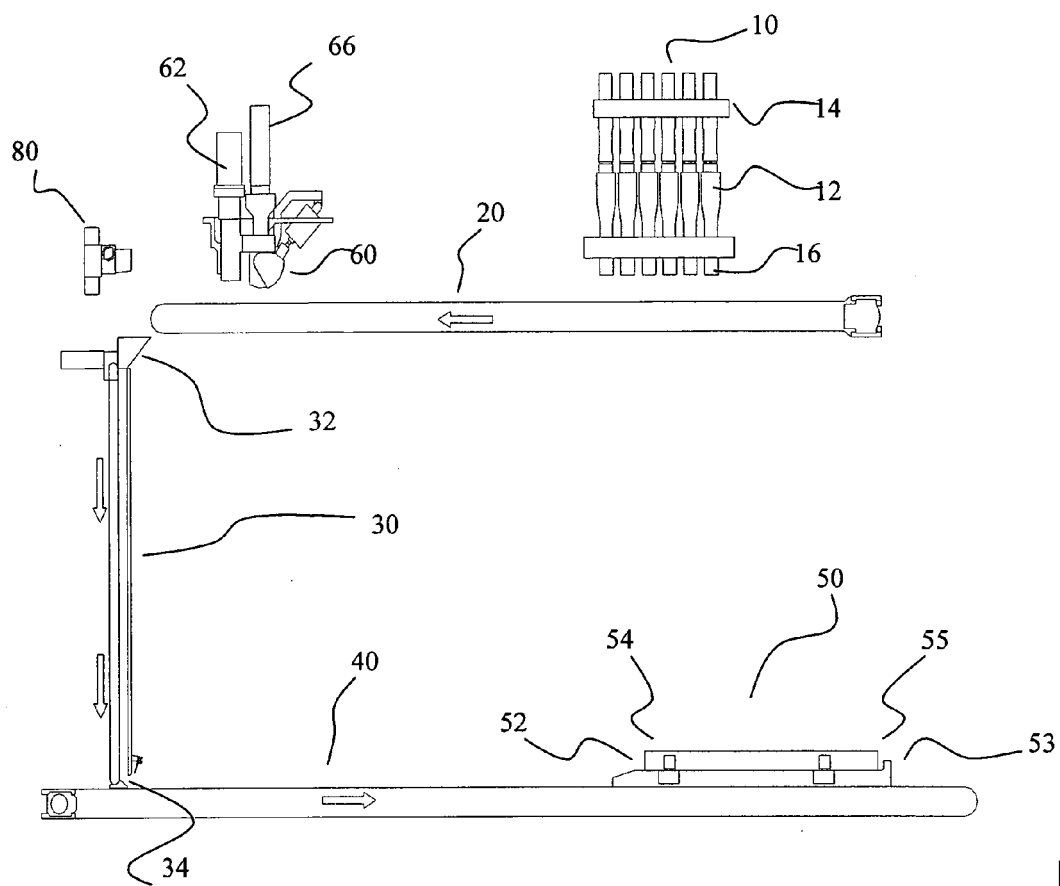


Fig. 1

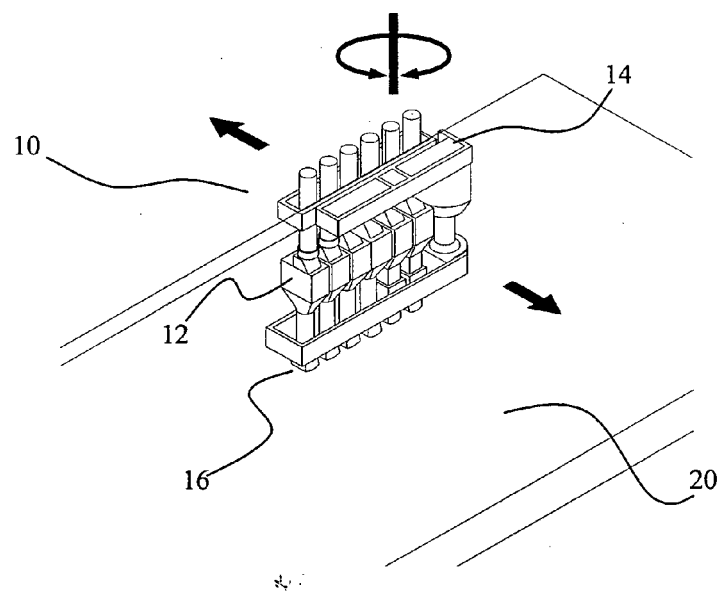


Fig. 2

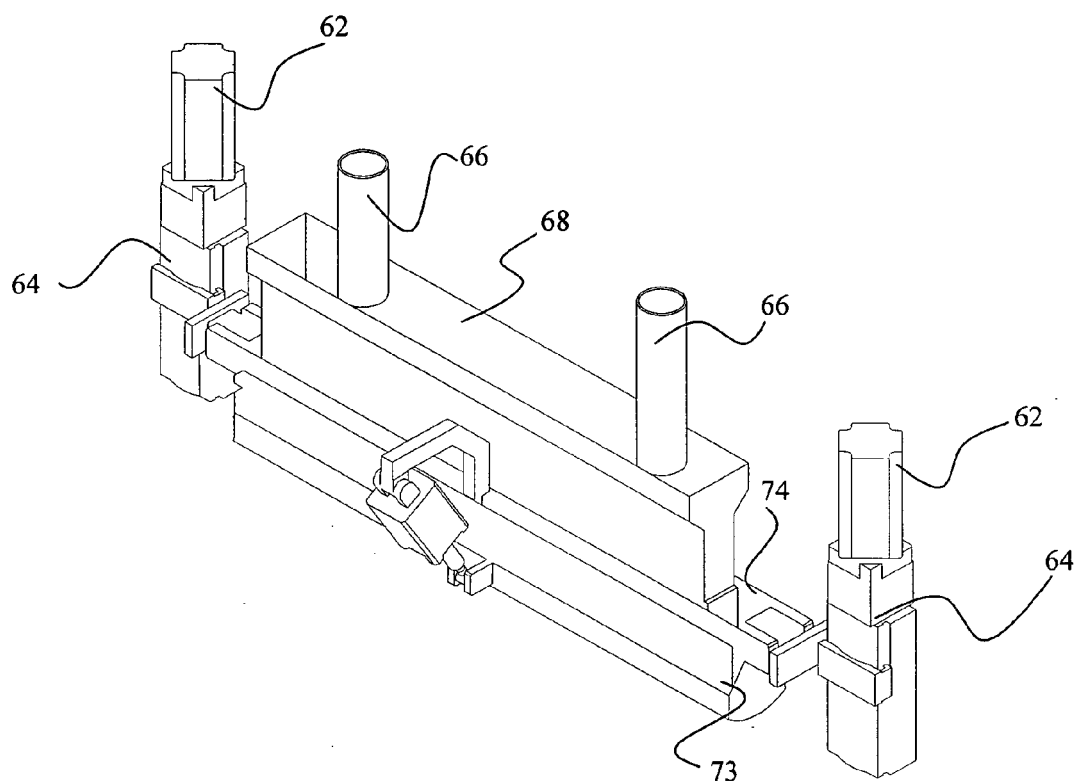


Fig. 3

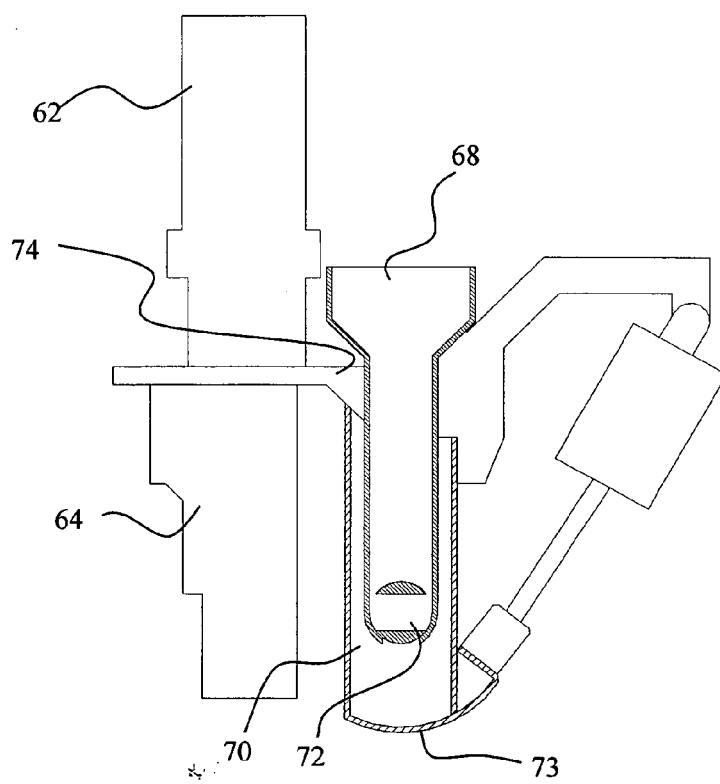


Fig. 4

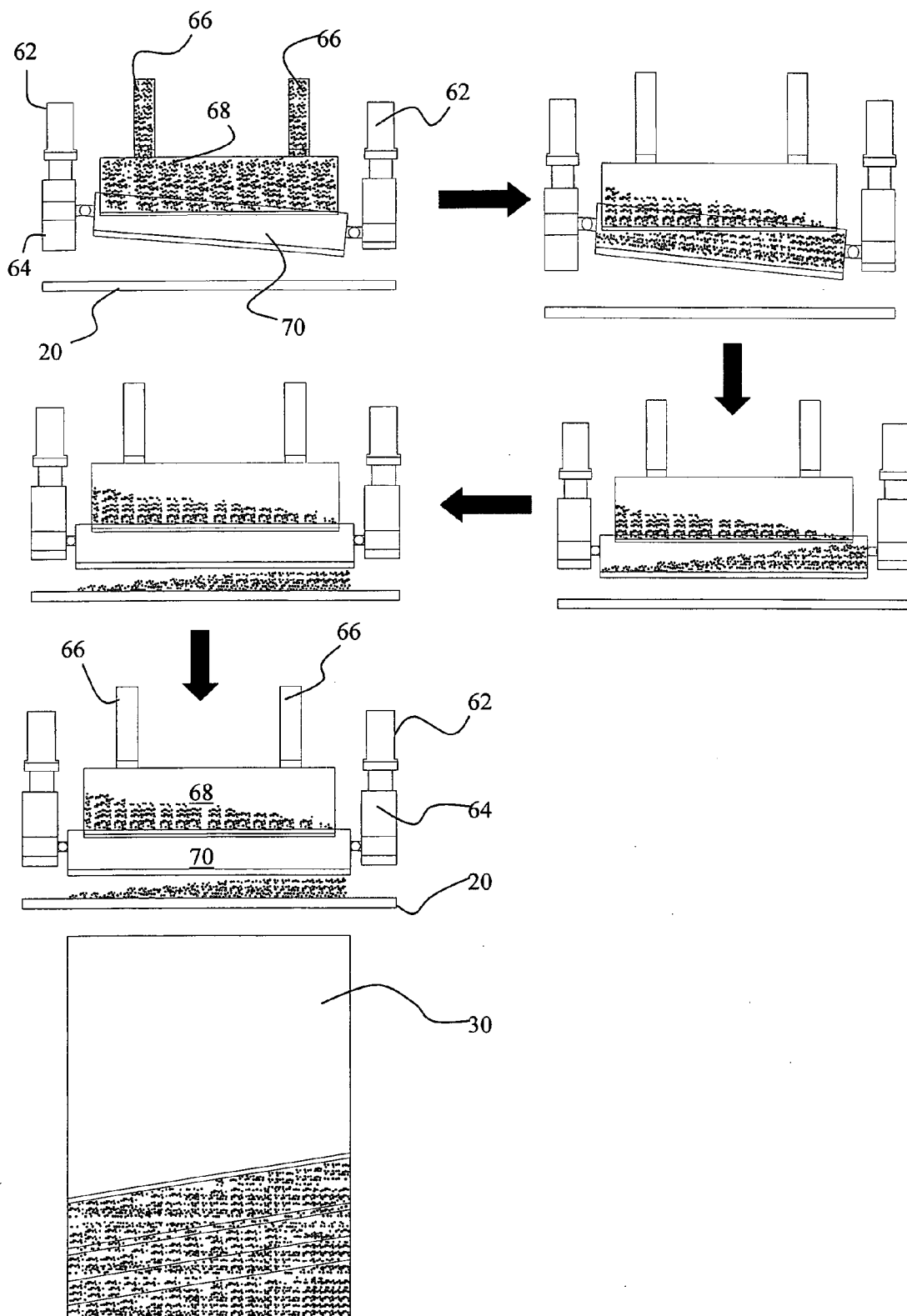


Fig. 5

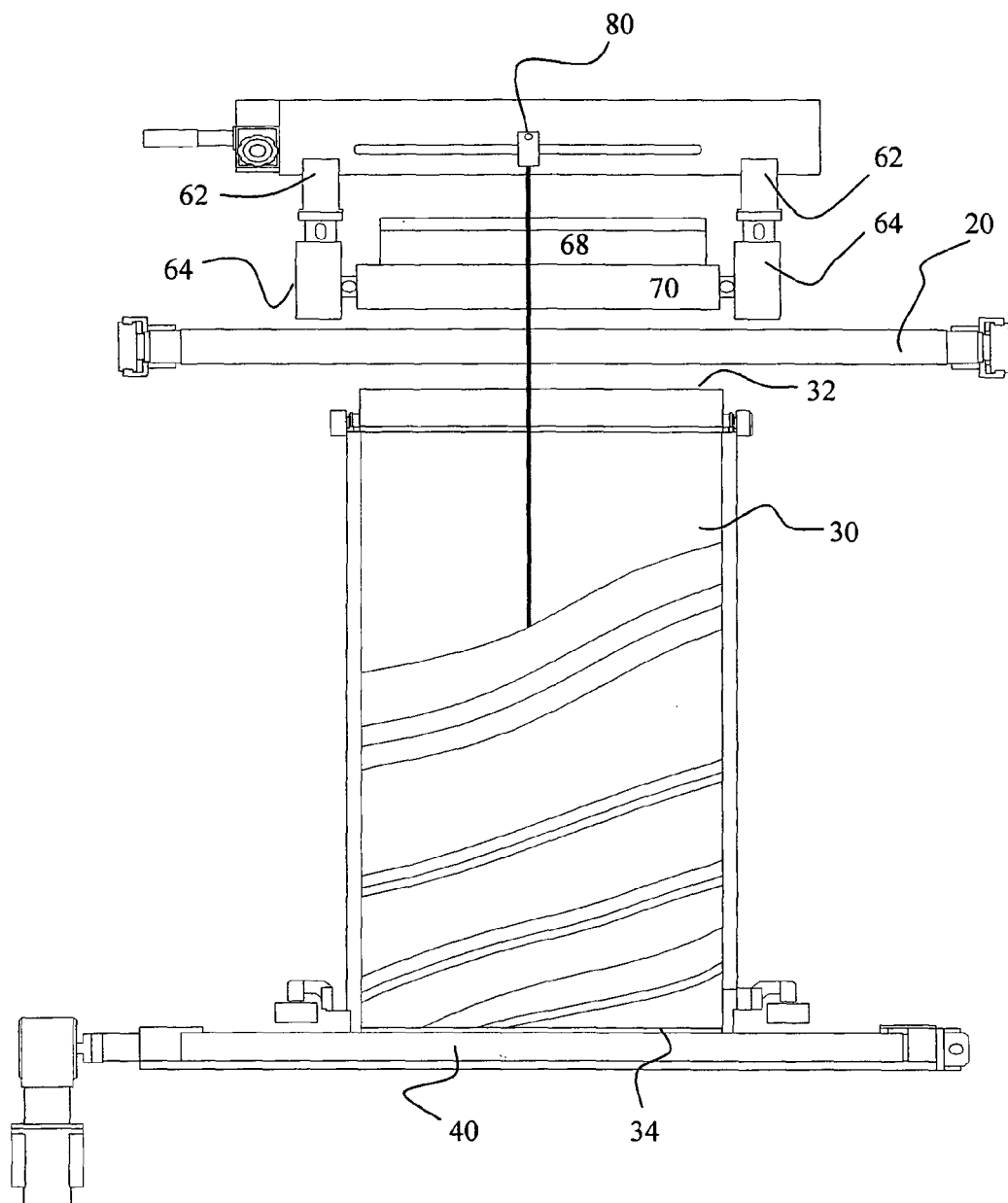


Fig. 6

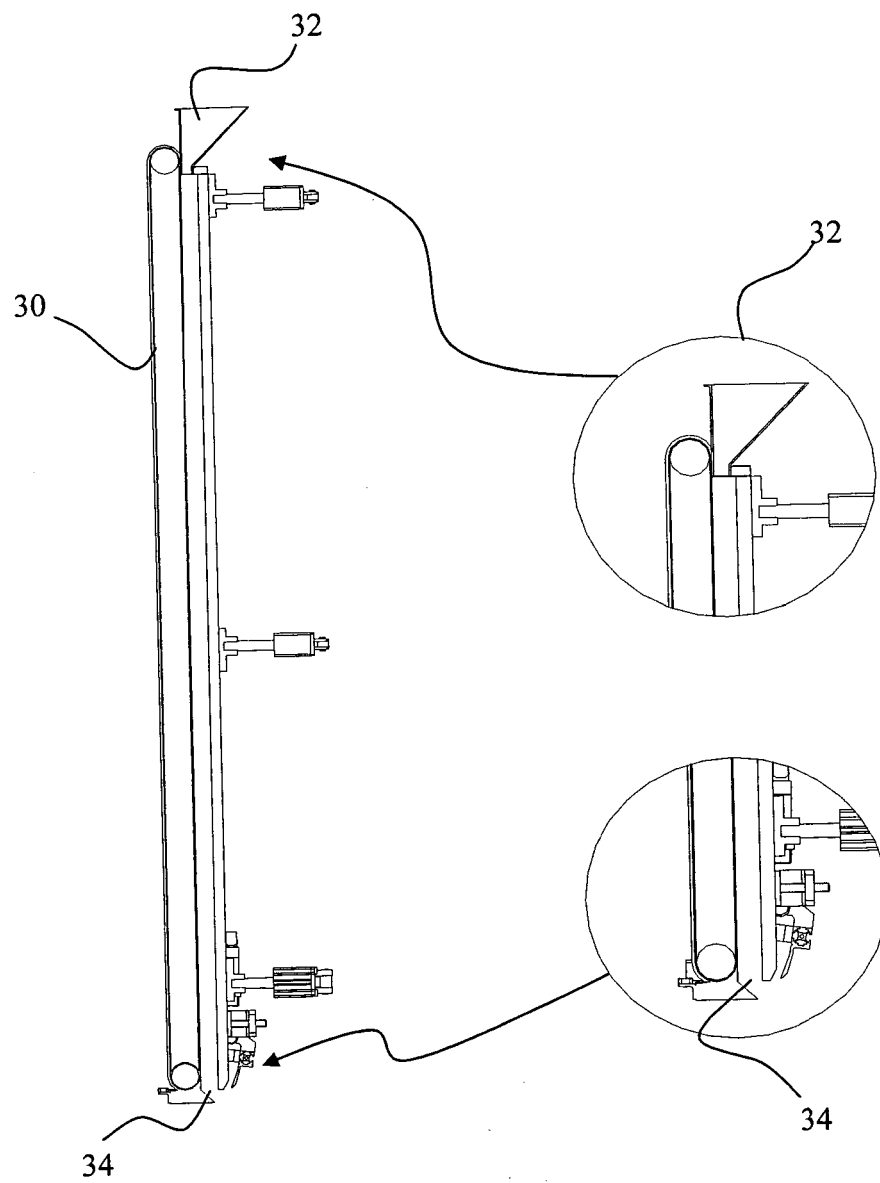


Fig. 7

