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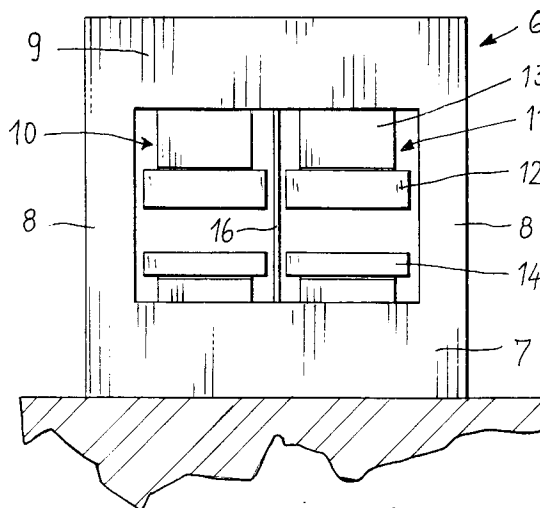
(11) Publication number:

0 629 495 A1

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EUROPEAN PATENT APPLICATION(21) Application number: **94108644.9**(51) Int. Cl.⁵: **B30B 11/02**, **B28B 3/06**,
B30B 1/32(22) Date of filing: **06.06.94**(30) Priority: **17.06.93 IT BO930275**(43) Date of publication of application:
21.12.94 Bulletin 94/51(84) Designated Contracting States:
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I-20123 Milano (IT)(54) **Modular hydraulic press for producing ceramic items.**

(57) A press for producing ceramic items, characterized in that it comprises, in a single frame (6), two or more pressing modules (10, 11), which can be individually managed independently of the others.

*FIG. 4***EP 0 629 495 A1**

The present invention relates to a modular hydraulic press for producing ceramic items.

Known hydraulic presses for pressing ceramic items starting from partially dry powder are schematically shown in figures 1, 2 and 3 and comprise (see figure 1) a closed metal structure (1) which is generally shaped like a quadrangular frame and inside which there is the pressing module (2) which is suitable to produce the necessary thrust between the parts of the pressing fixture (mold). The pressing fixture is generally constituted by two or more parts, of which at least one is movable (3) and the others are fixed (4). The pressing module (2) meant to generate the necessary thrust is generally of the hydraulic type.

With a press of this type, the cycle for pressing a ceramic item comprises the following steps:

- loading: the pressing fixture is filled with an appropriate amount of ceramic powder;
- pressing: the ceramic powder is compacted by means of rigid plungers (mechanical pressing) or elastic ones (isostatic pressing) until the required degree of compaction is achieved;
- extraction: the ceramic part thus formed is removed from the pressing fixture to allow the fixture to be rapidly restored for a subsequent cycle.

In a large number of industrial processes, in order to ensure appropriate productivity of the entire system, it is necessary to pool several machines to press items that have the same characteristics or different ones. This fact requires a considerable capital investment, since pressing machines are generally characterized initially by high purchase costs and subsequently by equally high operating costs.

In an attempt to increase the productivity of the individual machine with a limited additional investment, in some applications which are typical of the ceramics industry (e.g. flooring and wall tiles, crockery, etc.) more than one pressing fixture is introduced in a single press, as shown in figure 3. In this arrangement, the moving parts (3), i.e. the plungers of the molds, are fixed to a movable beam (5) which is rigidly connected to the same pressing module (2) of figure 1.

A severe limitation of the solution shown in figure 3 is the fact that the items to be obtained must be identical, or in any case the technological pressing cycle must be exactly the same, as it is impossible to mount various different fixtures in a single pressing module. This happens in flooring and wall ceramics, where the movable beam of the press carries a plurality of pressing fixtures capable of producing up to dozens of parts with a single pressing stroke. In other fields (such as for example in crockery) one must instead deal with types of items which may even be significantly different

from each other, with a consequent difference in the technological pressing cycles (particularly, different times for the various steps). The simultaneous presence of different pressing fixtures, moved by a single beam, thus prevents the full utilization of said fixtures, since the slowest technological cycle determines the overall production rate of the unit. In such cases, the solution of figure 3 can only partially meet a high demand for productivity.

The technical aim of the present invention is to provide a hydraulic press that can obviate the shortcomings of known ones, especially as regards the possibility of optimizing the production cycle with respect to the characteristics of the items to be obtained.

Within the scope of this aim, an important object of the present invention is to provide a press that allows to perform maintenance or to replace pressing fixtures without requiring the complete halting of the production cycle.

