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(54) **Mold with bottom die and inserts for forming ceramic tiles**

(57) A mold (10) for forming ceramic tiles has a bottom die comprising a frame member (11) having at least one seat (12) to receive in a removable manner inter-

changeable inserts (13) forming the pits (14) of the pressing chambers. Between the frame member (11) and the inserts (13) there are releasable means (18,19,28) for locking the inserts in the seats.

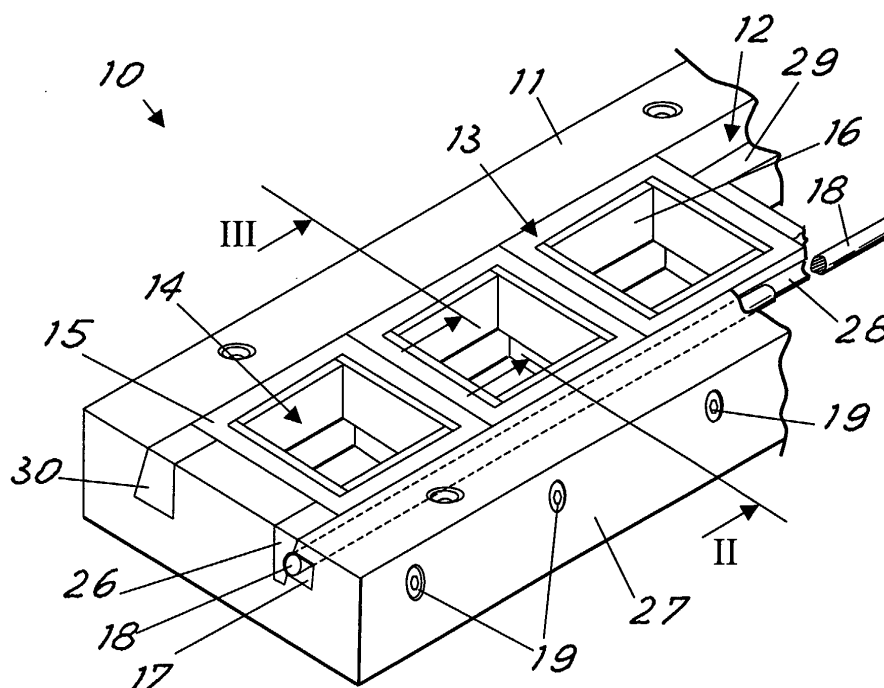


Fig.1

Description

[0001] The present invention relates to an innovative mold for forming ceramic tiles.

[0002] In the field of molds for the formation of ceramic tiles the problems generated by the need to replace the mold in the press are known. Even a simple change of format of the pressed product requires lengthy operations for the replacement of the die and its recalibration before resuming production.

[0003] Replacement is also complicated by the fact that the dies have a relatively heavy weight and therefore require the presence and use of hoisting and conveying means with considerable capacity.

[0004] Flexible production (i.e. with the capability of changing the dimensions of the product among a relatively high number of formats) requires a large number of molds with the resulting capital investment and large space requirements for storage of molds not in use).

[0005] The general purpose of the present invention is to remedy the above mentioned shortcomings by making available an innovative mold making unnecessary the changing of the mold with changes in formats or in conformation of the pressed product and thus reducing costs, space occupied, tooling times and the need of high capacity hoisting and handling equipment.

[0006] In view of this purpose it was sought to provide in accordance with the present invention a mold for forming ceramic tiles with bottom die comprising a frame member having at least one seat to receive in a removable manner interchangeable inserts forming the pits of the pressing chamber with there being between the frame member and the inserts releasable locking mean for releasing the inserts from the seats.

[0007] To clarify the explanation of the innovative principles of the present invention and its advantages compared with the prior art there is described below with the aid of the annexed drawings a possible embodiment thereof by way of non-limiting example applying said principles. In the drawings:

FIG 1 shows a diagrammatic partial perspective view of a mold in accordance with the present invention,

FIG 2 shows a partial cross section view along plane of cut II-II of FIG 1, and

FIG 3 shows a partial cross section view along plane of cut III-III of FIG 1.

[0008] With reference to the figures, FIG 1 shows a mold designated as a whole by reference number 10 for the forming of ceramic tiles realized in accordance with the present invention. This mold has a bottom die comprising a frame member 11 equipped with at least one seat 12 which receives in a removable manner interchangeable inserts 13. The inserts 13 form in turn pits 14 of the pressing chambers.

[0009] Between the frame member 11 and the inserts

13 there are releasable means allowing locking of the inserts in the seats.