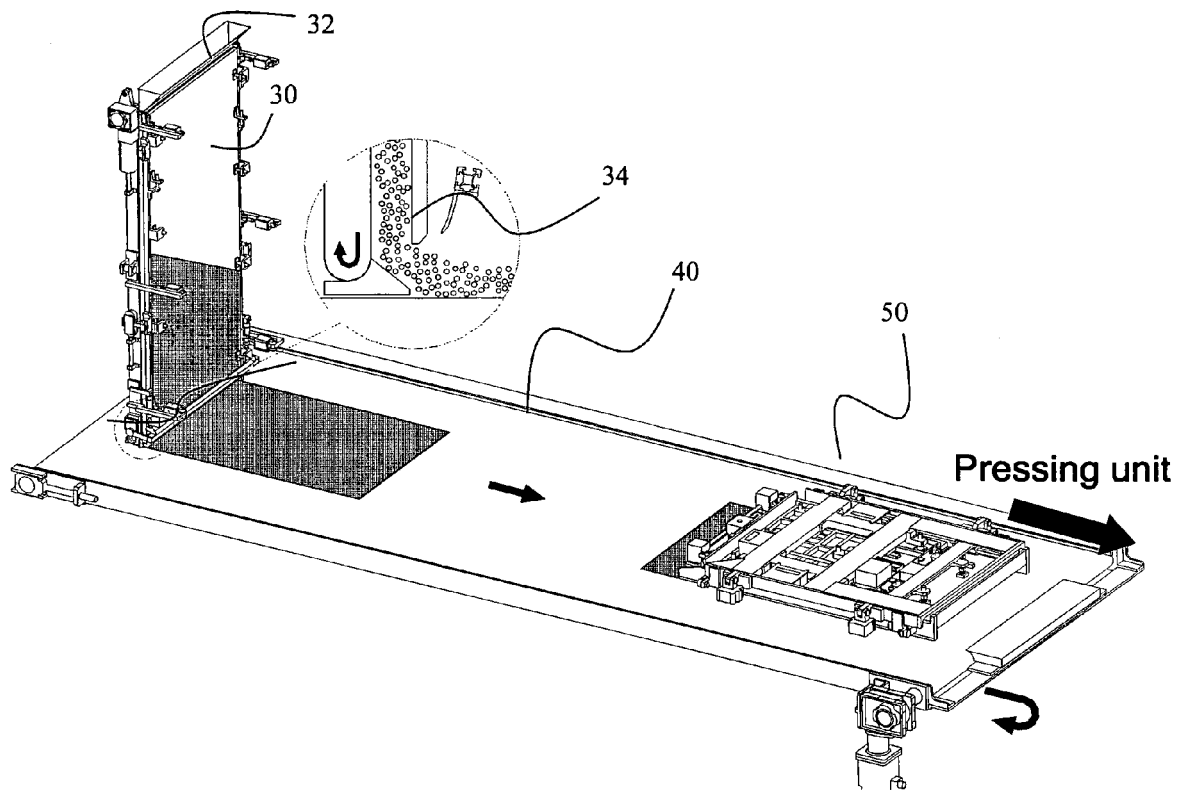


Fig. 8

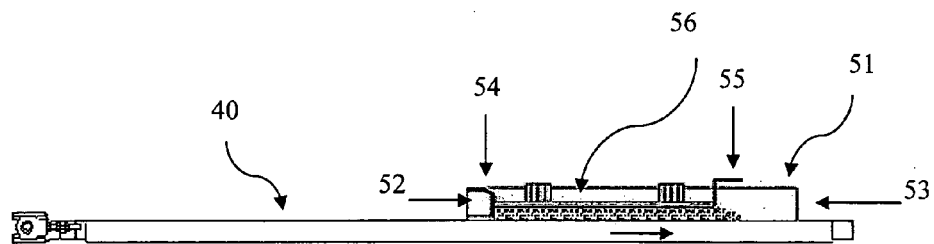


Fig. 9



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 45 0217

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,Y	EP 1 717 000 A (THAI CERAMIC CO LTD [TH]) 2 November 2006 (2006-11-02) * paragraph [0010] - paragraph [0022]; claims; figures *	1-3,5,7	INV. B28B13/02
