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(54) **METHOD AND PRESS FOR SIMULTANEOUSLY FORMING AND DECORATING CERAMIC ARTICLES**

VERFAHREN UND PRESSE ZUM GLEICHZEITIGEN FORMEN UND DEKORIEREN VON
KERAMIKARTIKELN

PROCÉDÉ ET PRESSE POUR FORMAGE ET DÉCORATION SIMULTANÉS D'ARTICLES
CÉRAMIQUES

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method and press for simultaneously forming and decorating ceramic articles.

[0002] More particularly, the present invention relates to a method and press for simultaneously forming and decorating crockery, such as ceramic plates.

BACKGROUND ART

[0003] Ceramic articles can be decorated by a known multiplicity of methods, such as decalcomania transfer, manual or automatic brush painting, direct silkscreen printing and tampography.

[0004] Decoration by decalcomania transfer consists of applying designs (decalcomanias) to the pressed, trimmed, glazed and fired ceramic article. When the decoration has been applied the article is re-fired to fuse the decalcomania into the glaze.

[0005] This method enables polychrome decoration to be carried out, but involves a certain operational slowness and a very high cost.

[0006] Moreover, decoration by decalcomania transfer does not allow subsequent application of glaze, which would make the decoration resistant to abrasion.

[0007] Decoration by manual or automatic brush painting consists substantially of applying the design to the ceramic biscuit by a brush.

[0008] This method, which also enables polychrome decoration to be obtained, is mainly used for very simple designs or for craft-type production. Decoration of ceramic articles by direct silkscreen printing consists of applying to the article to be decorated a "screen", the meshes of which can be traversed by the colour only in correspondence with the design to be reproduced.

[0009] Using a doctor blade or other known system, the colour is applied to the screen only in correspondence with the design, to deposit directly on the article to be decorated.

[0010] This method can be used only for decorating flat or slightly convex articles or flat or regular parts of an article, and hence limits the decoration to the central region or rim of the plate.

[0011] Decorative tampography uses siliconized elastic pads to transfer an ink film from an engraved plate (printing plate) to the surface of a finished article.

[0012] The decorative pad method is of very low cost and enables monochrome decorations or images to be very easily applied to serial articles, even on concave or convex surfaces such as those of crockery, in particular plates, however it presents difficulties of application to articles of polygonal shape.

[0013] Although decoration by tampography considerably reduces the production costs of decorated articles while at the same time substantially increasing versatility

of use on any shape, such advantages are limited to the purely decorative step within the complete cycle for forming decorated ceramic articles.

[0014] Essentially, in decoration methods of the known art, the decoration stage takes place on an already fired and possibly glazed ceramic article, consequently the production times for a finished decorated article are extremely lengthy, mainly because of the time required for arranging the article so that it is able to be decorated, plus its subsequent decoration.

[0015] DE3446175 discloses a process for producing decorated ceramic mouldings, wherein a decorative substance is applied to a pressure diaphragm. Subsequently a tight edge seal is produced between the pressure diaphragm and a first mould part, transferring the decorative substance to said first mould part. Then the pressure diaphragm is removed and from the first mould part and a second mould part there is formed a filling chamber, which is also evacuated and then filled with pourable ceramic composition. The composition is finally pressed to form a moulding, the decorative substance being transferred thereto.

[0016] This document discloses also a press for simultaneously forming and decorating ceramic articles according to the preamble of claim 13.

DISCLOSURE OF THE INVENTION

[0017] There is hence a strongly felt need for the availability of a method and press for forming and decorating ceramic articles which substantially reduce the overall production time for a decorated ceramic article and are able to decorate a surface having any shape compared with the limits of the known art, with consequent cost reduction. The object of the present invention is to provide a method for forming and decorating ceramic articles which enables said requirements to be satisfied while at the same time obviating the stated drawbacks of the known art, together with a press for implementing said method.

[0018] This object is attained by a method for simultaneously forming and decorating ceramic articles in accordance with claim 1, and a press in accordance with claim 13.

