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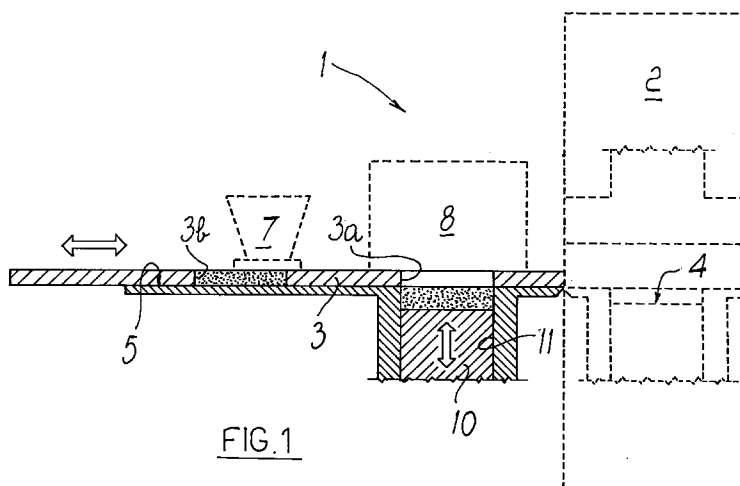
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(54) **Method for forming and decorating unfired ceramic tiles ahead of the press and machine for carrying out the method**

(57) A method for forming and decorating unfired ceramic tiles ahead of a press (2) and the machine for carrying out the method provide for a plurality of strokes to be performed with a loading carriage (3), which is provided with at least two rows of compartments (3a, 3b) which are arranged sequentially and are adapted to

be aligned, at each stroke, respectively with a loading station (7) and with a decoration station (8), in which there is provided a bed (10) which lowers at each return stroke of the carriage (3), and with the decoration station (8) and the mold (4) of the press (2).



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Description

[0001] The present invention relates to a method for forming and decorating unfired ceramic tiles ahead of the press and to a machine for carrying out the method.

[0002] Various methods have long been known and used to produce dry-decorated ceramic tiles, which essentially entail preparing at a press, in a mold, a dose of clay which is adapted to form the so-called unfired foundation on which multiple layers of powdered colors are distributed by several means to produce the decoration.

[0003] Although these methods achieve satisfactory end results, they are substantially time-consuming in their overall execution because the mold filling time and the time required to apply the decorations in one or more colors necessarily add up in operating sequences.

[0004] Moreover, applying the decorations directly in the mold of the press does not allow to check the correct distribution of the powdered colors, which is also exposed to risk due to the movement of the filling carriage.

[0005] The aim of the present invention is to solve the above problems of the prior art by providing a method for forming and decorating unfired ceramic tiles ahead of the press and a machine for carrying out the method which allow to produce already-decorated unfired tiles quickly and with no risk of altering the distribution of the decorations.

[0006] The above aim and other objects which will become apparent hereinafter are achieved by a method for forming and decorating unfired ceramic tiles ahead of the press, characterized in that it comprises the steps of: cyclically vertically aligning at least a first compartment of a press feeder carriage with respect to a station for loading material that composes the tiles and aligning at least a second compartment of the carriage, arranged in front, with respect to a decorating station which is provided directly ahead of the press; moving said carriage towards the press with a stroke which arranges said at least a first compartment in vertical alignment with respect to said decorating station and simultaneously aligns said second compartment or set of second parallel compartments with respect to said press; depositing the material contained in said compartments in said decorating station and in said mold of the press; making said carriage return to an initial configuration; placing said material deposited in the decorating station in said empty second compartment; and pressing the material deposited on the mold of said press.

[0007] Advantageously, the machine for performing the method for forming and decorating unfired ceramic tiles, which comprises a press which is served in a linear fashion by a mold feeding carriage which can move so as to skim, in an upward region, a travel surface, is characterized in that said carriage has at least two compartments which are in-line or has parallel rows of mutu-

ally adjacent loading compartments which are mutually aligned at right angles to the advancement direction of the carriage and are adapted to arrange themselves alternately and simultaneously in alignment with at least one loading station and at least one decoration station which is arranged ahead of the press and with said decoration station and said press.

