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(54) Autonomous hydraulic mould for the formation of ceramic elements

(57) An autonomous hydraulic mould where the mechanical, electrical, electronic, etc. elements that make the autonomous hydraulic mould work are installed inside the whole made up of base plate (7) and the ejector plate (5). This whole is closed and isolated from the exterior by leather skirting (6). On the back of the base plate (7) we install the hydraulic pistons so that, through some holes drilled in the base plate we can supply the oil necessary for the pistons to move. These holes are connected to the outside of the mould and at the same time to the hydraulic circuit of the press by means of some pressure connectors situated on the hydraulic block (4). This base plate (7) is, in turn, directly fixed to the bedplate of the press.

The hydraulic pistons move the ejector plate (5) they are fixed to at the cylinders so that on its upstroke and downstroke movement it positions the ejector plate (5) and, obviously, the other elements fixed to it: plunger holders (3), plungers (2), etc. These different positions will adapt based on the different orders that the press sends to the automatic system of the mould and on the orders that the automatic system sends to the press.

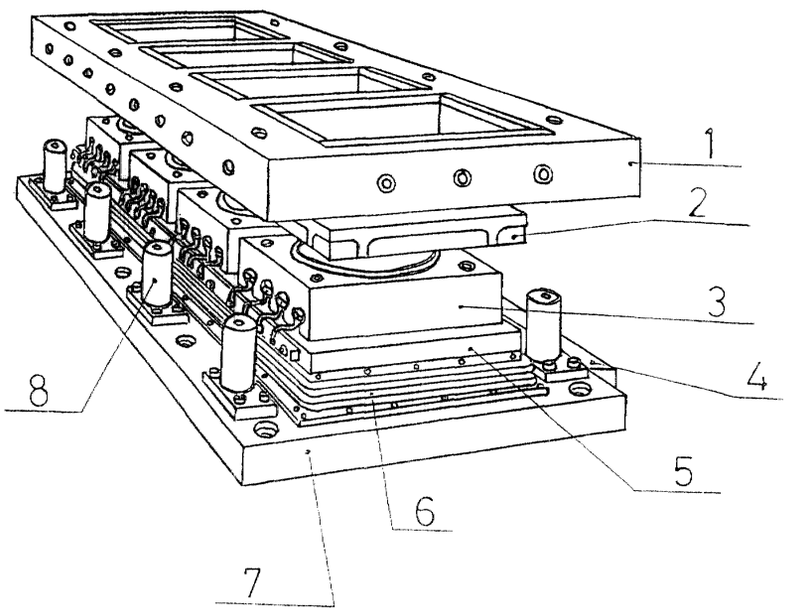

FIG. 1

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Description

OBJECTIVE OF THE INVENTION

[0001] This invention, as mentioned in the title of this report, is a mould for the manufacture of ceramic articles (floor tiles, wall tiles, pavement, coverings, etc), which, although externally does not change much, it does in the way it works, because it does not depend on the movement of a/some accessories of the press for its own movement, either by forming an indivisible part of the press or by some mechanical or hydraulic element that is attached to it for the movement of the mould, as was the case with traditional moulds. In this case, the Autonomous Hydraulic Mould (MHIA), among many other advantages, uses the hydraulic energy of the press for its movements, eliminating all the elements that existed on the press for the movement of moulds but taking advantage of the control elements that the press includes, (electrovalves, control systems, safety mechanisms, etc.).

BACKGROUND OF THE INVENTION

[0002] Many systems, mechanisms or means for the movement of moulds on ceramic presses are known. What differentiates them from the present system is that all of them are external to the mould, or in other words, they are mechanical or hydraulic elements that form part of the press or that are installed beneath the mould for the mould to move when the press decides during the formation process of the ceramic parts.

[0003] Of these existing systems, there are different types on the market. Some in which the movement is transmitted to the mould by connecting rods that are situated underneath the bedplate (the part where the mould rests in order to work with the press) of the press. These connecting rods are moved by a mechanical mechanism that includes some hydraulic pistons to move the connecting rods vertically. These rods then transmit the movement to the mould. These systems also include electrical or pneumatic elements for the correct regulation of the different positions to be able to coordinate the movements with the rest of the press. In order to situate all these elements, the presses that include these systems must have a well under the press made especially on the ground next to the base of of the press.

