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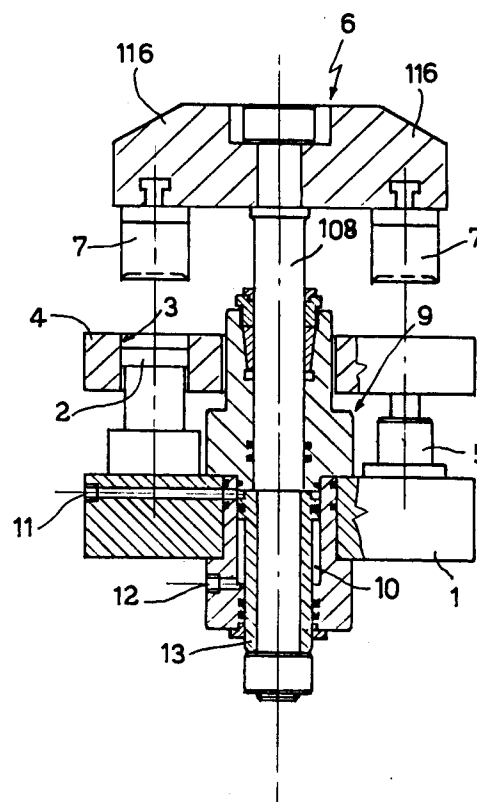
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I-42100 Reggio Emilia (IT)(54) **Press for forming small-dimension ceramic pieces.**

(57) A laboratory ceramic press comprises a horizontal fixed plate (1) provided upperly with at least one part (2-4) of a ceramic mould, and an overlying upwardly and downwardly slidable vertical flat frame (6) which is lowerly provided with at least one ceramic mould part (7) conjugate to the preceding and is raised and lowered by hydraulic means interposed between it and said plate.

**FIG. 3****EP 0 674 980 A1**

This invention relates in an entirely general manner to the ceramic tile production sector, and more particularly to a press of relatively low power for forming ceramic products of special type.

A typical use of the invention is in ceramics laboratories and in the small-scale manufacture of relatively small-dimension products such as small tile pieces, fillets, sections for covering concave and convex dihedral corners, sections for covering concave and convex trihedral corners, and end-pieces.

For such uses forming presses are known which differ from those used for the large-scale production of usual ceramic tiles by their dimensions and power consumption, these being much less than in the preceding case.

Briefly, said known low-power presses comprise:

- a base on which a part of a ceramic mould is to be placed,
- two vertical cylindrical bars fixed to said base to the side of said mould part,
- a vertically movable cross-member slidingly mounted on said cylindrical bars and lowerly provided with a mould part conjugate to the preceding,
- a fixed cross-member connecting together the upper ends of said cylindrical bars, and
- a hydraulic cylinder-piston unit positioned on said fixed cross-member to operate said movable cross-member.

Such known presses have proved unsatisfactory for various reasons.

Firstly they are particularly complex and comprise a relatively large number of component parts, making them rather costly.

Secondly they are excessively bulky and heavy.

There is therefore in this specific sector a widely felt need for means which overcome the aforesaid drawbacks, previous attempts in this direction not having achieved a positive result.

The main object of the present invention is to satisfy said requirements within the context of a simple and rational construction.

This object is attained according to the invention by a press comprising a horizontal fixed plate provided upperly with at least one part of a ceramic mould, and an overlying upwardly and downwardly slidable vertical flat frame which is lowerly provided with at least one ceramic mould part conjugate to the preceding and is raised and lowered by hydraulic means interposed between it and said plate.

According to a first embodiment said frame is in the form of a U-piece, the cross-member of which centrally carries, fixed thereto, said at least one conjugate ceramic mould part, and the arms of which are each provided with an end piston which

is received in a hydraulic chamber associated with said plate and connected to a convenient hydraulic system.