[0008] Further characteristics and advantages of the present invention will become apparent from the following description of a preferred embodiment of a machine for performing a method for forming and decorating unfired ceramic tiles ahead of the press, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a view of a possible embodiment of a machine for performing a method for forming and decorating unfired ceramic tiles ahead of the press, according to the present invention;

Figures 2 to 9 are sequential views of the operating steps for performing the method executed with a machine configured according to a possible and alternative embodiment of the press loading carriage of the present invention.

[0009] With particular reference to the above figures, the reference numeral 1 generally designates a machine for performing the method according to the invention.

[0010] The machine 1 comprises a conventional press 2 which is served by a carriage 3 for feeding a mold 4, which can move in a conventional manner so as to skim a travel surface 5.

[0011] The carriage 3, according to the requirements of the machine 1, can be configured in different embodiments: in one possible embodiment, shown in Figure 1, it has at least two loading compartments 3a and 3b which are mutually in-line along the longitudinal axis; there can be provided more than two of said compartments in order to produce small tiles 6, and in this case the compartments are adjacent and arranged in parallel rows which are transversely perpendicular to the direction of advancement of the carriage 3.

[0012] In another embodiment of the carriage 3 there are provided three or more compartments or rows of compartments, designated by the reference numeral 3c in the figures.

[0013] In the machine 1, along the travel surface 5, there are also provided at least one station 7 for loading material for producing the tiles 6 and at least one station 8 for dry decorating said tiles, which is arranged between the loading station 7 and the press 2.

[0014] Moreover, for particular applications it is possible to provide, between the stations 7 and 8, a station 9 for precompacting the material, as shown in Figures 2 to 9.

[0015] The decoration station 8 has a first bed 10 which can move vertically in a seat 11 formed in the

travel surface 5 of the carriage 3, so as to retract below the surface 5 and allow the return stroke of the carriage 3 without any interference therewith of the dose of material that is present on the bed 10.

[0016] The precompaction station 9 is also provided with a second similar bed 12 which can move, for the same purpose, vertically in a corresponding adapted seat 13 formed in the travel surface 5, vertically above which a compaction presser 14 is operatively installed.

[0017] The execution of the method for decorating unfired ceramic tiles ahead of the press and the operation of the corresponding machine for carrying out the method is as follows. Following the sequence of figures 2 to 9 for the sake of convenience in description, the method entails initially retracting the carriage 3 from the press 2, so that the compartment or set of compartments 3b arrange themselves below the loading station 7 to be filled (Figure 2).

[0018] By means of a first stroke, the carriage 3 travels forwards, arranging the compartments 3b so that they are vertically aligned with the precompaction station 9: in this manner, the material is deposited onto the bed 12, which thus arranges itself in a lowered configuration (Figure 3).

[0019] The carriage 3 returns to the configuration for loading the compartments 3b and, directly thereafter, the compaction presser 14 compacts the material on the bed 12. After compaction has been completed, the bed 12 has risen to an elevated configuration which is flush with the travel surface 5 and has introduced from below the dose of precompacted material into the intermediate compartments 3c (or the dose of loose material into the compartments 3a, in the simplified version of the carriage 3), moreover returning the empty compartments 3b below the station 7 again (Figure 4).

[0020] The carriage 3 performs a new stroke towards the press which is identical to the preceding one and arranges the compartments 3c, and therefore the precompacted material contained therein, at the bed 10 of the decoration station 8 on which it is deposited; simultaneously, the refilled compartments 3b are arranged at the precompaction station 9 (Figures 5 and 6).

[0021] The doses of the materials contained in the compartments 3c and 3b are then released onto the beds 12 and 10, which move downward, and the carriage 3 returns to the initial position for a subsequent cycle (Figures 5 and 6).

[0022] In this retracted configuration, the compartments 3b are again arranged at the station 7, while the compartments 3c and 3a receive from below, from the corresponding beds 12 and 10 which are aligned with them and rise again, the doses of materials to be precompacted or in which the first one is to be precompacted while the second one is being decorated.

[0023] The carriage 3 performs another stroke towards the press 2 and the compartments arrange themselves as follows: the compartment 3a that con-

tains the precompacted and decorated material aligns itself with the mold 4 of the press; simultaneously, the compartments 3c align themselves with the bed 10 of the decoration station 8 and the compartments 3b align themselves with the bed 12 of the precompaction station 9.

[0024] The beds 10 and 12 and the mold 4 move downwards (Figure 7), simultaneously unloading all the compartments of the carriage 3, which performs a new return stroke (Figure 8).