[0004] Other existing systems, of a more modern conception, are installed directly on the press bedplate and the mould is then installed on these. These systems also include connecting rods or a plate where the inferior part of the mould is fixed so that the movement and the different regulations of these rods on these plates are transmitted directly to the mould so that all these elements move together.

DESCRIPTION OF THE INVENTION

[0005] The new mould systems, MHIA, change the traditional functioning concept for moulds in the formation of ceramic elements, because it is no longer a passive part of the press (it is moved by the direct action of some external element), it is now an active part of the press.

[0006] Some of the advantages of this new system are, for example, the elimination of:

- The hydraulic ejector of the press with all its mechanical, hydraulic, electric elements, usually situated under the press in the well. This implies a considerable saving in possible breakdowns that are not easily observed.
- The electric or mechanical regulation system of the thickness of the ceramic parts that were pressed and of the plungers used in the mould.
- The blocking system for the extra elevation of the mould in order to extract the inferior plungers from the mould.
- Elimination of all the costly and laborious regulation and maintenance operations, that were made worse, by the inconvenience of having to be carried out underneath the press in the well mentioned above, and sometimes by more than one operator.

[0007] Another advantage is that the moulds of the press can be changed more quickly, and the regulations necessary after installing a new mould are also faster, with the obvious savings in the time production is stopped.

[0008] One more advantage is that one MHIA mould can be used on different types of press, only depending on its size (if it fits or not). What is more, it can be used on presses that originally could only use the system with the commercial name of "SMU". In other words, it can work correctly independently from the brand or model of the press on which it is installed.

The external elements of this type of MHIA moulds continue to be practically the same as a traditional mould:

- Matrix, this is the part of the mould that limits the measurements (perimeter) of the tile to be manufactured, basically this element will not be modified in the use of these new moulds.
- Inferior plunger, is the element of the mould that forms the visible side of the tile, that may be smooth or in relief. This part will not be modified either.
- Matrix rods, depending on the models, will continue to be fixed with regulation or hydraulic with regulation in order to change the working height of the matrix.
- Inferior electromagnetic plunger holders are the elements that hold the inferior plungers by means of an electromagnetic system, and transmit the movement to these. It will not be necessary to transform

them.

[0009] The elements that will be different to those of a traditional mould, are the parts of the mould that are defined as the base plate and the ejector plate. The base plate is the part of the mould that is screwed to the bedplate of the press. The ejector plate is where the plunger holders are fixed in order to transmit the movement to the inferior plungers inside the matrix.

[0010] All the hydraulic, mechanical, electronic, pneumatic and electrical systems will be installed in the combination of base plate and ejector plate. They will transmit the movement and the regulations of the Autonomous Hydraulic Mould (MHIA) for its correct and co-ordinated movement within the whole of the press. This combination, if necessary, because of the type of press or because of changes in production depending on the needs of the ceramist, may be attached to the bedplate of the press, in which case, it would only be necessary to change 50% of the mould and the cost of the investment for the client would be much lower.

[0011] For all the elements to work in co-ordination with the movement of the press, this type of mould, includes an electronic panel with an automatic system which manages the orders received from the press and sends the necessary signals for the press to work correctly. This electronic system may be installed in the general panel of the press.

[0012] The automatic system communicates with the operator through the screen of a digital monitor, where a number of windows inform the operator of the operations the mould is undertaking and of those the operator should carry out.

[0013] On this screen the operator may also correct or modify instructions, values, etc, for the mould, or with a bar code scanner, introduce the working parameters for the mould that is going to be installed on the press.

[0014] This scanner reads the data supplied by the manufacturer of the mould, which makes the start up of this type of mould much easier and faster.