[0010] Advantageously each insert 13 comprises a side frame 15 defining the pit which has side walls covered with plates 16 made of hardened metal such as for example tempered steel. The plates can be removable for easy replacement. FIGS 2 and 3 show a fixing realized with a screw 21 and a counterscrew 22.

[0011] Also advantageously as may be seen in FIG 1 the seat 12 contains a plurality of inserts side by side and aligned in a direction of extension of the locking means so that the inserts can all be positioned or removed with one simple operation.

[0012] The seat has a bottom open at the openings of the pits formed by the inserts so as to allow introduction into the pits of normal press planes not shown or further described because readily imaginable by those skilled in the art as is readily imaginable to those skilled in the art the press with all its production accessories.

[0013] As may be seen in FIG 1 and better yet in the cross sections of FIGS 2 and 3 the locking means comprise advantageously (FIG 3) on one side of the inserts first side walls 23, 24 tilted towards the seat so as to realize an undercut on that side of the inserts and on the other side of the inserts a member 18 for lateral thrust against the inserts. The seat and insert walls which realize the undercut are advantageously tilted at an angle of between 2° and 8° and preferably around 5°.

[0014] Again advantageously also on the side of the thrust member 18 the side walls are tilted. The tilt is turned in the same direction as the tilt of the side walls 23, 24 and preferably at the same angle. The insert can thus be inserted in the seat with an tilted movement as shown in broken lines at reference number 13' in FIG 3. To facilitate the movement the tilted wall 24 of the inserts has a rounded base edge 25.

[0015] As may be seen in FIGS 1 and 2 the thrust member is realized with a bar 18 which is extended for the entire extension of the row of inserts aligned in the seat and which is received parallel to the side of the inserts in a cavity 17 made in the side wall of the seat. Plugs 26 at the two ends (only one is shown in FIG 1 while the other is symmetrically identical thereto) prevent abandonment of the cavity 17 by the bar while allowing the necessary locking and unlocking travel of the inserts. If the seat is made by milling with accurate machining of the tilted walls there can also be plugs 30 for closing the passage of the cutters at the ends of the tilted walls 23.

[0016] The bar 18 is thrust against the inserts by screw members 19 distributed along the extension of the bar and facing with their handling head on one side 27 of the frame member.

[0017] As may be seen in FIG 2, the bar 18 rests on and pushes the inserts at a surface 28 of the insert which is tilted to have at the point of contact with the bar a normal turned downward so as to produce a thrust on the insert having a component directed toward the bot-

tom of the seat. In this manner the secure and accurate resting of the insert on the shelved bottom 29 of the seat is assured.

[0018] It was found advantageous that the contact point tangent between the bar and the surface of the insert be tilted at an angle of between 85° and 70° and preferably around 80°. In the maximum thrust position the bar is lodged between the tilted surface 28 and the upper surface of the cavity 17.

[0019] It is now clear that the predetermined purposes have been achieved. A mold in accordance with the present invention allows fast change depending on requirements of the profile of the pressing chamber (bottom die pit) while keeping the mold in position in the press and merely replacing the insert. In the embodiment shown the precision striker consisting of the shelved bottom of the seat and the tilted wall opposite the thrust means (surfaces machinable with high precision) allows keeping high precision in the mold after assembly and reassembly of the inserts with no need of resetting operations.

[0020] Retooling times upon change of product are thus considerably reduced.

[0021] In addition, as the inserts can be made relatively light (enough to be handled with light tools or manually) the heavy hoisting and handling means necessary in the prior art are eliminated.

[0022] There is also the capability of making use of the inserts in different molds with greater or smaller dimensions and different numbers of seats or chambers depending on the tonnage and size of the various presses.

[0023] By changing only the inserts it is possible to obtain tiles of different thicknesses or profiles (for example for passing from a tile with straight lines to one with wavy sides). The side plates of the inserts will of course be shaped according to requirements.

[0024] Lastly, the store of molds in reserve is considerably reduced with resulting reduction of capital investment and space requirements.

[0025] Naturally the above description of an embodiment applying the innovative principles of the present invention is given by way of non-limiting example of said principles within the scope of the exclusive right claimed here. For example as mentioned above, the form, proportions and number of members of the mold shown can vary depending on specific requirements.

Claims

1. Mold for forming ceramic tiles with bottom die comprising a frame member having at least one seat to receive in a removable manner interchangeable inserts forming the pits of the pressing chambers with there being between the frame member and the inserts releasable means for locking the inserts in the seats.

