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(54) A glazing machine for ceramic tiles

(57) The glazing machine for ceramic tiles comprises a glaze distributing device (4), predisposed above a tile (3) conveyor plane (2). The glaze is supplied under pressure to a chamber having an outlet (6) which is narrow, straight and elongate in a transversal direction to the advancement direction (F) of the transiting tiles (3). A vertical continuous veil of glaze (7) drops onto the upper surface of the transiting tiles (3) on the conveyor plane (2). The conveyor plane (2) comprises a first conveyor (2a) supplying the tiles (3) and a second conveyor (2b) removing the tiles (3), the first conveyor (2a) being arranged upstream of the glazing zone and the second conveyor (2b) being arranged downstream thereof. The first and second conveyors (2a and 2b) are coplanar and distanced from one another in the advancement direction (F). The invention reduces glaze waste and especially maintain a glaze delivery at a constant level, so that a same quantity of glaze is distributed onto each tile (3).

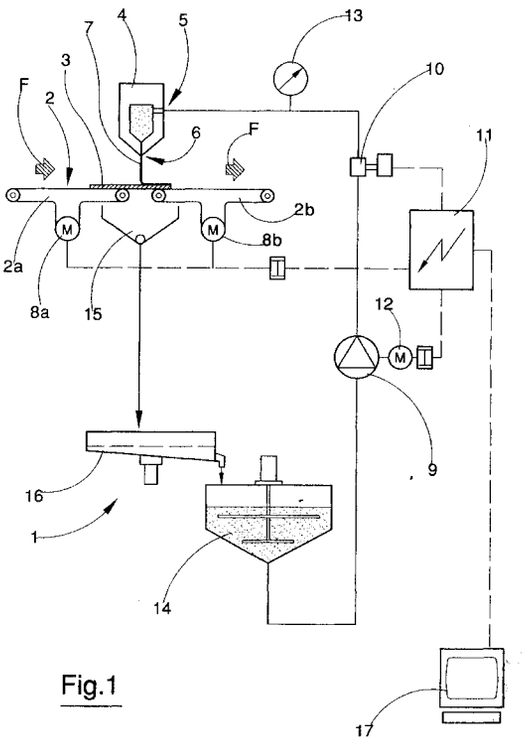

Fig.1

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Description

[0001] The invention relates to a glazing machine for ceramic tiles.

[0002] Specifically, though not exclusively, the invention is usefully applied in laying a continuous and uniform coating of glaze over all of the upper surface of ceramic tiles.

[0003] Particular reference is made to a glazing machine made according to the preamble of claim 1.

[0004] Italian patent application no. MO98A000142, in the present applicant's name, teaches a glazing machine of the above-indicated type, in which the tiles advance along a chain-link conveyor. One of the problems in known glazing machines is that the conveyor links are fouled by glaze as they pass through the glaze distribution zone, with a consequent waste of glaze and malfunctioning of the conveyor plane.

[0005] A further problem is caused by the need to guarantee that the quantity of glaze apportioned to each tile is uniform and constant.

[0006] The present invention solves the above-mentioned problems in the prior art.

[0007] An advantage of the invention is that it reduces fouling of the conveyor plane. A further advantage is that the quantity of glaze distributed on the tiles is kept under control even if some machine operation parameters are changed, such as for example tile advance speed, glaze delivery rate, especially glaze mass delivery rate, viscosity of the glaze, glaze density, and so on.

[0008] These aims and advantages and more besides are all attained by the present invention, as it is characterised in the appended claims.

[0009] Further characteristics and advantages of the invention will better emerge from the detailed description that follows of a preferred but non-exclusive embodiment of the invention, illustrated purely by way of a non-limiting example in the accompanying figures of the drawings, in which:

figure 1 is a diagram of a glazing machine made according to the invention.

[0010] With reference to the above-mentioned figure, 1 denotes in its entirety a glazing machine for ceramic tiles, which can distribute a continuous and uniform layer of glaze on the upper surface of the tiles.

[0011] The machine 1 comprises a horizontal conveyor plane 2, along which the tiles 3 advance in an orderly fashion, one after another in an advancement direction F.