According to a second embodiment said frame is in the form of a T-piece, the lateral arms of which support said at least one conjugate mould part, which is positioned symmetrically about the central rod, this latter being provided with an end piston which is slidable within a hydraulic chamber associated with said plate and connected to a convenient hydraulic system.

The characteristics and constructional merits of the invention will be apparent from the detailed description thereof given hereinafter with reference to the accompanying figures, which illustrate some preferred embodiments thereof by way of non-limiting example.

Figure 1 is a partly sectional elevation showing a first embodiment of the invention.

Figure 2 is a modification of the embodiment of Figure 1.

Figure 3 is a partly sectional elevation showing a second embodiment of the invention.

From said figures it can be seen that the press of the invention comprises a robust horizontally lying flat body 1 to be placed on a suitable support, not shown.

In the first embodiment shown in Figure 1, on the central part of said body 1 there is mounted a first part of a known ceramic mould. In the case illustrated, said ceramic mould is of the entering punch type, but there is nothing to prevent any other known type of ceramic mould from being associated with the invention.

Said mould part comprises at least one die 2, for example of the type for moulding the reverse face of a ceramic fillet, which is fixed to said body 1 and is slidingly mounted within a forming cavity 3 of a die box or die plate 4.

The die plate 4 is supported by at least two devices, not visible in Figure 1, arranged to lower and raise said die plate 4 respectively, to extract the formed fillet from the cavity 3 and to load into said cavity 3 the pulverulent material to be compacted.

A device of this kind, which is of known type, is indicated in Figures 2 and 3 by the reference numeral 5.

In both embodiments there is provided a vertically lying flat frame 6 slidable upwards and downwards relative to the body 1.

In the embodiment shown in Figure 1 said frame 6 is substantially in the form of a U-piece, under the cross-member of which there is positioned a die 7, for example of the type for moulding the front face of a ceramic fillet in combination with the underlying die 2.

The arms of said U-shaped frame 6 consist of two cylindrical bars 8 slidingly received in respective sleeves 9.

Specifically, each sleeve 9 is composed of two coaxial parts, of which the upper part projects beyond the mould part 2-4, whereas the lower part projects below the body 1 and comprises a hydraulic chamber 10.

An annular piston 13, mounted and fixed onto the lower part of the respective bar 8, is sealedly slidable within said chamber 10 and has its rod emerging from the lower end of the sleeve 9.

Finally the chamber 10 is served by two ducts 11 and 12 connected to a convenient hydraulic service circuit.

At this point it should be noted that in Figure 1 the mould part 2-4 lies between the two sleeves 9, whereas in Figure 2 the corresponding mould part 2-4 extends beyond the sleeves 9 with the respective die plate slidingly mounted on these latter via sliding bearings 33. This is for obvious reasons, but it is clear that the die plate 4 of Figure 2 could be mounted slackly on the sleeves 9 as in the embodiment shown in Figure 3.

In the different embodiments there are provided respectively one (Figure 1), three (Figure 2) and two (Figure 3) forming cavities.

In the embodiment shown in Figure 3 there are provided two upper dies 7, a lower mould part 2-4 conjugate to these latter, a single sleeve 9 with relative accessories, and a vertical flat frame 6 shaped differently from the preceding.

Specifically, the frame 6 is in the form of a T-piece, the lateral arms 116 of which are lowerly provided with said two dies 7, and of which the central rod 108 consists of a cylindrical bar arranged to slide relative to the sleeve 9 as already stated.

Finally, it should be noted that said mould parts 7 and 2-4 are arranged symmetrically about said rod 108. Alternatively, sliding bearings such as those indicated by 33 in Figure 2 could be interposed between the die plate 4 and the sleeve. In addition, instead of the single die plate (Figure 3), two die plates can be provided each conjugate to the overlying dies 7.

The merits and advantages of the invention together with its operation are apparent from the foregoing and from an examination of the accompanying figures.

The invention is not limited to that illustrated and described, but covers all technical equivalents of the aforesaid means and their combinations if implemented within the context of the following claims.