[0019] The dependent claims define preferred and particularly advantageous embodiments of the method and press for simultaneously forming and decorating ceramic articles according to the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Further characteristics and advantages of the invention will become apparent on reading the ensuing description provided by way of non-limiting example, with the aid of the figures shown in the accompanying drawing, in which:

Figures 1 and 2 are a perspective view of a press

according to the invention, shown in its spaced-apart position;

Figure 3 is a perspective view of a detail of the press of Figure 2;

Figure 4 is a plan view of a part of the press of Figure 2;

Figures 5 and 6 are a schematic vertical section through the press, shown in its spaced-apart and close-together position respectively.

MODE FOR CARRYING OUT THE INVENTION

[0021] With reference to said figures, the reference numeral 1 indicates overall a press for simultaneously forming and decorating ceramic articles in accordance with the present invention.

[0022] The term "decoration" in the present invention means any effect which embellishes an article, whether in the form of a design, lines or colours. The press 1 comprises essentially a first punch 2 and a second punch 3 mutually movable towards and away from each other between a spaced-apart position (Figures 1-5) and a close-together position (Figure 6). In the illustrated example, the press presents two pairs of punches, however a press of the present invention can be constructed with any number of pairs of punches.

[0023] In the figures, the first punch 2 is the fixed punch whereas the second punch 3 is the movable punch, they moving horizontally, however any other mode of relative movement can be used, such as vertically movable punches.

[0024] For simplicity of description, explicit reference will be made to the formation and decoration of a plate, however any other ceramic article, in particular crockery, can be formed. Again, any other decorated ceramic product can be formed, such as tiles.

[0025] According to the present invention, the fixed punch 2, to the left in the figures, and the movable punch 3, to the right in the figures, present their respective facing surfaces shaped to mould a plate, for example of the deep-bottomed type, with its concavity facing the fixed punch 2. According to the present invention, when the two punches are in their spaced-apart position, an annular frame 5, also called simply a ring, is mounted as an exact fit over the fixed punch 2, and is generally of steel or other material, possibly clad with a plastic material and provided with an elastically deformable membrane 6 fixed to the ring 5.

[0026] The manner in which the ring 5 (with membrane 6) is drawn over the fixed punch 2 is chosen on the basis of the press used and the direction along which the movable punch 3 moves, whether horizontally or vertically. A preferred manner is described in greater detail hereinafter.

[0027] The circular rim 2a of the fixed punch 2 is depressed with respect to its flat central portion 2b in order to create the concavity in the plate, hence the membrane 6 undergoes deformation to adhere at least to the central

portion 2b of the punch 2, whereas between the circular rim 2a of the punch 2 and the annular portion of the membrane 6 close to the ring 5 the adherence is not perfect.

[0028] According to a preferred embodiment of the present invention, in order to obtain complete adherence between the membrane 6 and the fixed punch 2, the fixed punch 2 is constructed of selectively porous material to enable a vacuum to be formed between the membrane 6 and the punch 2 by an air suction system.

[0029] In this manner, when the ring 5 with membrane is drawn over the fixed punch 2, the air suction system is activated to obtain perfect adherence between the membrane 6 and fixed punch 2 even at the rim 2a. Preferably, the fixed punch 2 is constructed of porous resin of the type traditionally used for die casting moulds, and hence known in the sector. In addition to ensuring the necessary permeability to apply vacuum through the punch 2, this resin also presents the necessary strength for operating at relatively high pressures.

[0030] In order to at least partially decorate the plate interior, decorative material is applied to that side of the membrane 6 opposite the side directly adhering to the fixed punch 2, i.e. the side facing rightwards in the figures, and which in the example is ceramic colouring generally in the form of silkscreen paste, to suitably reproduce the design to be transferred.

[0031] The plate is simultaneously formed and decorated by advancing the movable punch 3 towards the fixed punch 2.