2. Mold in accordance with claim 1 **characterized in that** the locking means comprise on one side of the inserts first side walls tilted towards the seat to realize an undercut and on the other side a member for lateral thrust against the inserts.

3. Mold in accordance with claim 2 **characterized in that** the first side walls are tilted at an angle between 2° and 8° and preferably around 5°.

4. Mold in accordance with claim 1 **characterized in that** on the side of the thrust member the sidewalls opposite said first side walls are tilted in the same direction as said tilted side walls.

5. Mold in accordance with claim 2 **characterized in that** said opposite side walls are tilted at an angle between 2° and 8° and preferably around 5°.

6. Mold in accordance with claim 2 **characterized in that** the thrust member is realized with a bar received parallel to the side of the inserts in a cavity in the side wall of the seat and thrust against the inserts by means of screw members overlooking with their handling head one side of the frame member.

7. Mold in accordance with claim 6 **characterized in that** the bar rests on and thrusts against the inserts at a surface of the tilted insert to have at the contact point with the bar a normal turned downward in such a manner as to produce a thrust on the insert with a component directed towards the bottom of the seat.

8. Mold in accordance with claim 7 **characterized in that** the tangent of the contact point is tilted at an angle between 85° and 70° and preferably around 80°.

9. Mold in accordance with claim 1 **characterized in that** the inserts comprise a side frame defining the pit with side walls of the pit covered by removable plates made of hardened metal such as tempered steel.

10. Mold in accordance with claim 1 **characterized in that** a seat contains a plurality of inserts side by side and aligned in a direction of extension of the locking means.

11. Mold in accordance with claim 1 **characterized in that** the seat has an open bottom opposite the openings of the pits formed by the inserts.