[0025] Accordingly, the operating cycle intended for the stations and the press is performed simultaneously in said stations and press; at the end of these cycles, both the beds 10 and 12 and the mold 4 are in a raised configuration.

[0026] At each successive active stroke of the carriage 3, the head of the carriage pushes away the formed and decorated tile ejected from the mold 4, which accordingly arranges itself in standby to receive, from the compartments 3a of the carriage 3 at each successive cycle thereof, the dose of precompacted and decorated material in order to produce other tiles or set of tiles (Figure 9).

[0027] For the sake of completeness it should be noted that in the embodiment of the carriage 3 (see Figure 1) that has only two compartments 3c and 3a, in the machine 1 the precompaction station 9 is not used and the dose of decorated material reaches the mold 4 while it is still entirely in the so-called loose state.

[0028] It has thus been observed that the described invention achieves the intended aim.

[0029] The invention thus conceived is susceptible of modifications and variations, all of which are within the scope of the invention.

[0030] All the details may further be replaced with other technically equivalent elements.

[0031] In the practical embodiment of the invention, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the appended claims.

[0032] The disclosures in Italian Patent Application No. MO97A000183 from which this application claims priority are incorporated herein by reference.

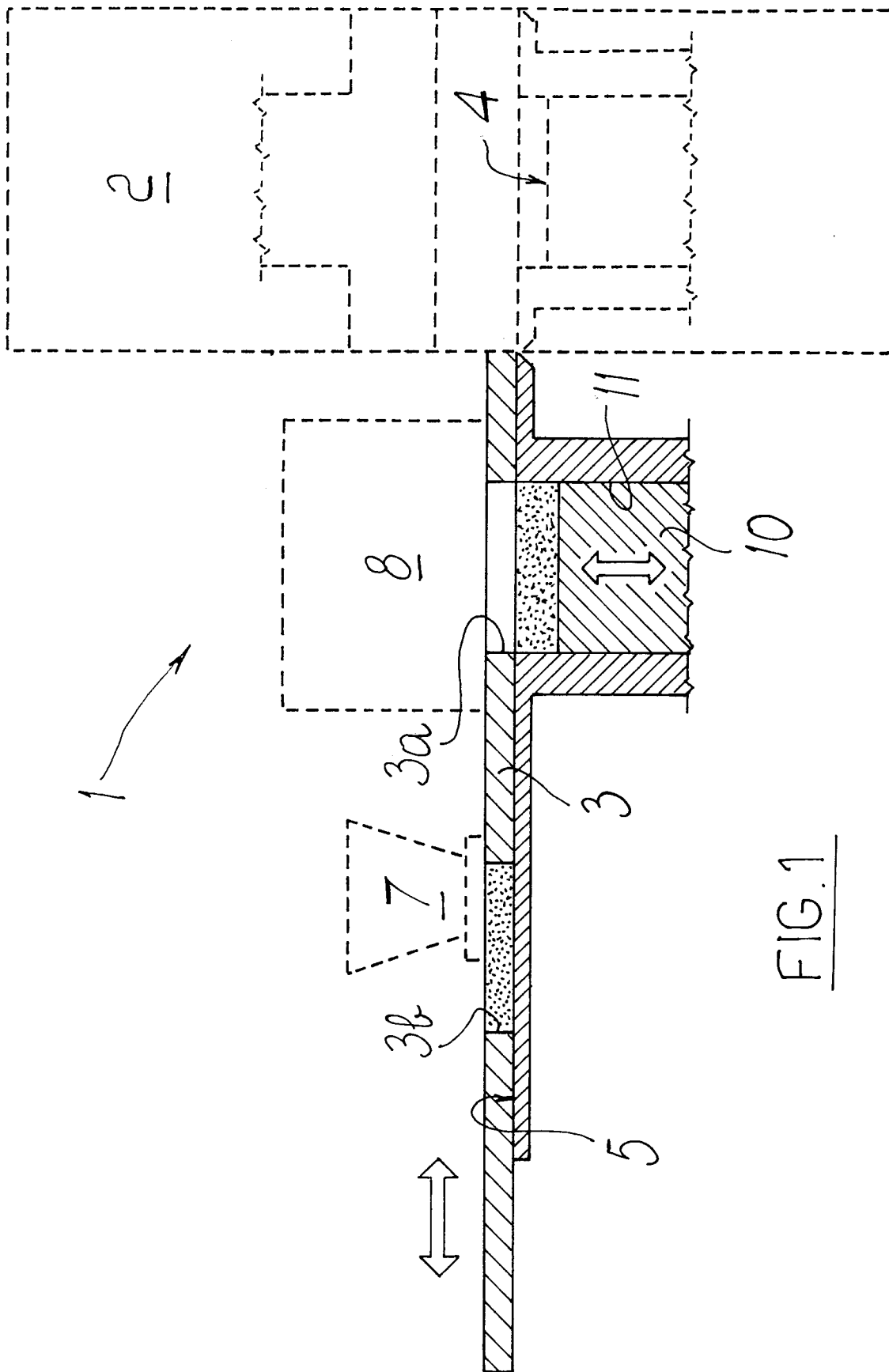
[0033] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A method for forming and decorating unfired ceramic tiles ahead of a press, characterized in that it comprises the steps of: cyclically vertically aligning at least a first compartment of a press feeder

