

(19)



(11)

EP 1 955 810 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
19.05.2010 Bulletin 2010/20

(51) Int Cl.:
B24B 9/00 (2006.01) B28B 11/00 (2006.01)

(21) Application number: **08381002.8**

(22) Date of filing: **18.01.2008**

(54) **Grinding process for ceramic tiles**

Schleifverfahren für Keramikfliesen

Procédé de meulage pour carreaux en céramique

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **12.02.2007 ES 200700372**

(43) Date of publication of application:
13.08.2008 Bulletin 2008/33

(73) Proprietor: **Maincer, S.L.**
12200 Onda (ES)

(72) Inventor: **Vigil Fernandez, Francisco**
12200 Onda (Castellon) (ES)

(74) Representative: **Esteban Perez-Serrano, Maria
Isabel**
UDAPI & Asociados
Explanada 8
28040 Madrid (ES)

(56) References cited:
EP-A- 0 865 870 EP-A- 1 088 636
FR-A- 2 687 340 US-B1- 6 416 382

EP 1 955 810 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a grinding process used in the ceramic piece manufacturing industry and, more specifically, of tiles, to guarantee that the facing sides of the pieces are parallel to each other and that the adjacent sides are perpendicular.

[0002] Due to its special configuration, the grinding machine does not need an additional contribution of water since the temperatures that are reached therein are not high.

[0003] Likewise, the grinding machine presents a series of grinding discs placed in each grinding section at different heights that guarantee a single cut of surplus material.

BACKGROUND OF THE INVENTION

[0004] Grinding machines for ceramic pieces, and more precisely, tiles, which use grinding wheels or diamond discs to give the final finish to the tile, are only too well known in the state of the art.

[0005] In previous machines, as the piece is already fired before the grinding process, a large supply of energy is necessary to carry out the incisions in the fired piece.

[0006] Likewise, this process requires water to cool the diamond discs or the grinding wheels and avoid their burning, but in this way, upon the combination of the water with the dust coming from the wear of the sides of the tiles, clay that needs to be eliminated in an additional cleaning process is created.

[0007] Furthermore, being a fired material, it becomes harder and the grinding is carried out by means of progressive elimination of the surplus material, presenting the risk that the pieces break because of their own hardness.

[0008] It is known from the state of the art a grinding machine as the one disclosed in US 6416382 which is a bilateral automatic machine for edge-machining plates of glass, stone-like materials and the like. It is also known a method for sizing natural- or synthetic-stone elements, particularly ceramic tiles, and machine for carrying out the method as the one disclosed in EP 0865870, and finally it is known a machine for polishing edges as the one disclosed in FR 2687340.

[0009] All of these drawbacks are overcome by means of the grinding process that will now be described, wherein the machine presents a series of grinding discs placed in each grinding section at different heights that guarantee a single cut of the surplus material of the piece before firing.

DESCRIPTION OF THE INVENTION

[0010] The present invention relates to a grinding machine of those used in the ceramic piece manufacturing

industry and, more specifically, of tiles, to guarantee that the facing sides of the pieces are parallel to each other and that the adjacent sides are perpendicular.

[0011] The tiles coming from the enamelling and decorating stage are centred in the grinding machine by means of rails that adjust to the size of the piece, which are detected by a sensor.

[0012] Subsequently, the tile is moved until it makes contact with grinding discs placed in grinding sections at different heights which guarantee a single cut of the surplus material, where the rotation speed and the height of the discs is adjustable.

[0013] The grinding sections can present their grinding discs in the lower piece or in the upper piece to act on the tile's lower or upper piece, respectively.

[0014] The grinding machine also presents a bevelled section of the lower edges of the tile by means of grinding wheels.

[0015] At the exit of the grinding machine, the pieces are cleaned to eliminate the residual dust from the process before putting them in the kiln for their firing.

DESCRIPTION OF THE DRAWINGS

[0016] The present specification is complemented with a set of illustrative plans of the preferred, and never limitative, example of the invention.

[0017] Figure 1 shows a plan view of the grinding machine of the present invention.

[0018] Figure 2 shows an elevational view of the machine's cutting area of the present invention.

[0019] Figure 3 shows a side view of the cutting area of the grinding machine of the present invention where the grinding discs can be observed in the upper piece of the tile, where the pulleys have been omitted for a better understanding.

[0020] Figure 4 shows a side view of the machine's cutting area of the present invention where the grinding discs can be observed in the lower piece of the piece, where the pulleys have been omitted for a better understanding.

