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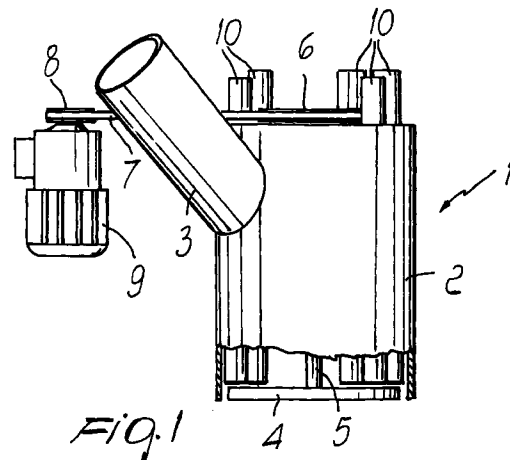
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(54) **Unit with rotating diaphragm for mixing powders for manufacturing ceramic tiles**

(57) A unit for mixing powders to be fed to a tile manufacturing press, which comprises: a plurality of vertical ducts (19), each of which is connected to a respective powder feed (3) and has respective lower discharge ports; and a disk-like shutter element which has at least one opening (11), is supported so that it can rotate about a vertical axis at a level for closing the discharge ports of the vertical ducts (10), and is rotated so as to allow, in one or more angular positions, the discharge of powder from the ducts (10) that become aligned with the openings (11).



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Description

The present invention relates to a unit with rotating diaphragm for mixing powders.

The unit according to the invention is meant to be used in the ceramics industry, particularly in feeding powders in presses for manufacturing ceramic tiles.

It is known that powders are loaded into ceramic presses by using a carriage which has a grille and is actuated back and forth between a position below a powder-containing hopper, at which the grille is filled with ceramic powder, and a discharge position, at which the powder is discharged from the grille into the recesses of an underlying mold of a ceramic press. After filling the recesses, the grille, during the return stroke under the hopper, removes the excess powder by skimming.

With the conventional loading carriage, the ability to affect the physical and aesthetic features of the final product is severely limited. The powders are in fact transferred from the carriage into the recesses of the mold by gravity and this almost exclusively produces only stratification of the powders.

The aim of the present invention is to provide a unit which allows to obviate this drawback by varying the manner of mixing both in terms of color of the powders and in terms of physical characteristics.

Within the scope of this aim, an object of the present invention is to provide a unit which has a simple structure and is adapted to be applied also in carriages for feeding powder to tile manufacturing presses that are already installed.

This aim, this object and others which will become apparent hereinafter, are achieved by a unit for mixing powders to be fed to a tile manufacturing press, characterized in that it comprises: a plurality of vertical ducts, each of which is connected to a respective powder feed and has respective lower discharge ports; and a disk-like shutter element which has at least one opening, is supported so that it can rotate about a vertical axis at a level for closing said discharge ports of said vertical ducts, and is rotated so as to allow, in one or more angular positions, the discharge of powder from the ducts that become aligned with said openings.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of an embodiment, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a vertical partially sectional view of the unit;

Figure 2 is a plan view of the shutter element according to a first embodiment; and

Figure 3 is a plan view of the shutter element according to another embodiment.

With reference to Figures 1 and 2, the unit is consti-

tuted by a structure which is generally designated by the reference numeral 1 and is composed of an outer cylindrical container 2, from the upper portion whereof there extends an inlet tube 3 for feeding a first type of ceramic powder.

The container 2 has a bottom which is constituted by a circular diaphragm 4 which forms a shutter element inserted in the lower end of the container, so as to form a sliding closure between the inner surface of the container and the perimetric surface of the diaphragm.

The diaphragm 4 is rigidly coupled to the lower end of a vertical shaft 5 which is rotatably supported inside the container 2. A driven pulley 6 is keyed to the top of the shaft 5 and a belt 7 is wound around said pulley and is closed in a loop around a driving pulley 8, which is keyed on the output shaft of a gearmotor 9.

Various vertical ducts 10 are arranged inside the container 2; each duct is connected to its own type of ceramic powder.

The ducts 10 are located, inside the container 2, in positions which are angularly and radially offset and their dimensions are chosen as a function of the amount of powder that each duct is meant to discharge.

The lower ends of the ducts 10 are in sliding contact with the upper face of the diaphragm 4, so as to prevent the escape of the powder contained in the ducts. In order to allow the powder contained in the ducts 10 to be discharged into the press feeder grille, in the shutter 4 there is an opening 11 through which the powder can fall when the opening 11 is located at a duct.