With this aim and this object in view, there is provided, according to the present invention, a press for producing ceramic items, characterized in that it comprises, in a single frame, two or more pressing modules, which can be individually managed independently of the others.

Further characteristics and advantages of the invention will become apparent from the following non-limitative detailed description thereof with reference to the accompanying drawings, wherein:

- figure 1 illustrates a machine with a vertical operating axis according to the prior art;
- figure 2 illustrates a machine with a horizontal working axis according to the prior art;
- figure 3 is a schematic view of a vertical-axis press according to the prior art, with more than one pressing fixtures;
- figure 4 is a schematic view of a vertical-axis press according to the present invention; and
- figure 5 is a schematic view of a horizontal-axis press according to the present invention.

With reference to the above figures, the reference numeral 6 designates the frame of the press, which conventionally comprises a base 7 from which posts 8 rise; said posts are mutually connected, at the top, by a fixed beam 9 so as to form a closed structure which can withstand the thrusts occurring during the pressing step.

Two pressing modules 10, 11 are supported in the structure, and each one has its own pressing fixture, the activation of each fixture being managed independently of the other one.

In the case of mechanical pressing, the fixture comprises, in a known manner which is accordingly not described in detail, a moving part 12 constituted by a plunger which, by means of a hydraulic jack 13, is actuated against a fixed part 14

constituted by a strike block that rests on the base and forms, together with a mold, the chamber for the containment and forming of the ceramic item.

In the case of isostatic pressing, the fixture comprises two parts which, when placed mutually adjacent, form a material containment chamber.

One of these parts is covered, at the front, by an elastic layer, made for example of rubber, which, by deforming under the action of a pressurized liquid, compresses the material which is contained in the chamber.

As can be seen, the two modules 10 and 11 can be managed independently, without one being able to interfere with the other.

In this manner it is possible to produce items that have different technological parameters and thus require different production times and compaction pressures.

For example, it is possible to produce tiles with one pressing module and special filler parts with a different shape with the other module.

Another substantial advantage of the present invention is the possibility of intervention on one module while the other one is still operating.

This option is particularly useful when having to change the type of items produced by replacing the mold. Advantageously, for safety reasons, between one module and the other there is interposed a separation device 16 that isolates the module requiring intervention from the adjacent one, ensuring the safety of the assigned personnel.

From an operational point of view, the press is managed by a programmable control system which is aimed at providing the maximum utilization of the production capabilities of the pressing fixtures and at adapting the pressing modules to the production cycles so as to provide synchronization of the modules when the items to be pressed are identical.

The pressing modules can be fed with a pressurized fluid by a single hydraulic control unit.