PREFERRED EMBODIMENT OF THE INVENTION

[0021] In view of the previous statements, the present invention relates to a grinding machine for ceramic tiles that presents grinding discs (7) placed at different heights in each grinding section which guarantee a single cut of surplus tile material (1) before the firing.

[0022] The tiles (1) coming from the enamelling and decorating stage are centred in the grinding machine by means of lateral positioning rails (2, 3) which adjust to the size of the piece, which is detected by a sensor (not shown in the Figures).

[0023] The lateral positioning rails (2, 3) comprise a lateral rail (2) with a brace to hold the piece and a fixed lateral positioning rail (3).

[0024] Next, the tile (1) is moved by means of belts (4)

guided by pulleys (5) and actuated by a motor (6) towards the grinding discs (7), which in this example of preferred embodiment there are six, placed in three grinding sections so that there are two discs in each section, one on each side of the tile, that guarantee a single cut of surplus tile material (1), where the height of the grinding discs (7) is determined by means of the actuation of positioning motors (8).

[0025] In this example of preferred embodiment the grinding discs (7) act on the upper piece of the tile (1) and each one of them is actuated by a cutting motor (9).

[0026] The grinding machine also presents a bevelled section of the lower edges of the tile (1) by means of grinding wheels (not shown in the Figures).

[0027] At the exit of the grinding machine, the tiles (1) are cleaned by means of blowing for the elimination of the residual dust from the process before putting them into the kiln for their firing.

[0028] In other examples, the grinding machine presents eight and ten grinding discs (7) in four and five grinding sections, respectively.

[0029] Variations in materials, shapes, sizes and availability of the components, described in a non-limitative fashion, do not alter the essentiality of this invention as defined in the appended claims, this being sufficient to go through with its reproduction by a person skilled in the art.

Claims

1. A grinding process for ceramic tiles comprising the following steps:

- the tiles coming out from an enamelling and decorating stage are centred in a grinding machine by means of rails that adjust to the size of the tiles;
- every tile is moved until it makes contact with grinding discs placed in grinding sections at different heights;
- grinding of the tiles is carried out by the grinding discs;
- the tiles exiting from the grinding machine are cleaned;
- the tiles are put in a kiln for their firing.

2. A grinding process according to claim 1 **characterized in that** some of the grinding sections have their discs on the upper part of the grinding machine.

3. A grinding process according to claim 1 or 2 **characterized in that** some of the grinding sections have their discs on the lower part of the grinding machine.

4. A grinding process according to claim 1 **characterized in that** additionally the tiles are submitted to bevelling process of the lower edges of the tiles in a

bevelled section.

Patentansprüche

1. Schleifverfahren für Keramikfliesen, das folgende Schritte umfasst:

- die aus einer Emaillier- und Dekorationsstufe kommenden Fliesen werden in einer Schleifmaschine mit Hilfe von an die Größe der Fliesen angepassten Schienen zentriert;
- jede Fliese wird bewegt, bis sie mit Schleifscheiben in Kontakt kommt, die in Schleifabschnitten in unterschiedlichen Höhen angeordnet sind;
- Schleifen der Fliesen mittels der Schleifscheiben;
- Reinigen der aus der Schleifmaschine auslaufenden Fliesen;
- Einbringen der Fliesen in einen Ofen zum Brennen derselben.

2. Schleifverfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Schleifscheiben einiger Schleifabschnitte im Oberteil der Schleifmaschine befinden.

3. Schleifverfahren nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sich die Schleifscheiben einiger Schleifabschnitte im Unterteil der Schleifmaschine befinden.

4. Schleifverfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Fliesen zusätzlich einem Abschrägungsprozess der Unterkanten in einem Abschrägungsabschnitt unterzogen werden.

Revendications

1. Procédé de rectification pour carreaux céramiques comprenant les étapes suivantes :

- les carreaux sortant d'une étape d'émaillage et de décoration sont centrés dans une machine à rectifier au moyen de rails qui s'ajustent à la dimension des carreaux;
- chaque carreau est déplacé jusqu'à ce qu'il contacte les disques à rectifier situés dans les sections de rectification à différentes hauteurs ;
- la rectification des carreaux est mise en oeuvre par les disques à rectifier ;
- les carreaux sortant de la machine à rectifier sont nettoyés ;
- les carreaux sont mis dans un four pour leur cuisson.

2. Procédé de rectification selon la revendication 1, **caractérisé en ce que** quelques sections de rectification ont leurs disques sur la partie supérieure de la machine à rectifier.

5

3. Procédé de rectification selon la revendication 1 ou 2, **caractérisé en ce que** quelques sections de rectification ont leurs disques sur la partie inférieure de la machine à rectifier.