carriage with respect to a station for loading material that composes the tiles and aligning at least a second compartment of the carriage, arranged in front, with respect to a decorating station which is provided directly ahead of the press; moving said carriage towards the press with a stroke which arranges said at least a first compartment in vertical alignment with respect to said decorating station and simultaneously aligns said at least a second compartment; depositing the material contained in said compartments in said decorating station and in said mold of the press; making said carriage return to an initial configuration; placing said material deposited in the decorating station in said empty second compartment; and pressing the material deposited on the mold of said press.

2. The method according to claim 1, characterized in that it provides for the precompaction of the material in the compartments before applying the corresponding decorations.
3. A machine for carrying out the method according to claim 1, comprising a press which is served in a linear manner by a mold feeding carriage which can move so as to skim over a travel surface, characterized in that said carriage has at least two in-line loading compartments or parallel rows of mutually adjacent loading compartments which are mutually aligned at right angles to the advancement direction of the carriage and are adapted to alternately arrange themselves simultaneously in alignment with at least one loading station and at least one decoration station which is arranged ahead of the press and with said decoration station and said press.
4. The machine according to claim 3, characterized in that said decoration station is provided with a first bed which can move vertically in a seat formed in a travel surface of the carriage.
5. The machine according to claim 3, characterized in that between said loading station and said decoration station there is provided a station for precompacting, with corresponding means, material contained in the compartment or set of compartments.
6. The machine according to claim 5, characterized in that said precompaction means are constituted by a second bed which can move vertically in a respective corresponding seat formed in said travel surface of the carriage, vertically above which a corresponding compaction presser is installed.