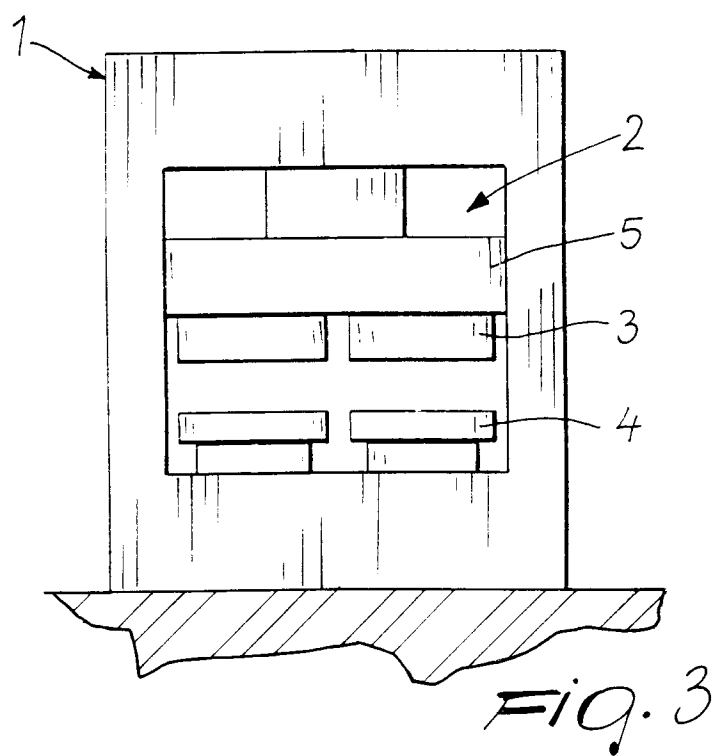
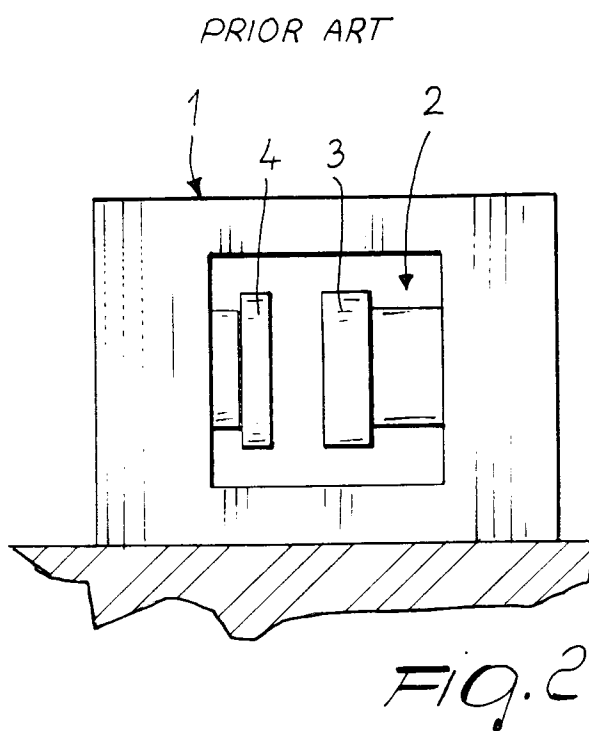
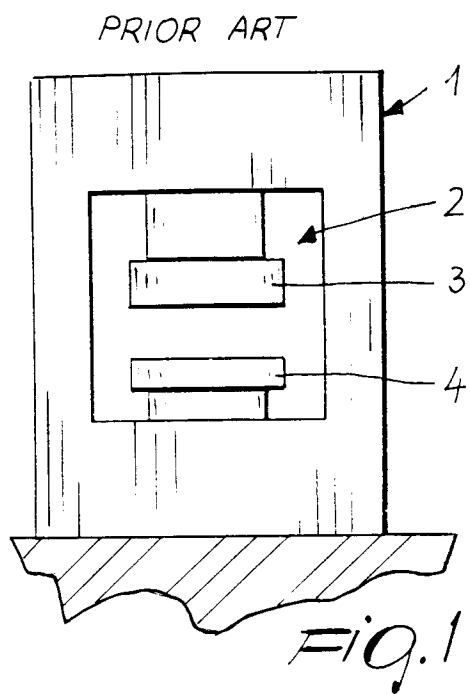
The same inventive concept described above with respect to a vertical press can be used in horizontal presses according to the diagram of figure 5.