[0032] The shape of the movable punch 3 is identical to the shape required for the rear of the plate, i.e. that part which rests on the table under normal conditions of use. When in their close-together position (Figure 6), between the fixed punch 2 (with membrane 6) and movable punch 3 the moulding cavity 4 is formed, into which ceramic material in the form of atomized clay is loaded under pressure or by suction. This filling takes place when the two punches 2 and 3 have approached each other to a distance apart such as to form a cavity 4 having a thickness of about 1.5 times the thickness of the final plate required (Figure 6).

[0033] Said ceramic material is of known type and can for example be stoneware, porcelain, vitreous china, etc., reduced to atomized powder. The atomized powder is loaded by the known method.

[0034] In the example, loading takes place through a slit 60 (Figure 6) formed when in the close-together position. During loading, the cavity 4 is put under vacuum by known suction means which draw air through two opposing holes 61 provided in the ring 5 and communicating with the cavity 4 when in the close-together position, in order to draw out the air present in the cavity 4.

[0035] When loading is complete, the movable punch 3, preferably of isostatic type, carries out pre-pressing to a pressure of about 280-300 bar in order to isolate the cavity 4 and enable an isostatic membrane 7 of rubber to adhere to the powders present in the cavity 4. During pre-pressing, the cavity remains under vacuum to re-

move the air present in the loaded powders. On termination of pre-pressing, the powders present in the cavity 4, isolated and already free of air, are further pressed by feeding a pressurized fluid, for example oil, behind the isostatic membrane 7, which presses the powders with equal intensity in all directions.

[0036] Generally this latter final pressing takes place at an overall pressure of about 400 bar.

[0037] Although a punch of isostatic type is preferable, a non-isostatic punch can evidently be used.

[0038] The pressure exerted by the punch 3 on the powders loaded by the known method into the moulding cavity 4 facilitates transfer of the design from the membrane 6, on which it is present, to the inside of the plate, with partial incorporation of the design into the ceramic powders, in the manner of marquetry. In this respect, at the end of the process the decorated surface presents no raised portions typical of decorations of the known art, as the colours are perfectly incorporated.

[0039] On termination of pressing, the movable punch 3 is withdrawn and the decorated unfired plate is expelled and fed to the trimming line, to be then dried or fired prior to final glazing, when the glaze is applied.

[0040] In this manner the decoration on the finished plate lies totally under glaze. According to the present invention and in order to easily obtain visually attractive decorations, the colours are applied to the membrane by silkscreen printing, which is already known and therefore only mentioned hereinafter.

[0041] Specifically, the membrane is decorated by successive predetermined passes with known flat silkscreen printing machines, each pass being dedicated to transporting a specific colour, which is dried before application of the next.

[0042] On termination of all the passes required to apply the desired design, the membrane 6 is subjected to steaming, i.e. it is exposed to steam which enables the silkscreen printing paste present on the membrane 6 to undergo wetting and pass into a substantially liquid state.

[0043] This allows better transfer of the design during plate formation, as it prevents the silkscreen printing paste from remaining partly adhering to the membrane 6.

[0044] As an alternative to the aforescribed cold transfer, the coloured powders can be mixed with wax-based heat meltable carriers. In this case neither drying after each colour pass nor subsequent steaming of the membrane 6 on termination of colour application and prior to design transfer onto the plate is required, as the wax contained in the heat meltable carriers prevents the powders from remaining attached to the membrane 6. Moreover the heat meltable powders can be silkscreen printing continuously one on the other.

[0045] Preferably the membrane 6 is formed of elastic silicone or polyurethane material.

[0046] According to a preferred embodiment of the present invention, to further improve the production rate of the press 1 suitable support and transfer means indicated overall by 8 are used to move the ring 5 with mem-

brane 6.

[0047] Said support and transfer means 8, shown for simplicity for a single press, are in the form of a carriage 9 vertically slidable on a pair of parallel guides 10 provided on two corresponding uprights 11, to which are fixed two pairs of sliders 12 slidable horizontally on two pairs of rails 13 provided on two pairs of fixed crosspieces.