[0012] At least one device 4 for distributing glaze on the transiting tiles is predisposed above the conveyor plane 2. This device 4 comprises a sealed distribution chamber having an inlet 5 connected with a glaze supply and an outlet 6 for the glaze. The outlet 6 is conformed in such a way that the glaze can exit in the form of a thin veil 7, a continuous vertical rain which deposits on the upper surface of the underlying tiles 3 as they pass on the conveyor plane 2. The outlet 6 is a thin fissure, straight and extending along a transversal direction to direction F, in which the tiles 3 are advancing. The length of the longitudinal glaze outlet fissure is not shorter than the transversal dimension of the tiles 3. The width of the glaze outlet fissure is adjustable, so that the width of the veil 7 of glaze falling on the tiles can be regulated.

[0013] The conveyor plane 2 comprises a first conveyor 2a supplying the tiles 3 and a second conveyor 2b for extracting the tiles 3; the first conveyor 2a is upstream of the glaze distribution zone, while the second conveyor 2b is downstream thereof. Both conveyors 2a and 2b are preferably belt-type.

[0014] The first conveyor 2a has a tile drop end which is situated at a predetermined distance, measured in advancement direction F, from the vertical of the outlet 6 of the glaze distribution chamber.

[0015] The second conveyor 2b has a tile collection end which predisposed to receive the tiles 3 from the tile drop end of the first conveyor 2a, which is situated at a predetermined distance, measured according to the advance direction F, from the vertical of the outlet of the glaze distribution chamber. Between the tile drop end of the first conveyor 2a and the tile collection end of the second conveyor 2b there is an empty space, which is crossed by the vertical of the glaze distribution chamber outlet 6. Basically, the two conveyors 2a and 2b, which are coplanar and reciprocally distanced, define a sort of interruption in the overall conveyor plane 2 at the zone where the glaze drops. This interruption in the conveyor plane does not constitute a break in the tile advance along the plane 2, so there is no instability in the tile progress.

[0016] The conveyor plane 2 is actuated by a means comprising at least one motor 8a which drives the first conveyor 2a and a motor 8b driving the second conveyor 2b.

[0017] The means for supplying glaze are predisposed for pressure-feeding the glaze to the sealed glaze distribution chamber. The means for supplying glaze comprise at least one hydraulic supply circuit terminating in the glaze distribution chamber under pressure; at least one pump 9, preferably of the positive-displacement type, operates along the glaze supply circuit.

[0018] The pump 9 is equipped with means for controlling and regulating the batched supply of glaze to the distribution chamber, which means preferably comprise a glaze delivery measuring device 10 in the supply circuit and which supply one or more signals which can be used to control the pump 9.

[0019] The glaze delivery measuring device 10 is advantageously constituted by a mass delivery gauge which also measures the density of the supplied product. A glaze supply circuit central control unit 11 is predisposed to receive the delivery signals supplied by the measuring device 10 and in turn supplies a control signal to a pump 9 activating motor 12. The central control unit 11 is predisposed to compare the delivery signals (mass and density) supplied by the measuring device

10 with the preset delivery values (mass and density) so as to be able to maintain constant the delivery (in terms of mass) to the glaze supply circuit.

[0020] A gauge 13 is predisposed on the glaze supply circuit to control pump 9 delivery pressure.

[0021] The central control unit 11 is predisposed to set and maintain the conveyor motors and the pump motor 12 in a predetermined relationship.

[0022] Both the pump motor 12 and the belt drive motors 8a and 8b (belts 2a and 2b) are preferably electrically-powered and controlled by an inverter.

[0023] The glazing machine is also provided with means for excess glaze collection, which convey excess glaze (glaze which has outletted from the distribution chamber but which has not coated a tile) to a collection tank 14 connected to the supply circuit. The means for excess glaze collection comprise a small tank 15 predisposed below the conveyor plane 2 (and in particular below the glaze distribution zone and below the space where the two belts 2a and 2b leave the empty space) and collects excess glaze, and a device 16 for filtering the glaze which is located upstream of the collection tank 14.

[0024] A remote personal computer 17 could be used for contemporaneously overseeing the control units of a plurality of glazing machines operating in sequence along a single glazing line.

[0025] During operation, the tiles are supplied at a predetermined constant speed into the glazing zone located below the distributing device. The glaze is supplied under pressure to the distribution chamber and from there descends in a continuous and uniform veil onto the underlying transiting tiles, leaving a regular and continuous coating of glaze thereon.

[0026] In the zone where the glaze drips down, corresponding in effect to the vertical projection of the lower outlet 6 of the pressurised chamber of the distributing device 4, there is an interruption in the conveyor plane 2, so that the plane 2 itself is not fouled by the glaze. The part of glaze distributed but not deposited on the tiles is recuperated, and waste is therefore reduced to a minimum.