[0015] The software that the automatic system includes has, among other features, the ability to regulate the load of ceramic paste that the mould is going to press, regulate the height of the inferior plungers that the mould will be using, read and manage the pressure of each one of the tiles that are being pressed at a given moment, control the temperature of the plungers, move the mould in order to extract the plungers, move the mould in order to remove it from the press, control the magnetising and demagnetising of the plungers, read the bar codes with technical and regulation specifications with which the mould is delivered to the client, accumulation of production values, etc, etc. And it is open to improvements that future production needs may require.

[0016] Obviously it also sends the emergency and blocking signals for the press, and obeys the signals that the press sends for its correct function.

[0017] All the movements that the mould has to undertake for its correct functioning can be ordered from the console or touch screen by the touch of a button: from the regulation of the thickness of tiles that have to be pressed, to that of the plungers, the orders for the mould to extract the plungers or the mould, etc.. In existing traditional systems mentioned above, many of these regulations and movements have to be carried out by complicated mechanical regulations directly on the mechanical elements that move the mould.

DISCRIPTION OF THE DRAWINGS

[0018] In order to help the client understand the different parts of a mould as known today, and therefore, have a clearer idea of the proposal of this invention, we enclose a drawing of the main parts of a traditional mould. This drawing is not binding, it is only an example because, as can be seen on the drawing, the number of exits and the format of this mould is a specific case, but, depending on the needs of the client, the number of exits (number of tiles that can be pressed in one go) and the size and distribution of those exits may vary.

DESCRIPTION OF MANUFACTURING PROCESS

[0019] As explained above, the mechanical, electrical, electronic, etc. elements are installed inside the base plate and the ejector plate.

[0020] On the back of the base plate we install the hydraulic pistons so that, through some holes drilled in the base plate we can supply the oil necessary for the pistons to move. These holes are connected to the outside of the mould and at the same time to the hydraulic circuit of the press by means of some pressure connectors.

[0021] The hydraulic pistons move the ejector plate they are fixed to so that on its upstroke and downstroke movement it positions the plate and, obviously, the other elements fixed to it, (plunger holders, plungers, etc.).

[0022] These different positions will adapt to the different orders that the press sends to the automatic system of the mould and to the orders that the automatic system sends to the press. All this is managed through the sensors and encoders that are strategically situated inside the combination of base plate and ejector plate.

[0023] These sensors and encoders measure the different positions of the pistons and of the mechanical elements related to them (stops, rails, etc.) so that the automatic system may indicate to the press, to the mould and to the operator the position and state of the mould .

[0024] Depending on the system the press originally had for actioning of the traditional models, the MHIA will either include a mechanical system to limit its stroke or a proportional control system that is included in the latest generations.

[0025] With these proportional-positioning systems the mould has no mechanical limitations as far as its

stroke is concerned (upstroke or downstroke). The encoder, together with the electronic systems and the electrovalves of the proportional system send and receive data referring to the position of the mould and therefore limits its position.

[0026] The system of mechanical positioning has some pistons on the base plate that act on the different positions that the mould has to adopt.

[0027] When we require the matrix of the mould to be moved, the rods it rests on are hydraulic with a double effect and positioning control so that, depending on the order received from the automatic system, it may adopt any position.

[0028] The materials, form, size, design and situation of the elements may be changed if they do not suppose an alteration in the essential conception of the invention.

[0029] The information presented in this report must always be taken in a wide and informative sense and not as binding.

Claims

1. The autonomous hydraulic mould for the formation of ceramic elements, moves with hydraulic energy (hydraulic switchboard) from the press it is functioning with, without the need for external elements of any type to move the mould, as used to be the case until now. Basically, it includes all the hydraulic, pneumatic, electrical, electronic and mechanical elements necessary for the mould to carry out all its movements and regulations and for its correct operation with the press it is installed on.

2. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can have the inferior plungers changed quickly and conformably by means of a simple instruction on the screen of the automatic system.

3. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can have up to approximately 50% of its parts dismantled if necessary, leaving the bottom part which is in charge of moving and regulating the mould (base plate and ejector plate) attached to the press.

4. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can regulate, from the touch screen that is connected to the automatic system, the height (thickness) of the inferior plungers, the height (thickness) of the tile that is being pressed, as well as the height of the edge (distance) of the tile.

5. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can be used on any type or brand of press that exists on the market if the dimensions are correct.

6. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can be quickly programmed with the relevant data on regulations and features of the mould for its correct operation by means of a bar code supplied by the operator.

7. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, measures and regulates the specific pressure of each of the cells of the mould by means of a number of isostatic sensors installed on the upper plungers.

8. The autonomous hydraulic mould, which moves with the hydraulic energy provided by the press, can work with presses that have the traditional system for moving and regulating the mechanical parts of the mould as well as with more modem types that include proportional control regulation and movement systems.

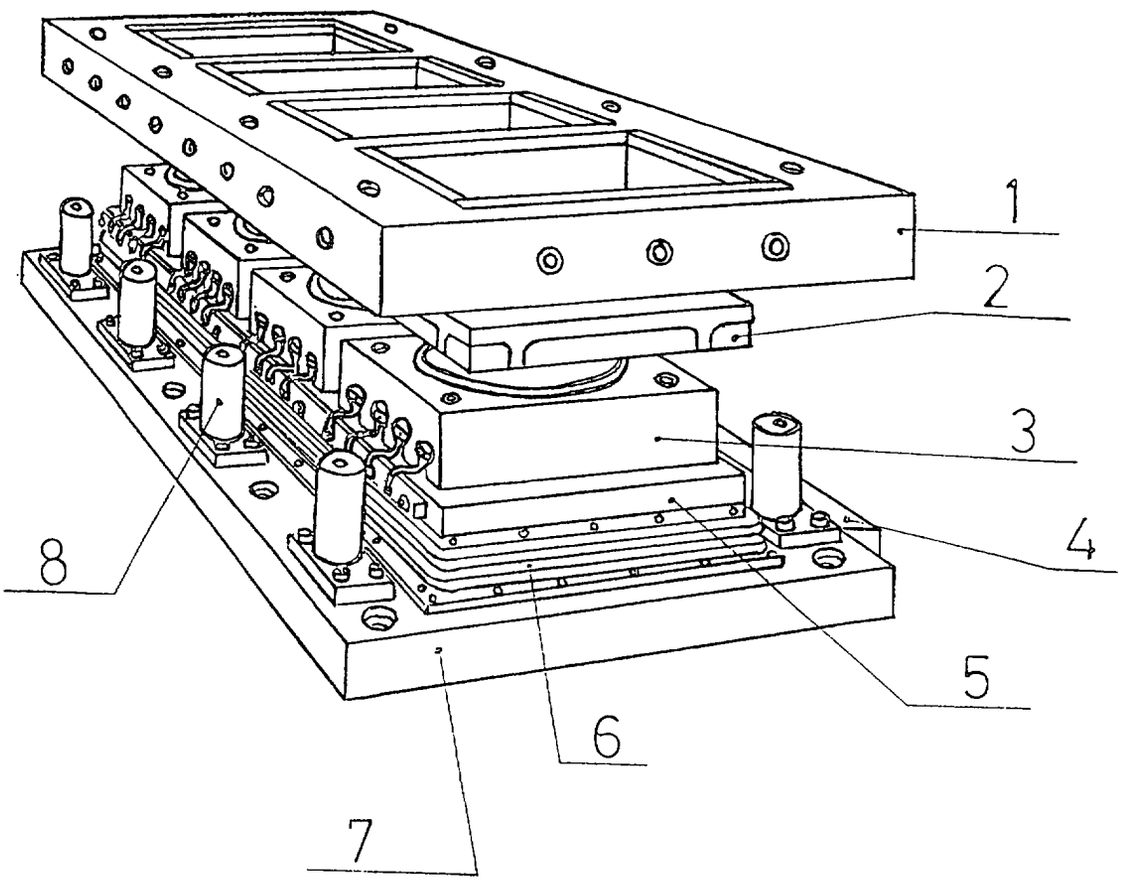

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 00 56 0001

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 July 2001	Jensen, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 56 0001

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