10

4. Procédé selon la revendication 1, **caractérisé en ce qu'**en outre, les carreaux sont soumis à un procédé de biseautage des bords inférieurs des carreaux dans une section de biseautage.

15

20

25

30

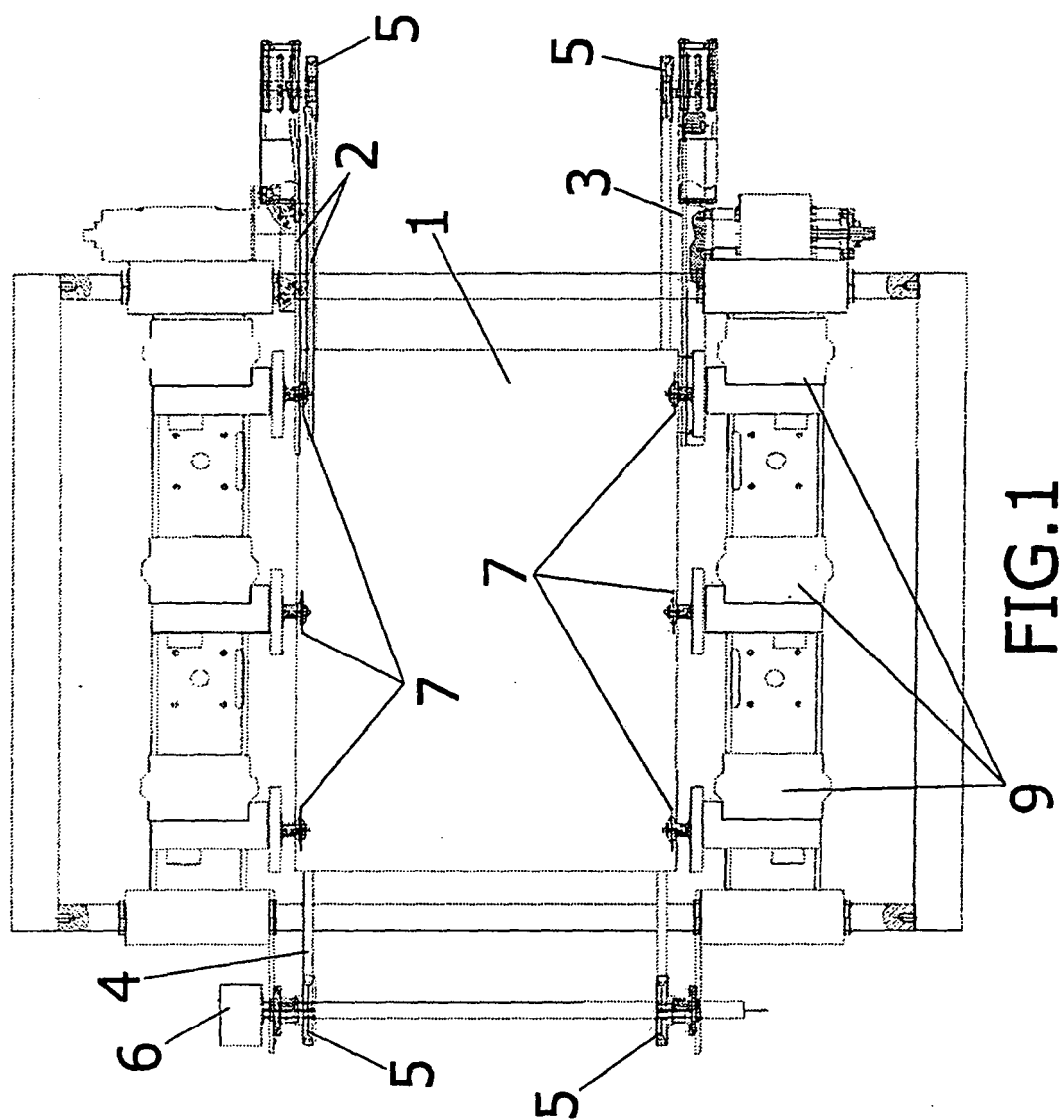
35

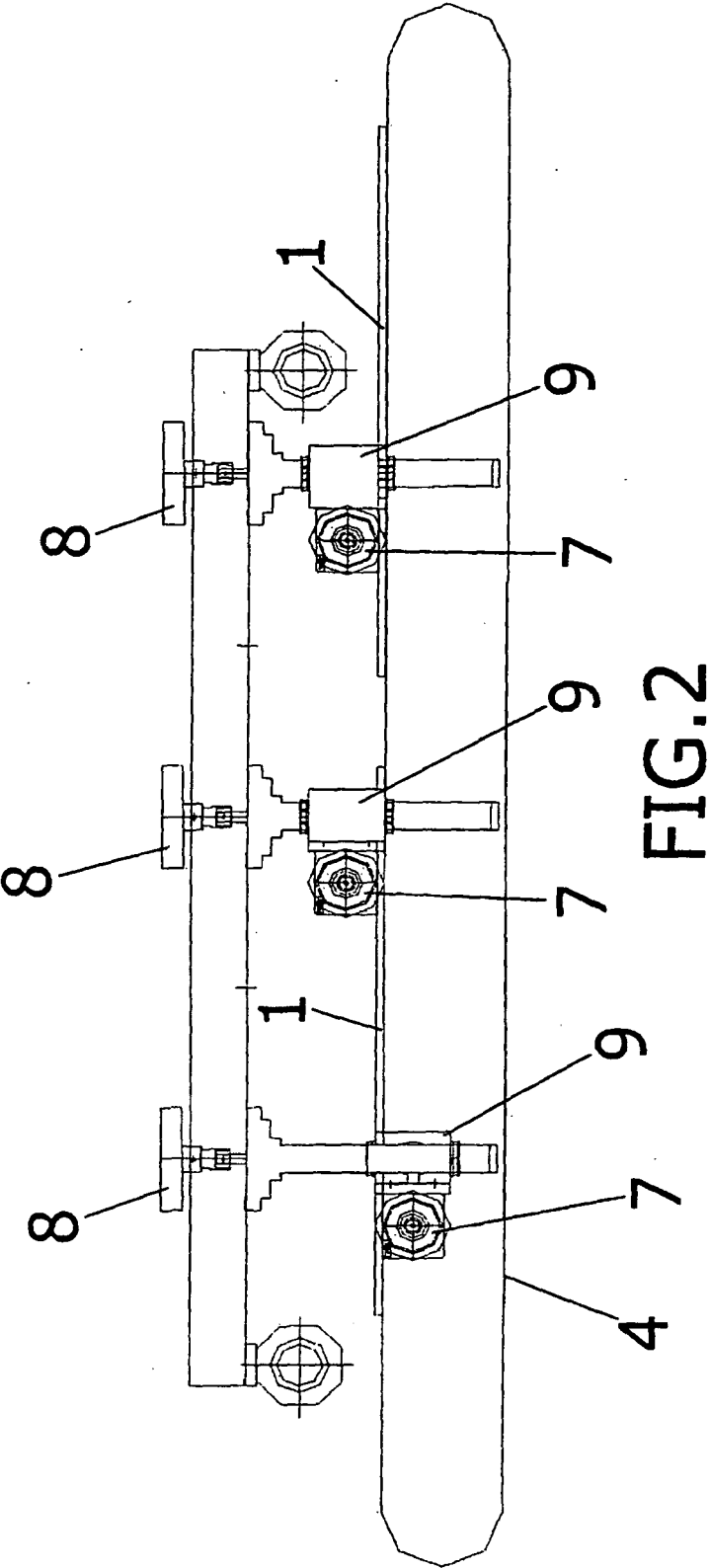
40

45

50

55





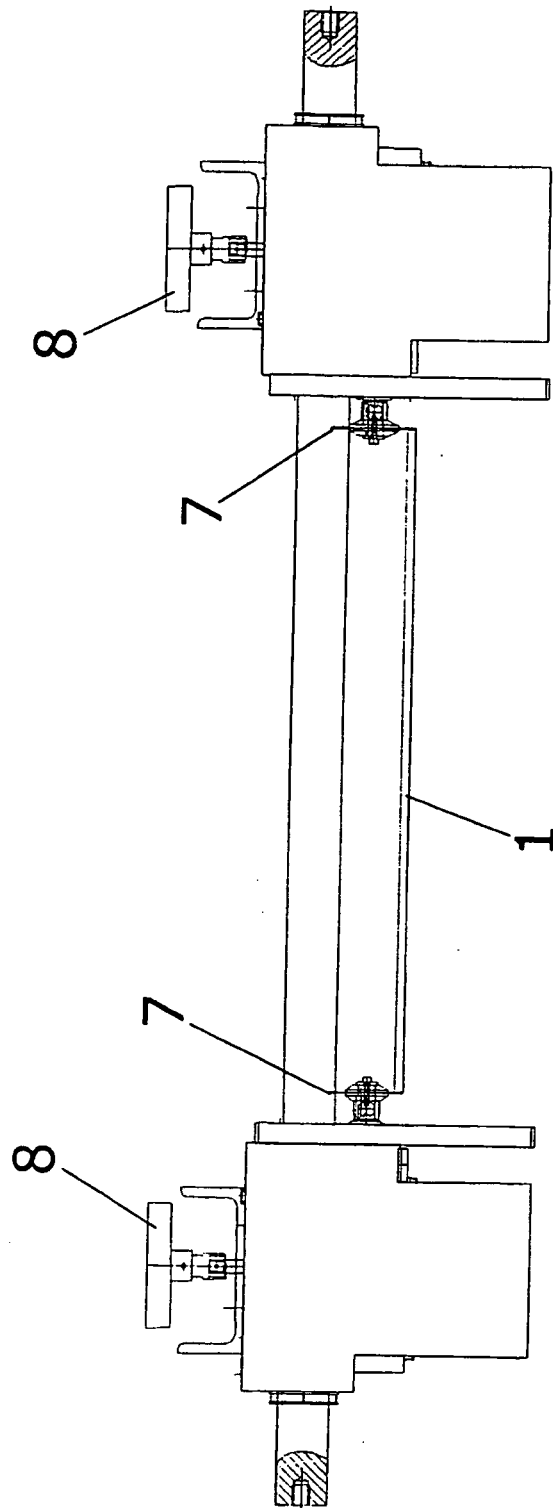