[0027] As mentioned previously, the central unit 11 is able to maintain the conveyor plane advancement speed and the delivery in terms of mass of the glaze in the supply circuit in a reciprocal relationship. If, for whatever reason (for example, an operator error, or a change in glaze viscosity or density, or wear in the conveyor plane or supply pump, etc.) one of the above-mentioned parameters undergoes a sudden change, the central unit 11 automatically corrects the other parameter so as to keep the quantity of glaze distributed on each single tile 3 constant. This allows improvement in the quality of the production, and also enables manual control by an operator of the thickness of the glaze to be avoided.

Claims

1. A glazing machine for ceramic tiles, comprising:

a horizontal conveyor plane (2), along which tiles (3) advance one after another in an advancement direction (F);
at least one glaze distributing device (4), predisposed above the conveyor plane (2), for distributing glaze on the transiting tiles (3), having a distribution chamber provided with an outlet (6) for the glaze, the outlet (6) having a narrow and elongate shape, being elongate in a transversal direction to the tile advancement direction (F); the glaze exiting from the outlet (6) in a vertically-directed veil and depositing on upper surfaces of the tiles (3) transiting on the conveyor plane (2);

characterised in that:

the conveyor plane (2) comprises a first conveyor (2a) for supplying the tiles and a second conveyor (2b) for receiving the tiles (3), the first conveyor (2a) being located upstream of a glaze distribution zone and the second conveyor (2b) being located downstream of the glaze distribution zone;
the first conveyor (2a) has a tile drop end situated at a predetermined distance, measured in the tile advancement direction (F), from a vertical projection originating from the outlet (6) of the glaze distribution chamber;
the second conveyor (2b) has a tile collection end, predisposed to receive the tiles (3) from the first conveyor (2a) drop end, situated at a predetermined distance, measured in the tile advancement direction (F), from a vertical projection originating from the outlet (6) of the glaze distribution chamber; between the tile drop end of the first conveyor (2a) and the tile collection end of the second conveyor (2b) there being a space which is crossed by the vertical projection originating at the outlet (6) of the glaze distribution chamber.

2. The glazing machine of claim 1, **characterised in that** below the conveyor plane (2), between the drop end of the first conveyor (2a) and the collection end of the second conveyor (2b), means for collecting are arranged which collect excess glaze which is not deposited on the tiles (3).

3. The glazing machine of claim 1 or 2, **characterised in that** it comprises:

motors (8a, 8b) for driving the conveyor plane (2);

means for supplying glaze under pressure to the distribution chamber, which means for supplying comprise a supply circuit along which a pump (9) operates, which pump (9) is actuated by a motor (12);
a central control unit (11) for setting the motors (8a, 8b) of the conveyor plane (2) in a fixed relationship with the motors (12) of the pump (9) of the supply circuit.

4. The glazing machine of claim 3, **characterised in that** the central control unit (11) is connected to a glaze delivery measuring device (10) operating in the supply circuit, the central control unit (11) being predisposed to compare a delivery signal provided by the delivery measuring device (10) with a preset delivery value so as to maintain delivery in the supply circuit at a constant level.

5. A glazing machine for ceramic tiles, comprising:

a horizontal conveyor plane (2), along which tiles (3) advance one after another in an advancement direction (F);
motors (8a, 8b) for driving the conveyor plane (2);
at least one glaze distributing device (4), predisposed above the conveyor plane (2), for distributing glaze on the transiting tiles (3); the glaze distributing device (4) comprising a sealed distribution chamber having an inlet (5) and an outlet (6) for the glaze, the outlet (6) being straight, narrow and elongate in a transversal direction to an advancement direction (F) of the tiles (3);
means for supplying glaze under pressure to the inlet (5) of the distribution chamber, which means for supplying comprise a glaze supply circuit along which a pump (9) operates, which pump (9) is actuated by a motor (12);
the glaze exiting the outlet (6) in a continuous vertical veil-fashion, and depositing on upper surfaces of the tiles (3) transiting on the conveyor plane (2);

characterised in that the glazing machine comprises a central control unit (11) predisposed to set up and maintain a relationship between the motors (8a, 8b) driving the conveyor plane (2) and the motor (12) actuating the pump (9) supplying the glaze.

6. The glazing machine of claim 5, **characterised in that** the central control unit (11) is connected to a glaze delivery measuring device (10) operating on the glaze supply circuit and is predisposed to compare a delivery signal supplied by the glaze delivery measuring device (10) with a preset delivery value, so as to keep delivery rate constant within the glaze supply circuit.