[0048] The fixed crosspieces are positioned horizontally parallel to the direction in which the movable punch 3 moves, in order to be outside the overall profile of the punches 2, 3.

[0049] Essentially, the carriage 9 is able to execute a vertical movement along the guides 10 and a horizontal movement along the rails 13.

[0050] The carriage 9 supports a pair of upper and lower coupling means (Figure 1), each removably retaining a ring 5 with membrane 6. In the example, said coupling means are in the form of a magnetic gripping system comprising two parallel bars 15 pivoted to two horizontal elements 16 projecting from the carriage 9, each presenting at its free end a coupling magnet 16.

[0051] As an alternative to the aforescribed support and transfer means, a gripping system, not shown, using mechanical grippers can be used.

[0052] In operation, the support and transfer means 8 act in the following manner: a suitable supply system, not shown for simplicity, and operating in the example from above the punches 2, 3 in order not to constitute a hindrance, places the ring 5 with decorated membrane 6 on the upper coupling means, which by means of the magnets 16 attract two opposing gripping elements 50 projecting from the edge of the ring 5.

[0053] When the ring 5 with membrane 6 has been loaded, the carriage 9 slides downwards to bring the membrane 6 in correspondence with the forming mould. After halting the vertical movement of the carriage 9, the press 1 is operated so that the isostatic movable punch 3 moves towards the fixed punch 2 to form the cavity into which to inject the atomized ceramic material.

[0054] In advancing, the isostatic movable punch 3 drags with it the carriage 9 carrying the ring 5, which slides along the rails 13 to bring the membrane 6 against the fixed punch 2, where the ring 5 is drawn over the fixed punch 2 by detaching itself from the magnets 16.

[0055] Alternatively, the ring 5 can be mounted by a mechanical or pneumatic control independent of the movement of the movable punch 3.

[0056] At this point the close-together position is reached, in which the cavity 4 is defined to be filled with the atomized ceramic powders.

[0057] To optimise the shape of this cavity 4 and hence improve subsequent loading with the ceramic powders, the membrane 6 is made to adhere completely to the fixed punch 2 by creating a vacuum through the constituent porous material of the fixed punch 2 before loading with the ceramic powders.

[0058] When the optimum position for loading the cav-

ity is reached, the ceramic material is injected in accordance with the known art to form a decorated plate of the invention.

[0059] Simultaneously with the loading of the mould with ceramic material, the carriage 9 returns the upper coupling means free of the ring 5 with membrane 6, above the punches 2, 3 to receive a new ring 5 with decorated membrane 6, while the lower coupling means are brought to the level of the cavity 4.

[0060] On termination of loading, the isostatic punch 3 compresses the powders at high pressure within the cavity until a decorated unfired plate is obtained.

[0061] The isostatic movable punch 3 is then withdrawn from the fixed punch 2 and the magnets 16 of the lower coupling means withdraw the just used ring 5 with membrane 6.

[0062] The carriage 9 is then moved vertically downwards to bring a new ring 5 with decorated membrane 6 in correspondence with the forming mould. This involves simultaneous downward movement, away from the punches 2, 3, of the lower coupling means carrying the ring 5 with the already used membrane 6, which has to be uncoupled.

[0063] To facilitate uncoupling of the ring 5 with membrane 6 from the magnets 16 of the lower coupling means, use is made of a bottom located pair of parallel opposing arched ribs 17 arranged to cooperate with a pair of wheels 18 associated with the bars 15 for overturning the ring 5 with the used membrane 6.

