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Double-loading carriage for ceramic moulds in general, and typically for the manufacture of pressure-glazed tiles.

A double-loading carriage for ceramic moulds in general, comprising a loader (5) for atomized clay (66) (or other material) which is driven with horizontal outward and return movement relative to at least one forming cavity (20) of the mould, and is provided at its front with a perforated masking element (6) for distributing powdered glaze (77) (or other material), a slidable glaze loader (78) being upperly associated

with this masking element.

When the loader (5) advances the clay (66) is deposited into the cavity (20), whereas during its return movement the loader (5) stops temporarily when said masking element lies above the cavity, while the glaze loader slides relative to the masking element (6) to allow the glaze to fall through the apertures (7; 71, 72, 73) of this latter.

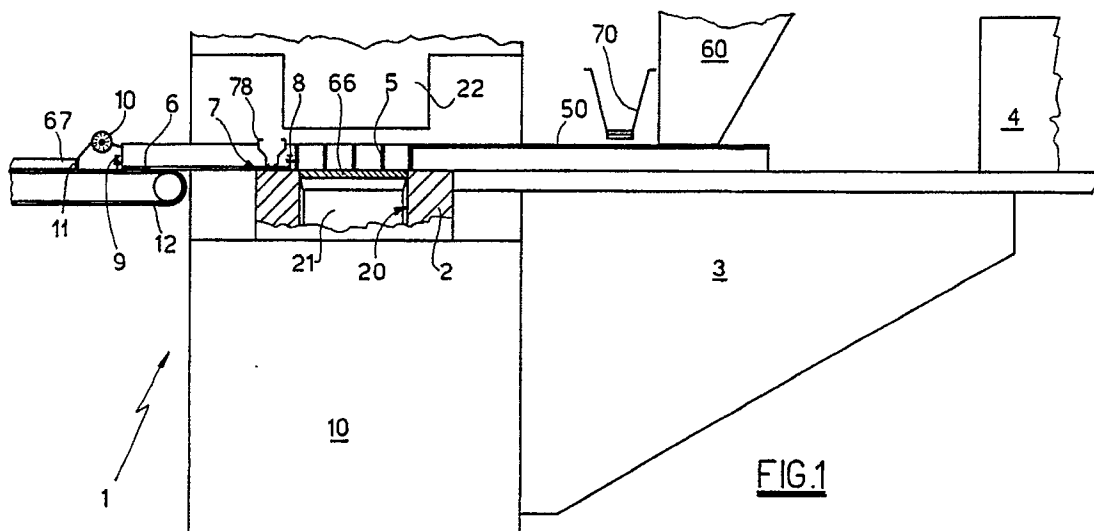


FIG.1

EP 0 444 730 A2

This invention relates generally to the manufacture of pressure-glazed tiles, and in particular to a service carriage for loading ceramic moulds with the materials required for forming said pressure-glazed tiles, and similar products.

The forming method known as pressure glazing has been known for some time in the field of ceramic tile production.

Using this known method, atomized clay is firstly deposited in the forming cavities of a usual ceramic mould, followed by a layer of powdered ceramic glaze, after which said two pulverulent materials are compressed to form tiles ready for subsequent firing. A method virtually identical to this is used to form other types of tile, such as the so-called "grained" tiles, and to form other materials with multi-component supports, as is well known in the sector concerned. Thus for reasons of clarity and economy of description specific reference is made hereinafter only to pressure glazing, however the use of the invention extends to the manufacture of other similar articles.

To load said two materials, ie atomized clay and powdered glaze, corresponding carriages are provided in the known art on one and the other side of the forming mould.

Said two carriages are arranged to slide forwards and rearwards as stated.

The clay carriage firstly slides forwards while the glaze carriage remains at rest in the retracted position.

The clay carriage then moves rearwards to level off the clay present in the mould cavities, after which the lower mould punches are lowered through a predetermined distance, the glaze carriage then being enabled to advance to fill the upper regions of said cavities, which are free by virtue of the lowering of the punches.

These punches are then further lowered into the pressing position, after which the tiles are formed and then discharged, to be followed by a further loading cycle.

However, this known loading method has proved unsatisfactory in that it involves considerable operating time, making it inadequate for modern manufacturing cycles, which are characterised by particularly high production rates. In this respect, it is well known that most modern ceramic plants are installed in existing workshops in which it is usually not possible to further extend the covered area.

It is therefore considerably important that the machines or operating stations attain particularly high production rates within the context of limited overall dimensions.

The main object of the present invention is to overcome the aforesaid problems within the context of a constructionally simple solution of small overall

size.

According to the invention, to attain said object the carriage in question comprises a clay loader driven with horizontal outward and return movement relative to at least one forming cavity of an underlying ceramic mould, and provided at its front with a perforated element which distributes the powdered glaze and is upperly associated with a loader for this glaze.