Claims

1. A laboratory ceramic press, characterised by comprising a horizontal fixed plate (1) provided upperly with at least one part (2-4) of a ceramic mould, and an overlying upwardly and downwardly slidable vertical flat frame (6) which is lowerly provided with at least one ceramic mould part (7) conjugate to the preceding and is raised and lowered by hydraulic means interposed between it and said plate.
2. A press as claimed in claim 1, characterised in that said frame (6) is in the form of a U-piece, the cross-member (16) of which centrally carries, fixed thereto, said at least one conjugate ceramic mould part (7), and the arms (8) of which are each provided with an end piston (13) which is slidable within a hydraulic chamber (10) associated with said plate and connected to a convenient hydraulic system.
3. A press as claimed in claim 1, characterised in that said frame (6) is in the form of a T-piece, the lateral arms (116) of which support said at least one conjugate mould part (7), which is positioned symmetrically about the central rod (108), this latter being provided with an end piston (13) which is slidable within a hydraulic chamber (10) associated with said plate and connected to a convenient hydraulic system.
4. A press as claimed in the preceding claims, characterised in that said arms (8) and said central rod (108) are cylindrical and are received in respective guide sleeves (9) which project both above said plate (1), where they extend beyond the respective mould parts (2-4), and below said plate where they comprise the respective hydraulic chambers (10).
5. A press as claimed in the preceding claims, characterised in that the rod of said piston (13) extends beyond the lower end of the respective sleeve (9).
6. A press as claimed in the preceding claims, of the type in which the lower mould part is provided with at least one vertically movable die plate (4), characterised in that said die plate (4) is provided with apertures for the passage of said sleeves (9).
7. A press as claimed in claim 6, characterised in that sliding bearings (33) are interposed between said sleeves (9) and the respective apertures provided through said die plate.