[0064] Essentially, when the upper coupling means carry the ring 5 with decorated membrane 6 to the forming mould, the lower coupling means move downwards until the wheels 18 slide along the ribs 17 to rotate the bars 15 pivoted to the carriage 9 and overturn the ring 5 with the already used membrane 6. Here, the ring 5 with the used membrane 6 is transferred to suitable withdrawal means, not shown, which return it to the membrane decoration station which cooperates with the supply system. The aforescribed cycle is repeated to form each decorated article. Consequently, the upper coupling means take the ring 5 with the decorated membrane 6 and bring these to the forming mould, while simultaneously the lower coupling means, after the article has been formed, take the ring 5 with the used membrane 6 and move these towards the withdrawal means.

[0065] The entire production process with its associated movements can be easily controlled automatically, so reducing plate forming and decorating costs.

[0066] Should the press punches move with vertical mutual movement, different support and transfer means are used for moving the rings 5 with membrane 6.

[0067] As is apparent from the description, the method and press for simultaneously forming and decorating ceramic articles according to the present invention satisfy the requirements and overcome the drawbacks described in the introduction to the present description with reference to the known art.

[0068] In this respect, as the decoration of the deco-

rated side and the formation of articles take place simultaneously, the overall times and hence costs are considerably reduced.

[0069] The method and press of the present invention also enable the following to be achieved: to obtain an aesthetically pleasing decoration as it at least partly penetrates into the ceramic base material to give extremely glossy results and an almost three-dimensional effect; to decorate any surface without limits on shape, whether in bas-relief or high-relief and without limits on usable colours.

[0070] Of non-negligible importance is the increased resistance to wear and to acid attack of the decorations obtained by the method and press of the present invention, as the decoration is obtained under glaze.

[0071] An expert of the art can apply numerous modifications and variants to the described method and press to satisfy specific contingent requirements, all of which however are contained within the scope of protection of the invention, as defined by the following claims.

Claims

1. A method for simultaneously forming and decorating ceramic articles, comprising the steps of:
 - a) preparing a press (1) provided with a first punch (2) and a second punch (3) mutually movable between a spaced-apart position and a close-together position in which a moulding cavity (4) is defined;
 - b) drawing over the first punch (2) a frame (5) provided with an elastically deformable membrane (6), said membrane (6) being partly covered with decorative material on that side facing the second punch (3);
 - c) driving the press (1) into said close-together position;
 - d) loading ceramic material into said cavity (4) and subjecting it to compression to form the article;
 - e) returning said press (1) to its spaced-apart position and withdrawing the decorated ceramic article.
2. A method as claimed in claim 1, wherein said first punch (2) is formed of porous material.
3. A method as claimed in claim 2, wherein prior to said step c), that side of the membrane (6) without decorative material is made to adhere the first punch (2) by vacuum applied through said first punch (2).
4. A method as claimed in claim 1, wherein said second punch (3) is of isostatic type.
5. A method as claimed in claim 4, wherein said second