Said glaze loader is arranged to slide parallel to said distributor while this latter is temporarily stationary, lying above said at least one forming cavity in which the clay has been previously deposited.

Said combination attains all the objects of the invention in that the ceramic press is able to operate at practically double the rate obtainable in the initially described known art. In addition the invention is of small overall size.

According to a first embodiment, said glaze distributor, which consists of a horizontal flat plate or masking element, is provided with an aperture of dimensions practically equal to those of said at least one cavity, whereas according to other embodiments said plate comprises one or more apertures of any shape but having a total surface area less than that of the cavity.

Thus with said first embodiment pressure-glazed tiles are obtained completely covered with glaze, whereas with the other embodiments partial glazing of the tiles can be achieved, to enable unusual aesthetic and ornamental effects to be obtained.

The characteristics and constructional merits of the invention will be apparent from the detailed description given hereinafter with reference to the accompanying figures which illustrate some preferred embodiments thereof by way of non-limiting example.

Figure 1 is a sectional side elevational view of the invention associated with a ceramic press.

Figure 2 is a plan view of Figure 1, without the press,

Figures 3A, 3B and 3C are schematic vertical sections showing a forming cavity during the most significant operating stages of the carriage according to the invention.

Figures 4A, 4B and 4C are plan views showing a part of three different forms of the glaze-distributing masking element of the present invention.

Said figures, and in particular Figure 1, show a ceramic press 1, which is represented schematically as it can be of any known type, and because it does not form any characterising part of the invention.

On the base of the press 1, indicated by the reference numeral 10 in Figure 1, there is located the die 2 of a ceramic mould, which is shown

schematically as it can be of any known type. It can be for example of the entering punch type, of the so-called "inverted mirror" type, or of the type in which the tile forming takes place in the upper part of the mould (indicated by 22 in Figure 1), which is arranged on the moving cross-member of the press 1.

Further technical and constructional details relating to said press and mould will not be provided as these are well known to the expert of the art.

It will merely be noted that the forming cavities, indicated by 20 in Figures 1, 2 and 3A to 3C, can be of any shape in addition to the square shape shown in Figure 2, and can be of any number and dimensions. As is usual, each forming cavity 20 is lowerly delimited by a lower forming punch 21, which moves in height relative to the die 2 as described hereinafter.

As stated in the introduction, the invention is particularly but not exclusively suitable for the manufacture of pressure-glazed tiles, the starting materials for which are introduced into the cavities 20 as will be apparent hereinafter.

The first material, consisting (for example) of atomized clay (indicated by 66 in Figures 3A to 3C), is contained in a respective hopper 60 (Figures 1, 2), while the second material, consisting (for example) of powdered glaze (indicated by 77 in Figures 3A to 3C), is contained in a corresponding hopper 70 located adjacent to the preceding, on the side facing the press 1 (Figure 1).

Said two feed hoppers 60 and 70 for the atomized clay (or other material) and powdered glaze (or other material) respectively, are arranged transversely to an underlying structure 3 which is fixed to the press base 10 and on which the carriage of the invention is slidingly mounted.

The operating unit for said carriage is housed in a casing 4 supported by the structure 3 and positioned on the opposite side of the hopper 60 to that occupied by the hopper 70 (see Figures 1, 2).

Said operating unit is not shown as it is of known type, consisting for example of a device of the connecting rod-crank or other equivalent type, which unit can however be differently positioned from that shown, for example within the structure 3.

At this point, again in relation to that stated in the introduction, it should be noted that the hopper 70 can contain either a single type of powdered glaze, different powdered glazes not completely mixed together but in any event compatible, clay mixed with one or more glazes, or other materials used in the ceramics field to give the tiles particular aesthetic characteristics.

Again, although not shown, at the base of the hopper 70 there is a convenient valve.

As can be seen in Figures 1 and 2, the carriage of the invention comprises a clay loader 5

which in the illustrated case consists of a mesh of mutually perpendicular plates, although there is nothing to prevent only transverse plates being used.

To the rear of the loader 5 (to the right in Figures 1, 2) there is a horizontal plate 50 which closes the lower mouth of the hopper 60 when the carriage reaches the end of its advancement path, while to the front of the loader 5 a distribution plate 6 or masking element for the powdered glaze is provided.

With reference to Figure 2 it will be seen that in said glaze-distributing masking element 6 there is a series of apertures 7, provided in a number equal to the number of forming cavities 20 and having dimensions slightly smaller than or at the most equal to the dimensions of these latter (Figures 1, 2).

In addition, above the masking element 6 there is provided a glaze loader 78 consisting essentially of a small hopper caused to slide forwards and rearwards by convenient means (not shown), in a horizontal direction parallel to the sliding direction of the loader 5. At this point it should be noted that the closure of the lower mouth of the loader 78 at the ends of its advancement and withdrawal movement is effected by the two transverse portions of the masking element 6 in front of and behind the apertures 7, said masking element 6 sliding practically in contact with the die 2 (Figure 1).