12. Mold in accordance with claim 2 **characterized in that** the tilted walls of the inserts have a rounded base edge.

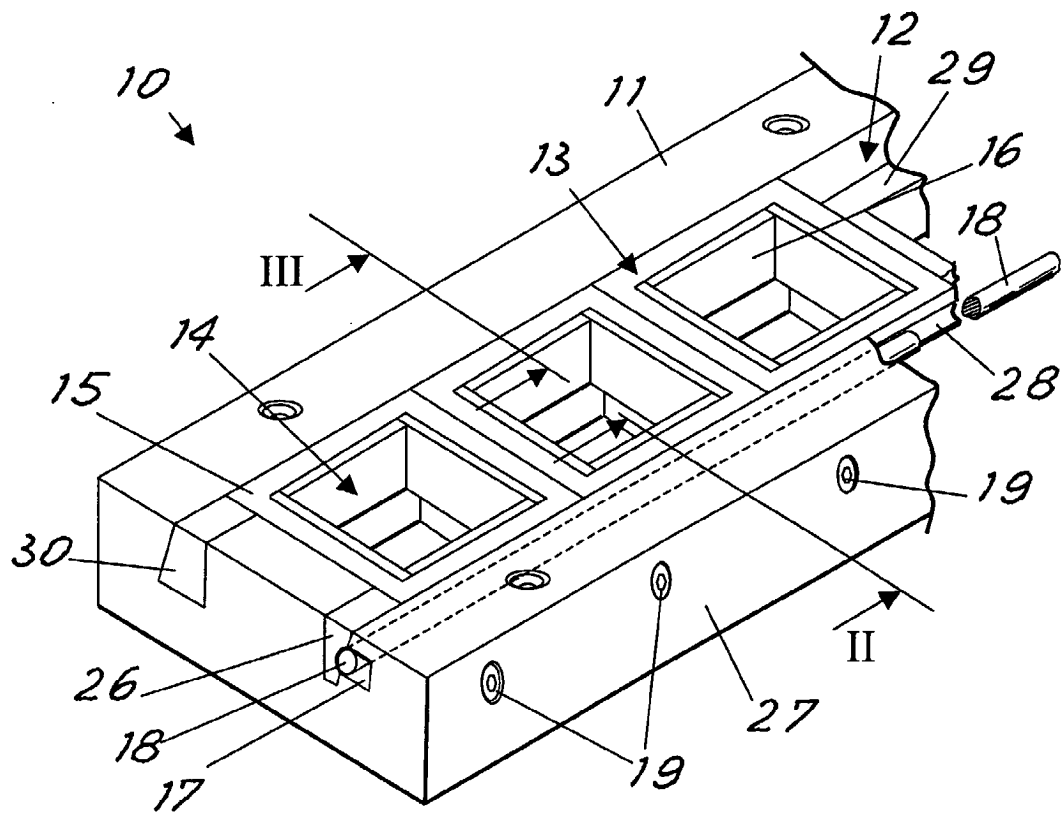


Fig.1

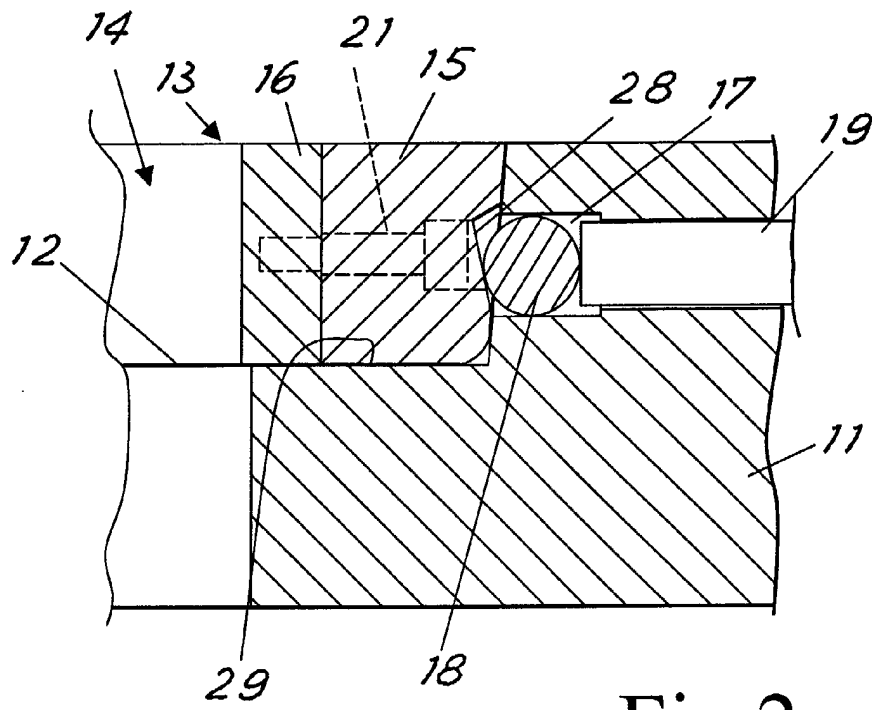


Fig.2

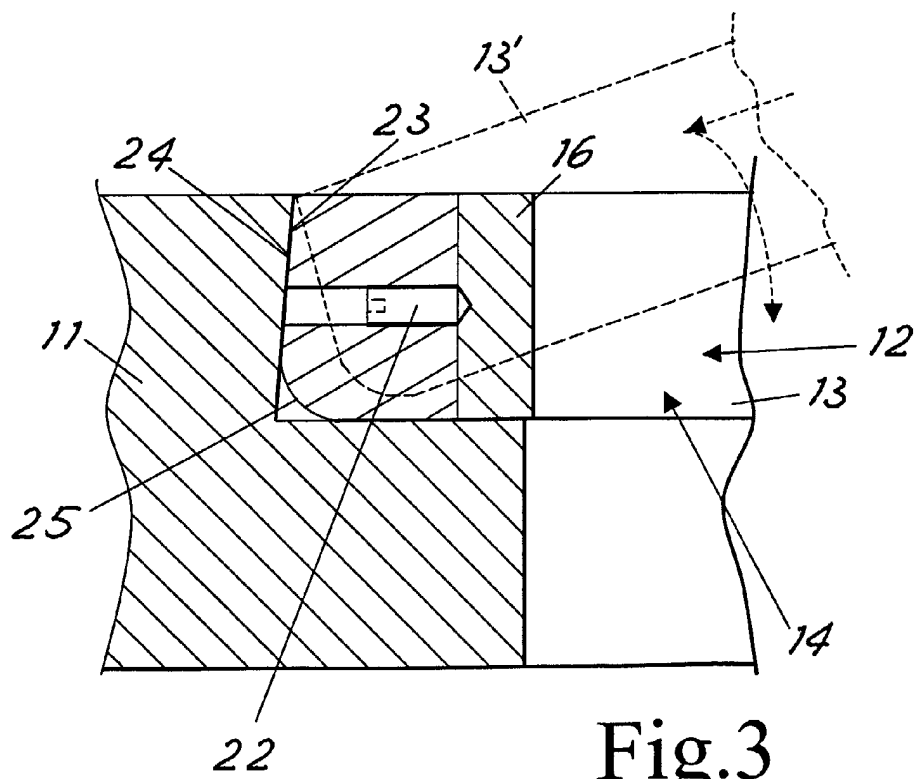


Fig.3