- punch (3) effects said compression of step d) by injecting pressurized fluid behind an elastic wall.
6. A method as claimed in claim 1, wherein said decorative material comprises ceramic colours.
 7. A method as claimed in claim 6, wherein said ceramic colours are applied to the membrane (6) by silk-screen printing.
 8. A method as claimed in claim 7, wherein said ceramic colours applied to the membrane (6) are subjected to a jet of steam before said frame (5) is drawn over the first punch (2).
 9. A method as claimed in claim 1, wherein said ceramic material loaded in step d) is in the form of atomized powder.
 10. A method as claimed in claim 1, wherein during the ceramic material loading of step d), said cavity (4) is put under vacuum by drawing out the air contained in the ceramic material.
 11. A method as claimed in claim 1, wherein the ceramic material compression of step d) is effected at a pressure of about 400 bar.
 12. A method as claimed in claim 1, wherein said decorated ceramic article resulting from step e) is subjected to final glazing so that the decoration lies under glaze.
 13. A press for simultaneously forming and decorating ceramic articles, comprising a first punch (2) and a second punch (3) mutually movable between a spaced-apart position and a close-together position in which a moulding cavity (4) is defined, an elastically deformable membrane (6), wherein said membrane (6) is fixed to a frame (5), said membrane (6) being at least partly covered on only one side with decorative material, **characterised by** further comprising means for drawing said membrane (6) over said first punch (2) in such a manner as to lie in said cavity (4) within which ceramic material intended to form a decorated article is compressed.
 14. A press as claimed in claim 13, wherein said first punch (2) is formed of porous material.
 15. A press as claimed in claim 14, wherein an air suction system is associated with said first punch (2) to create the vacuum between it and the drawn-over membrane (6).
 16. A press as claimed in claim 13, wherein said second punch (3) is of isostatic type.
 17. A press as claimed in claim 13, wherein said membrane (6) is formed of elastic silicone or polyurethane material.
 18. A press as claimed in claim 13, wherein said means for drawing said membrane (6) over said first punch (2) comprise a carriage (9) slidable in both a direction perpendicular to and a direction parallel to the direction in which the punches (2, 3) move, said carriage (9) comprising first and second coupling means, said first coupling means being arranged to take a decorated membrane (6) and bring it to the moulding cavity (4), said second coupling means being arranged to take the already used membrane (6) from said cavity (4) and to carry it towards withdrawal means.
 19. A press as claimed in claim 18, wherein said first and second coupling means comprise a gripping system of magnet (16) type.
 20. A press as claimed in claim 18, wherein said second coupling means are provided with a pair of wheels (18) arranged to cooperate with arched ribs (17) such as to overturn the membrane (6) before it is transferred to the withdrawal means.

Patentansprüche

1. Verfahren zum gleichzeitigen Bilden und Dekorieren von Keramikartikeln, folgende Schritte umfassend:
 - a) Herstellen einer Presse (1), die mit einem ersten Presswerkzeug (2) und einem zweiten Presswerkzeug (3) ausgestattet ist, die zueinander zwischen einer beabstandeten Position und einer Position nahe beieinander, in der ein Formhohlraum (4) definiert wird, beweglich sind,
 - b) Ziehen eines Rahmens (5), der mit einer elastisch verformbaren Membran (6) ausgestattet ist, über das erste Presswerkzeug (2), wobei die Membran (6) auf der dem zweiten Presswerkzeug (3) zugewandten Seite teilweise mit dekorativem Material überzogen ist,
 - c) Antreiben der Presse (1) in die Position nahe beieinander,
 - d) Laden keramischen Materials in den Hohlraum (4) und Pressen desselben, um den Artikel zu bilden,
 - e) Rückführen der Presse (1) in ihre beabstandete Position und Entnehmen des dekorierten Keramikartikels.
2. Verfahren nach Anspruch 1, wobei das erste Presswerkzeug (2) aus porösem Material gebildet ist.
3. Verfahren nach Anspruch 2, wobei vor Schritt c) die Seite der Membran (6) ohne dekoratives Material