Two usual transverse scrapers 8 and 9 are provided to remove the clay and glaze respectively from the upper face of the die during the rearward movement of the carriage.

Finally, in front of the plate 6 there are provided, proceeding from right to left in Figures 1 and 2, a rotary transverse cylindrical brush 10 for cleaning the upper punches (not shown) for forming the exposed face of the tiles 67 and a pusher 11 to push the formed tiles 67 from the die 2 towards a removal conveyor 12.

The invention operates as follows.

On termination of a pressing stage the lower punches 21 (which were previously lowered onto the base of the press) are raised to the level of the die 2, after which the carriage (which had previously been moved completely rearwards, ie to the right in Figures 1 and 2), receives the enabling signal to move forwards. During this forward movement the loader 78 remains in its previously occupied position, such as that shown, and when the pusher 11 has removed the tiles from the punches 21 these latter receive the enabling signal to move downwards into a predetermined position, such as that of Figure 3A. In this respect, said predetermined position is known to depend on many factors, such as the thickness of the formed tile, the clay moisture content, its particle size, the ratio of

finer particles to coarser particles, type of loading and other factors, as is well known to the expert of the art.

Consequently, during the forward movement the loader 5 deposits clay 66 into the cavity 20, after which the carriage moves rearwards and the scraper 8 (Figure 1) levels off said clay 66 as shown in Figure 3A. The punches 21 are then lowered into the position shown in Figure 3B, which obviously depends on the layer of glaze to be deposited on the clay 66, this lowering being done before the masking element 6 halts (temporarily) in the position shown in said Figure 3B, with the apertures 7 concentric with the cavities 20. After the carriage stops, the loader 78 slides towards the pusher 11, with simultaneous depositing of the glaze 77 on the clay 66 and inside the apertures 7, said loader 78 then halting at the front end of the masking element 6. The lower punches 21 are then lowered against the base 10 (Figures 1, 3C), after which the carriage is moved to the end of its rearward path, to the right in Figure 1, the scraper 9 thus cleaning the upper face of the die 2.

The pressing stage then takes place, followed by the raising of the punches 21 to the level of the die 2, after which the cycle is repeated identically. At this point it should be noted that (as stated) the loader 78 can undergo either half of its travel per loading cycle or total outward/return travel, depending on the capacity of the loader 78 and the quantity of glaze to be deposited on the clay.

In other words the loader 78 can arrive below the hopper 70 (to receive glaze) either every two loading cycles or every loading cycle.

Again with reference to Figures 1, 2 and 3A to 3C, it can be seen that the relative pressure-glazed tiles 67 comprise a uniform layer of glaze 77 or mixture of glazes.

In contrast, by means of the apertures 71, 72 and 73 in the masking element 6 of the embodiments shown in Figures 4A to 4C, partial layers of glaze or mixtures of glazes can be deposited on the clay 66, with consequent new aesthetic effects.

The shapes of said partial (or incomplete) layers can obviously vary, as can their thickness, which is determined by the thickness of the masking element 6 and the extent to which the punches 21 are lowered before the glaze 77 is deposited on the clay 66 (Figure 2B). Basically, said masking element represents a sort of silk-screen stencil for powdered glaze.

The merits and advantages of the invention are apparent from the foregoing and from an examination of the accompanying figures.

The invention is not limited to that illustrated and described, but covers all technical equivalents of the aforesaid means and their combinations, if implemented within the context of the following

claims.

Claims

1. A double-loading carriage for ceramic moulds in general, characterised by comprising:
 - a loader (5) for atomized clay (66) (or other material) which is driven with horizontal outward and return movement relative to at least one forming cavity (20) of an underlying ceramic mould, and is arranged to discharge the clay into said at least one cavity during the outward movement,
 - a flat perforated masking element (6) for distributing powdered glaze (or other material), fixed in front of said clay loader and situated at the level of the mouth of said at least one cavity, and
 - a loader (78) for powdered glaze (77) (or other material), slidably arranged above said perforated masking element (6), by which it is normally closed during the outward/return movement of said clay loader;
 - said glaze loader moving relative to said masking element while this latter is temporarily stationary above said at least one cavity during the return movement of the clay loader, in order to deposit the glaze onto the underlying clay via said masking element.
2. A carriage as claimed in claim 1, characterised in that said masking element (6) consists of a flat body provided with a number of apertures (7) equal to the number of forming cavities of said mould, each aperture having the same shape as the respective cavity, with dimensions slightly less than or equal to those of this latter.
3. A carriage as claimed in claim 1, characterised in that for each forming cavity (20) said masking element (6) comprises at least one aperture which may or may not be of the same shape as said cavity, and has a total surface area which is less than that of this latter.
4. A ceramic mould equipped with a double-loading carriage as claimed in claims 1 to 3.