The operation of the unit according to the invention can be easily understood from the above description.

During tile pressing, the shutter is in an angular position at which the diaphragm 4 blocks the descent of the powders. When the press feeder slider is below the container 2, the actuation of the gearmotor 9 turns the diaphragm 4, thus producing the cyclic emptying of the vertical ducts 10 and mixing the powders.

The sequence of the various doses of powder can be deposited in the grille that transfers the powder directly into the recesses or in the container (secondary hopper) upstream of said grille, achieving different aesthetic effects according to the deposition.

The way in which the powders are mixed can be altered by varying the number and diameter of the vertical ducts 10 and of the container 2, the rotation rate of the diaphragm 4, and the distance between the upper face of the diaphragm and the lower edge of the vertical ducts.

Another option for intervention is allowed by the geometry of the diaphragm, for example by providing an additional discharge opening 12 as shown in Figure 3.

An important feature of the unit according to the present invention is constituted by the fact that the characteristics of the product that arises from the mixing vary not only according to the colors and particle size of the powders conveyed by the vertical ducts 10 and by the container 2 and according to the number and size

thereof, but also according to dynamic factors such as the rotation rate of the diaphragm 4.

Particular importance is given to the fact that the unit allows to vary the distribution of the powders, taking into account their physical properties, so as to optimize subsequent tile drying and baking steps.

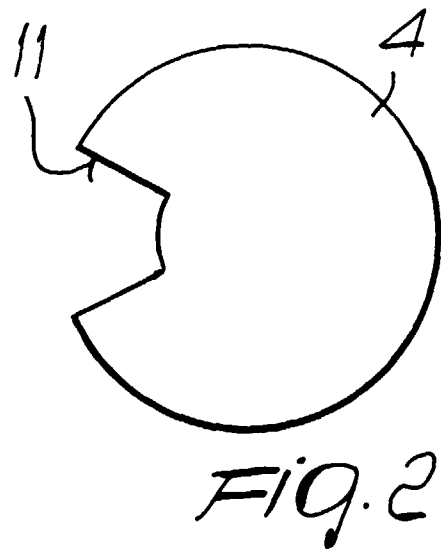
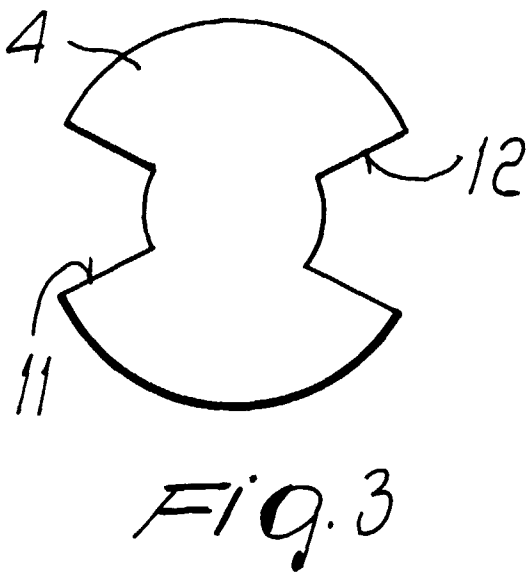
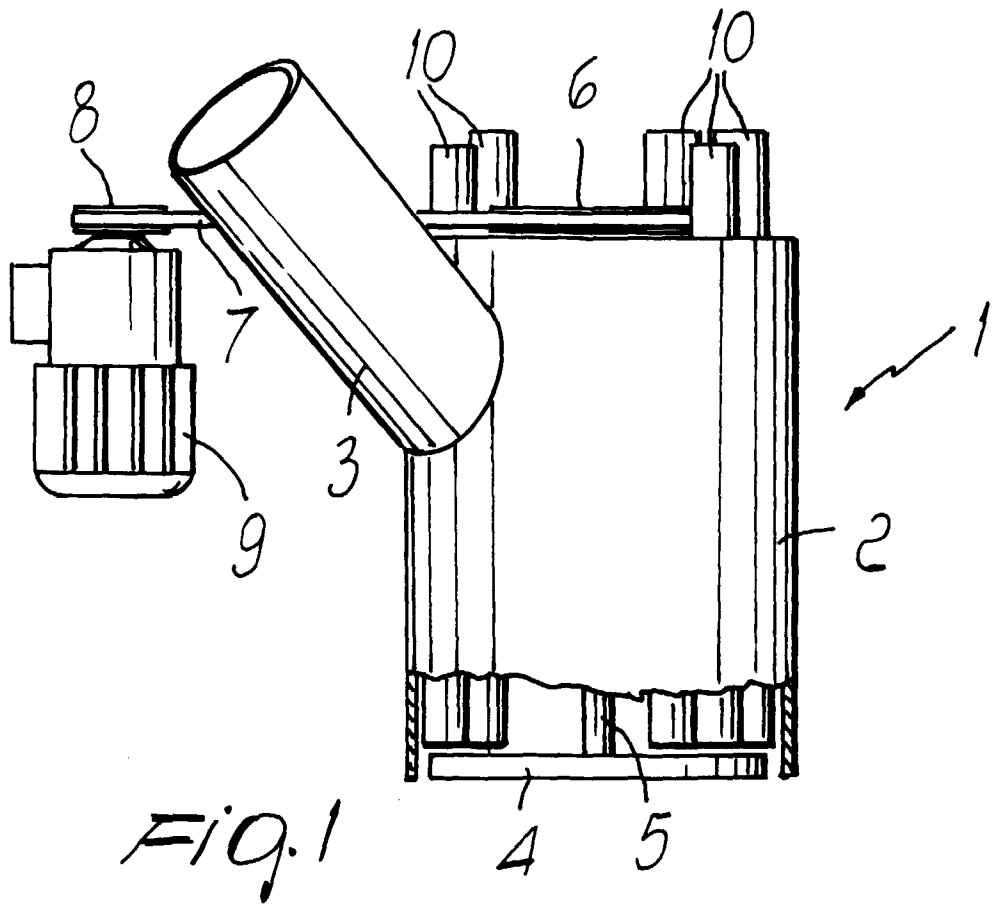
The described unit is susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept. For example, the unit can have a transverse translatory motion with respect to the movement of the press feeder grille and the rotation rate of the diaphragm can be controlled by the position of the grille, in order to determine a rule for depositing the sequence of colored doses which can be reproduced over time in the various regions of the pressed item.