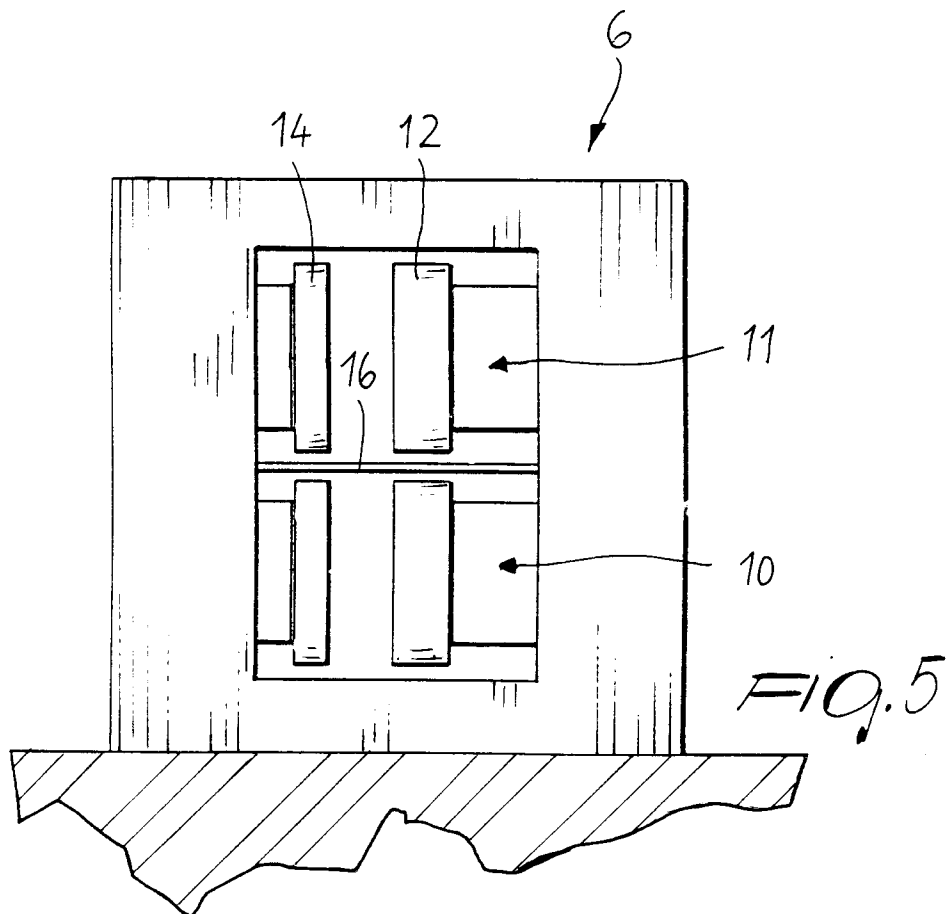
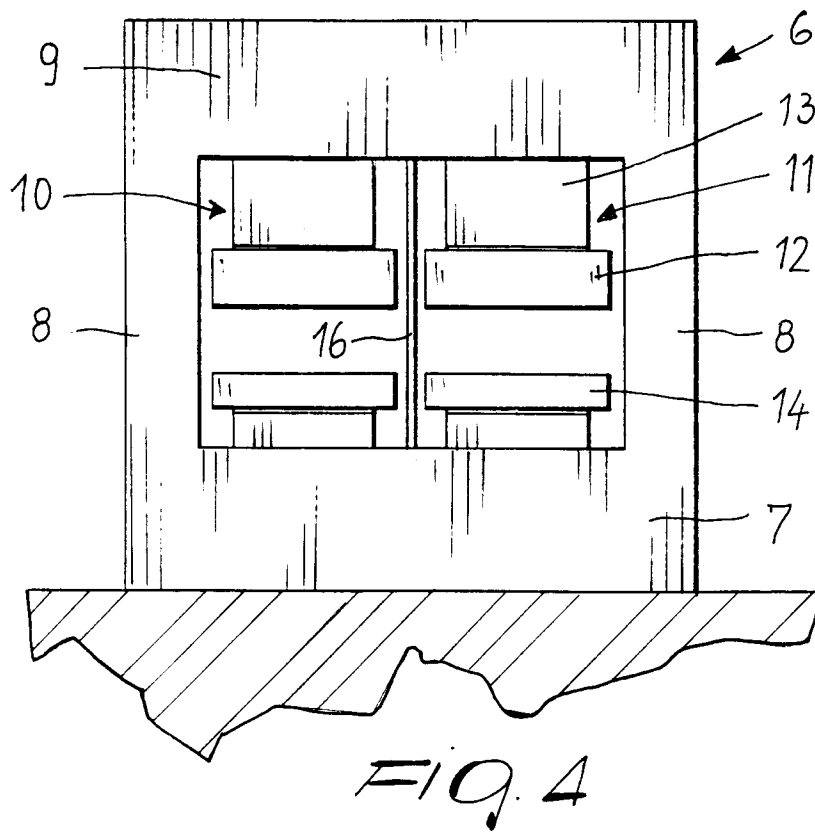
Naturally, the number and arrangement of the pressing modules can vary at will according to the requirements.

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 scope of each element identified by way of example by such reference signs.

Claims

1. Press for producing ceramic items, characterized in that it comprises, in a single frame (6), two or more pressing modules (10, 11), which can be individually managed independently of the others.
2. Press according to claim 1, characterized in that it comprises a single programmable control system for managing the pressing modules (10, 11).
3. Press according to claim 1 or 2, characterized in that it comprises a single hydraulic control unit for supplying the pressing modules (10, 11) with a pressurized fluid.
4. Press according to one or more of the preceding claims, characterized in that safety devices (16) are interposed between the pressing modules (10, 11).
5. Modular hydraulic press for producing ceramic items, according to one or more of the technical features described and/or illustrated in the accompanying drawings.







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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 8644

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	DE-C-893 400 (R. BÜRKLE & CO.) * the whole document * ---	1, 3	B30B11/02 B28B3/06 B30B1/32
A	FR-A-2 089 337 (LAEIS-WERKE AG.) * the whole document * ---	1-5	
A	FR-A-2 152 058 (WALCHHÜTTER) * claim 1; figures * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			B30B B28B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 5 October 1994	Examiner Voutsadopoulos, K
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			