Y	WO 2005/068146 A (SACMI [IT]; SCARDOVI STEFANO [IT]; VALLI SILVANO [IT]) 28 July 2005 (2005-07-28) * page 13, line 10 - page 16, line 5; figures 7,8 *	1-3,5,7	
Y	US 5 554 393 A (UCHIDA HIROSHI [JP] ET AL) 10 September 1996 (1996-09-10) * column 4, line 3 - column 5, line 13; figures 3,4 *	2	
A	EP 1 787 779 A (SACMI [IT]) 23 May 2007 (2007-05-23) * paragraph [0015] - paragraph [0036]; claims 1,5; figures *	1,6-8	
A	EP 0 586 257 A (CCA INC [JP]) 9 March 1994 (1994-03-09) * column 5, line 30 - column 6, line 17; figures 3,4 *	2	TECHNICAL FIELDS SEARCHED (IPC) B28B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 August 2008	Examiner Orij, Jack
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 45 0217

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-08-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1717000	A	02-11-2006	NONE	

WO 2005068146	A	28-07-2005	BR PI0506669 A	15-05-2007
			CN 1906001 A	31-01-2007
			EP 1701830 A2	20-09-2006

US 5554393	A	10-09-1996	NONE	

EP 1787779	A	23-05-2007	CN 1966229 A	23-05-2007

EP 0586257	A	09-03-1994	AT 169525 T	15-08-1998
			AU 671846 B2	12-09-1996
			AU 4614493 A	10-03-1994
			CA 2105643 A1	05-03-1994
			CN 1108718 A	20-09-1995
			DE 69320277 D1	17-09-1998
			DE 69320277 T2	08-04-1999
			ES 2121059 T3	16-11-1998
			ID 19046 A	04-06-1998
			JP 3236360 B2	10-12-2001
			JP 6106521 A	19-04-1994
			US 5429676 A	04-07-1995

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1334811 A [0003]
- EP 1273408 A [0005]
- WO 2004071733 A [0005]
- EP 1717000 A1 [0006]