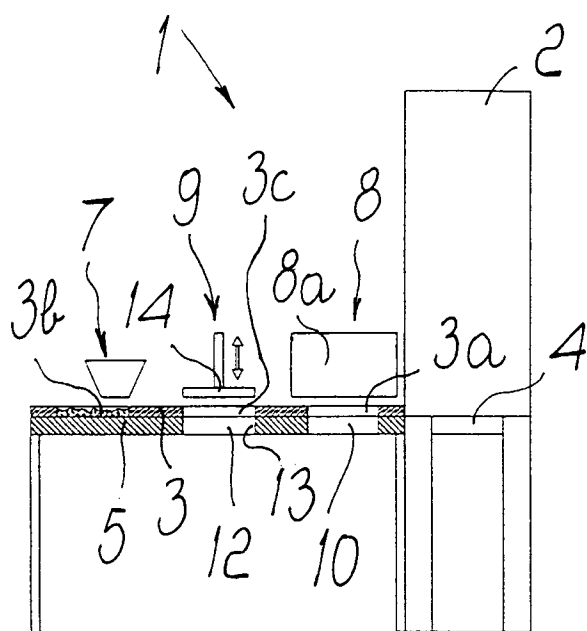


FIG. 2

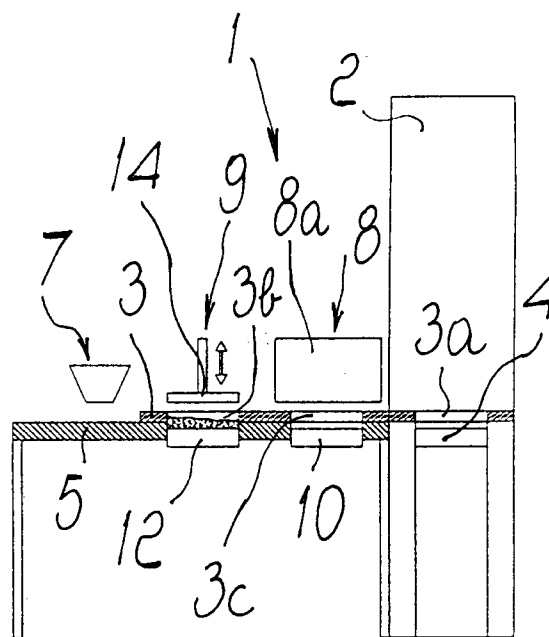


FIG. 3

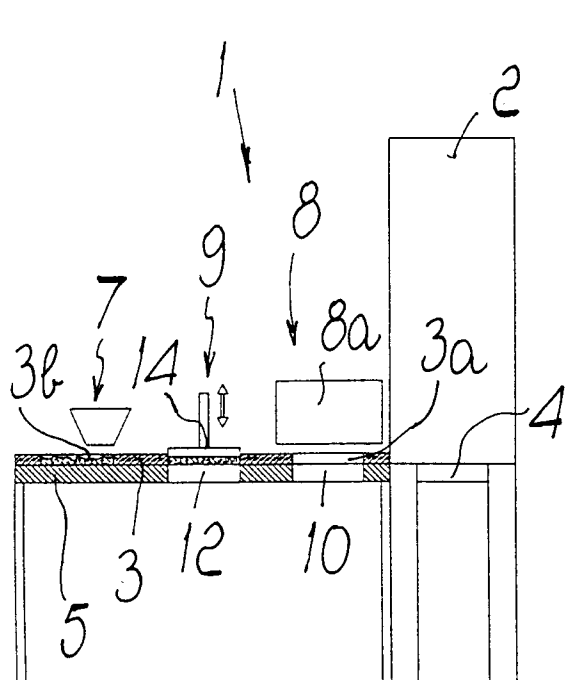


FIG. 4

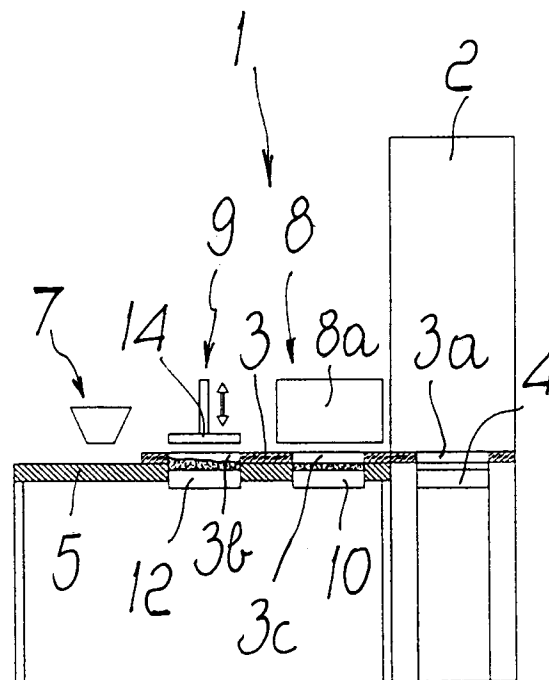


FIG. 5

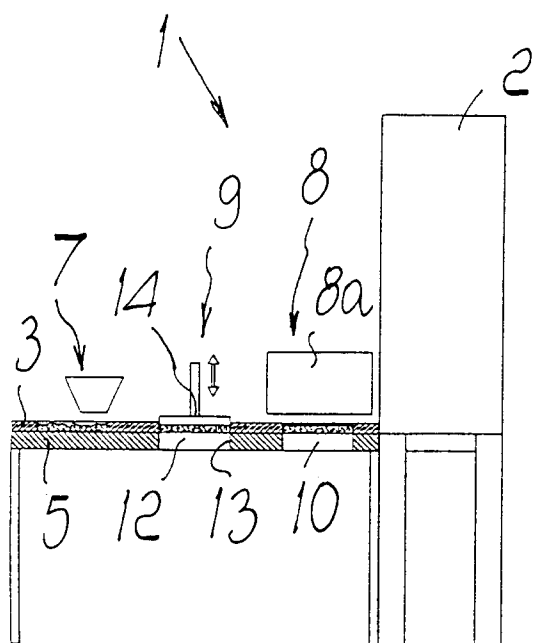


FIG. 6

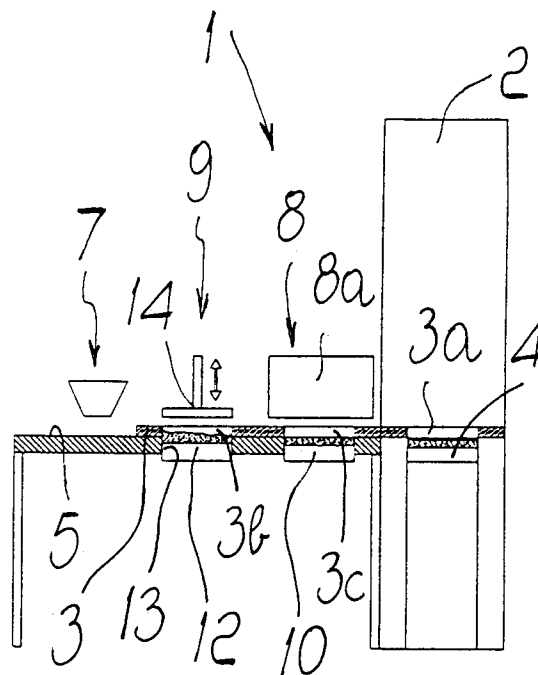


FIG. 7

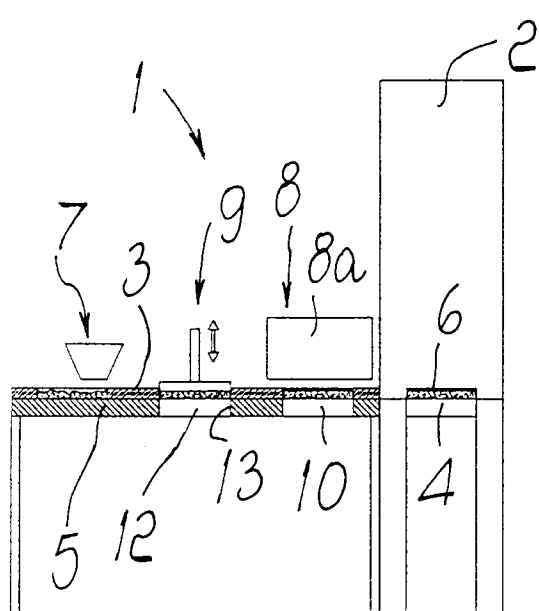


FIG. 8

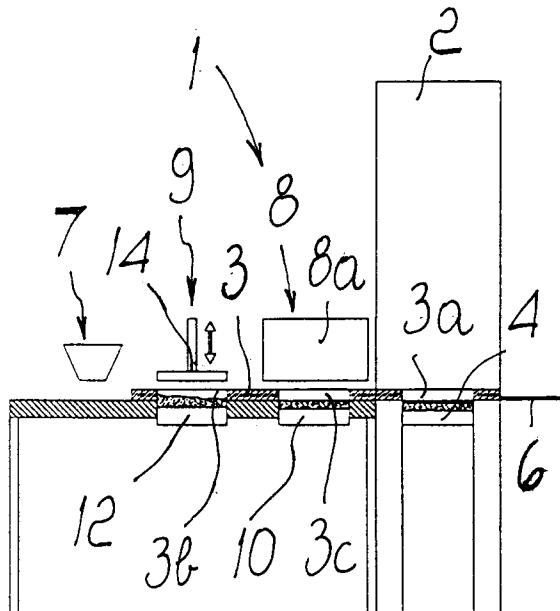


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 98 11 8752

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A	PATENT ABSTRACTS OF JAPAN vol. 096, no. 011, 29 November 1996 & JP 08 187709 A (INAX CORP), 23 July 1996 * abstract *	1-4			
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T	EP 0 873 832 A (SACMI) 28 October 1998 * the whole document *	1-5	<table border="1"> <thead> <tr> <th>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</th> </tr> </thead> <tbody> <tr> <td>B28B</td> </tr> </tbody> </table>	TECHNICAL FIELDS SEARCHED (Int.Cl.6)	B28B
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The present search report has been drawn up for all claims					
Place of search THE HAGUE		Date of completion of the search 29 January 1999	Examiner Gourier, P		
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EP 98 11 8752

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