FIG.3

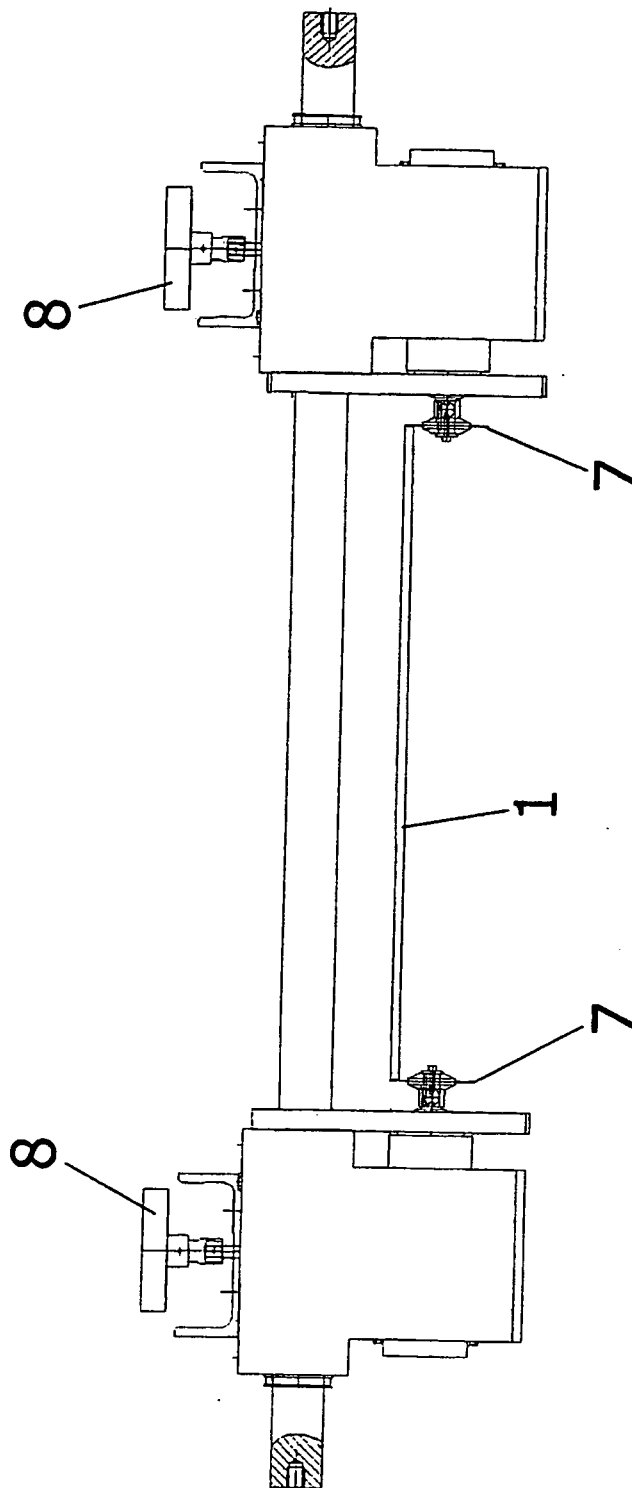


FIG.4

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

- US 6416382 B [0008]
- EP 0865870 A [0008]
- FR 2687340 [0008]