In the practical embodiment of the unit, the diaphragm does not have to be in sliding contact with the lower ports of the ducts. Likewise, the ports do not have to lie on a same plane.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A unit for mixing powders to be fed to a tile manufacturing press, characterized in that it comprises: a plurality of vertical ducts (10), each of which is connected to a respective powder feed and has respective lower discharge ports; and a disk-like shutter element (4) which has at least one opening (11), is supported so that it can rotate about a vertical axis (5) at a level for closing said discharge ports of said vertical ducts (10), and is rotated so as to allow, in one or more angular positions, the discharge of powder from the ducts (10) that become aligned with said openings (11).
2. A unit according to claim 1, characterized in that it comprises an outer cylindrical container (2), an inlet tube (3) for a first type of ceramic powder extending from the upper portion of said container, said container (2) having a bottom which is constituted by a circular diaphragm (4) which forms said shutter element and is inserted in the lower end of the container (2) so as to provide a sliding closure between the inner surface of the container and the perimetric surface of the diaphragm (4), said diaphragm being rigidly coupled to the lower end of a vertical shaft (5) which is rotatably supported inside the container and is connected to motorization means (9), various vertical ducts (10) being arranged inside said container (2), being connected to respective ceramic powder feeds and being arranged, inside the container, in angularly and radially offset positions, at least one opening (11) being formed in said diaphragm (4), the powder being able to descend through said opening (11) when it is located at a duct (10) during the rotation of said diaphragm (4).
3. A unit according to claim 2, characterized in that said motorization means comprise a pulley (6) which is rigidly coupled to the top of said shaft (5) and is actuated, by means of a driving belt (7), by a gearmotor (9) which is external to said container (2).
4. A unit according to claim 1, characterized in that it is supported so that it can move transversely to the movement of the press feeder grille and with a rotation rate of the diaphragm (4) which is controlled by the position of the grille in order to determine a rule for depositing the sequence of colored doses which can be reproduced over time in the various regions of the pressed item.





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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 0906

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 605 930 A (MIRAGE CERAMICA SPA) 13 July 1994 * the whole document *	1, 4	B28B17/02 B01F5/02
A	DD 126 956 A (E. KALIN) 24 August 1977 * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B28B B01F B30B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 8 October 1998	Examiner Gourier, P
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