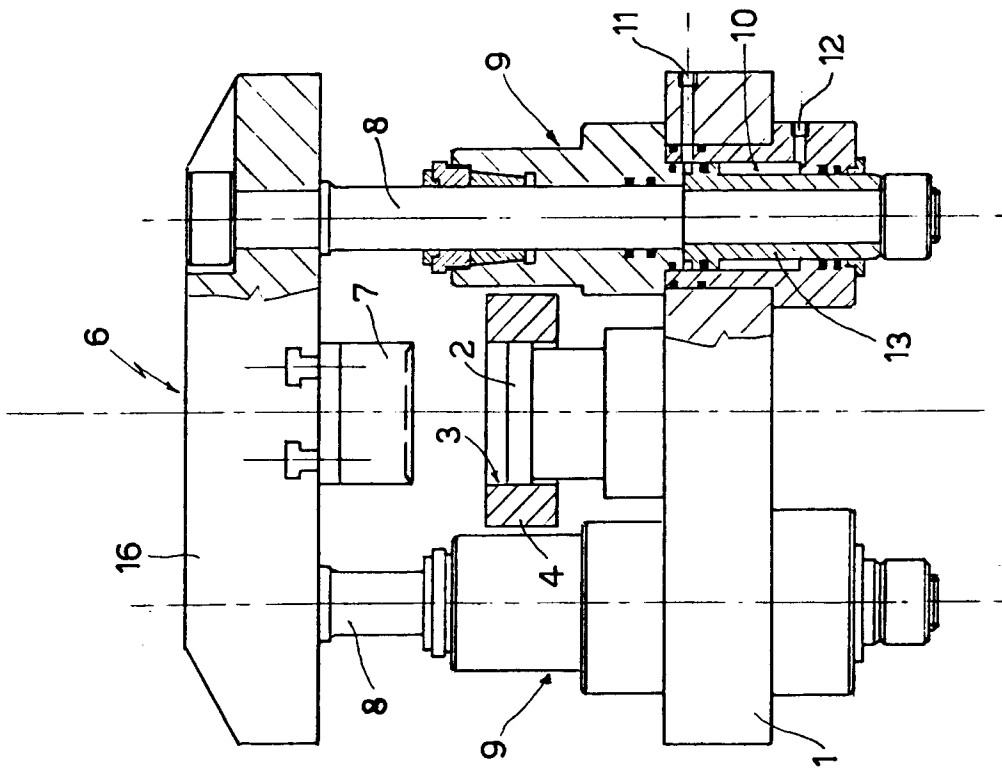


FIG. 1

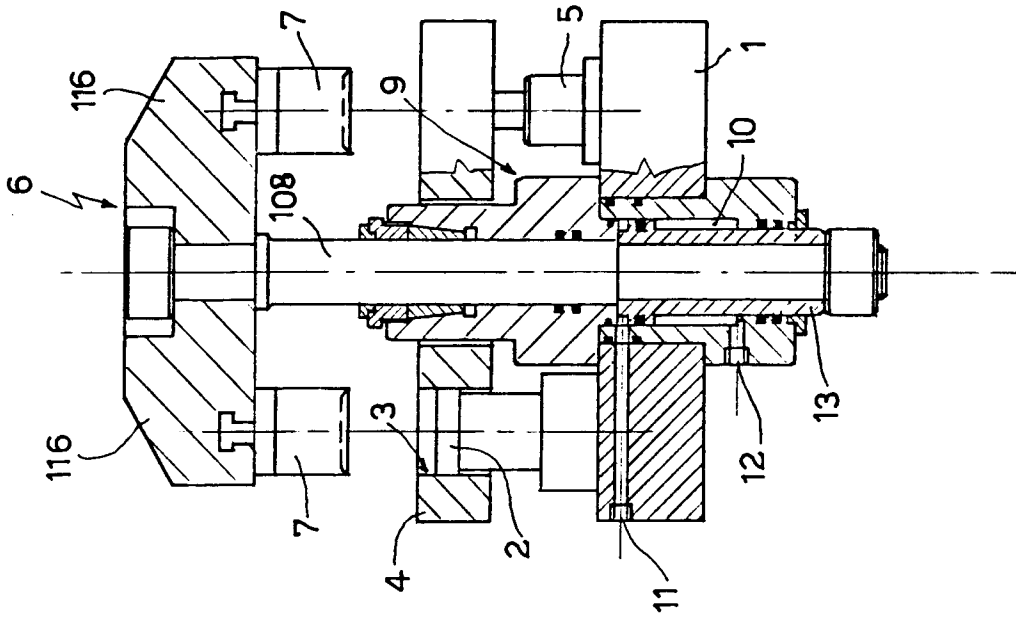
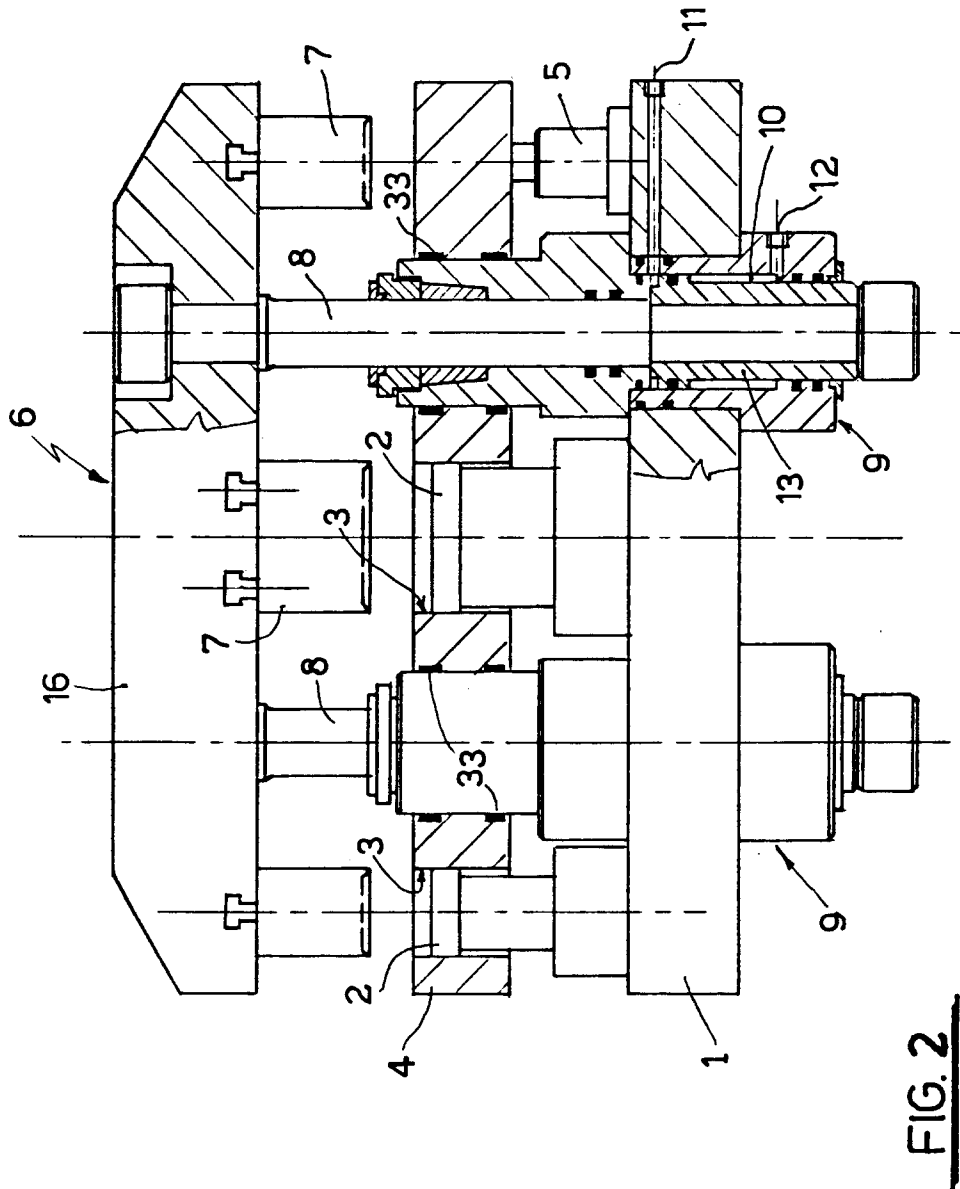