7. The glazing machine of claim 4 or 6, **characterised in that** the glaze delivery measuring device (10) operating on the glaze supply circuit is a measuring device for delivery in terms of mass, and in that the control unit (11) is predisposed to compare at least one delivery signal in terms of mass supplied by the glaze delivery measuring device (10) with a preset mass delivery value so as to keep delivery in terms of mass constant within the glaze supply circuit.

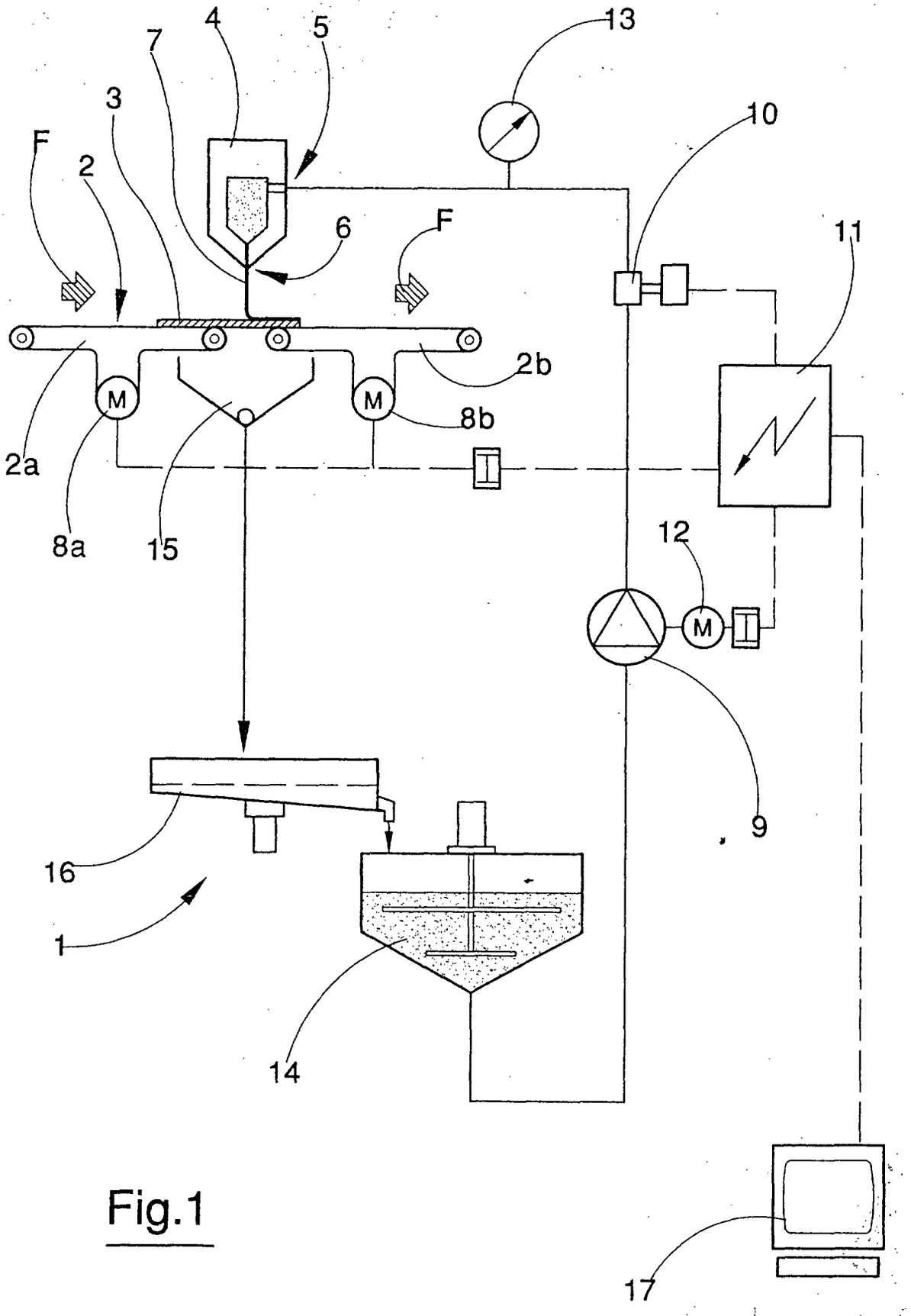

Fig.1