FIG. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 0668

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.6)
X	FR-A-1 527 126 (J. VAUX) * the whole document * ---	1,2,4,5	B28B3/02 B30B15/04 B30B11/00
X	FR-A-1 453 238 (R. FARRAS) * the whole document * ---	1,2	
X	DE-A-19 57 052 (W. THEOBALD) * the whole document *	1	
Y	---	3	
Y	DE-A-14 79 804 (VERWALTUNGSGESELLSCHAFT MOELLER UND NEUMANN OHG) * the whole document * ---	1,2,5	
Y	DE-A-15 84 760 (STEULER-INDUSTRIEWERKE GMBH) * the whole document * ---	1,2,5	
Y	DE-A-28 04 806 (K.K. KOMATSU SEISAKUSHO) * the whole document * ---	1,3	
A	US-A-4 195 565 (A. V. CORDEIRO) * the whole document * ---	1,3	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	FR-A-2 590 519 (M. CHAIGNAY) * abstract *	1	B28B B30B
A	SOVIET PATENT ABSTRACTS Week 9405 23 March 1994 Derwent Publications Ltd., London, GB; AN 94-042068 & SU-A-1 787 781 (TVER POLY) , 15 January 1993 * abstract *	1	
A	EP-A-0 566 171 (MASS S.P.A.) * the whole document * -----	1,6,7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 July 1995	Examiner Gourier, P
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	