- dazu gebracht wird, an dem ersten Presswerkzeug (2) zu haften, indem durch das erste Presswerkzeug (2) hindurch ein Vakuum angelegt wird.
4. Verfahren nach Anspruch 1, wobei das zweite Presswerkzeug (3) isostatischer Art ist. 5
 5. Verfahren nach Anspruch 4, wobei das zweite Presswerkzeug (3) das Pressen von Schritt d) durchführt, indem mit Druck beaufschlagtes Fluid hinter einer elastischen Wand eingepresst wird. 10
 6. Verfahren nach Anspruch 1, wobei das dekorative Material Keramikfarben umfasst. 15
 7. Verfahren nach Anspruch 6, wobei die Keramikfarben durch Siebdruck auf die Membran (6) aufgebracht werden.
 8. Verfahren nach Anspruch 7, wobei die auf die Membran (6) aufgetragenen Farben einem Dampfstrahl ausgesetzt werden, bevor der Rahmen (5) über das erste Presswerkzeug (2) gezogen wird. 20
 9. Verfahren nach Anspruch 1, wobei das in Schritt d) geladene Keramikmaterial in Form von atomisiertem Pulver vorliegt. 25
 10. Verfahren nach Anspruch 1, wobei während des Ladens von Keramikmaterial in Schritt d) der Hohlraum unter Vakuum gesetzt wird, indem die im Keramikmaterial enthaltene Luft herausgesogen wird. 30
 11. Verfahren nach Anspruch 1, wobei das Pressen des Keramikmaterials von Schritt d) bei einem Druck von etwa 400 bar durchgeführt wird. 35
 12. Verfahren nach Anspruch 1, wobei der aus Schritt e) resultierende dekorierte Keramikartikel einer abschließenden Glasur unterzogen wird, so dass die Dekoration unter Glasur liegt. 40
 13. Presse zum gleichzeitigen Bilden und Dekorieren von Keramikartikeln, umfassend ein erstes Presswerkzeug (2) und ein zweites Presswerkzeug (3), die zueinander zwischen einer beabstandeten Position und einer Position nahe beieinander, in der ein Formhohlraum (4) definiert wird, beweglich sind, eine elastisch verformbare Membran (6), wobei die Membran (6) an einem Rahmen (5) befestigt ist, wobei die Membran (6) nur an einer Seite mindestens teilweise mit dekorativem Material bedeckt ist, **dadurch gekennzeichnet, dass** sie ferner Mittel zum Ziehen der Membran (6) über das erste Presswerkzeug (2) derart, dass sie in dem Hohlraum (4) liegt, in dem Keramikmaterial gepresst wird, das einen dekorierten Artikel bilden soll, umfasst. 50
 14. Presse nach Anspruch 13, wobei das erste Presswerkzeug (2) aus porösem Material gebildet ist.
 15. Presse nach Anspruch 14, wobei das erste Presswerkzeug (2) an ein Luftsaugsystem angeschlossen ist, um das Vakuum zwischen ihm und der übergezogenen Membran (6) zu erzeugen.
 16. Presse nach Anspruch 13, wobei das zweite Presswerkzeug (3) isostatischer Art ist.
 17. Presse nach Anspruch 13, wobei die Membran (6) aus elastischem Silikon- oder Polyurethanmaterial gebildet ist.
 18. Presse nach Anspruch 13, wobei die Mittel zum Ziehen der Membran (6) über das erste Presswerkzeug (2) einen Schlitten (9) umfassen, der sowohl in eine Richtung senkrecht zur Bewegungsrichtung der Presswerkzeuge (2, 3) als auch in eine Richtung parallel zu diesen gleitfähig ist, wobei der Schlitten (9) erste und zweite Kopplungsmittel umfasst, wobei die ersten Kopplungsmittel dafür angeordnet sind, eine dekorierte Membran (6) zu erfassen und sie zu dem Formhohlraum (4) zu bringen, wobei die zweiten Kopplungsmittel dafür angeordnet sind, die bereits benutzte Membran (6) aus dem Hohlraum (4) zu nehmen und sie zu Entnahmemitteln zu führen.
 19. Presse nach Anspruch 18, wobei die ersten und zweiten Kopplungsmittel ein Greifsystem der Art eines Magneten (16) umfassen.
 20. Presse nach Anspruch 18, wobei die zweiten Kopplungsmittel mit einem Paar Rädern (18) ausgestattet sind, die dafür angeordnet sind, mit bogenförmigen Rippen (17) zusammenzuwirken, so dass die Membran (6) gekippt wird, bevor sie zu den Entnahmemitteln überführt wird.

Revendications

1. Procédé pour former et décorer simultanément des articles en céramique, comprenant les étapes suivantes :
 - a) la préparation d'une presse (1) munie d'un premier poinçon (2) et d'un deuxième poinçon (3) mobiles mutuellement entre une position écartée et une position rapprochée dans laquelle une cavité de moulage (4) est définie ;
 - b) le fait de tirer sur le premier poinçon (2) un cadre (5) muni d'une membrane déformable élastiquement (6), ladite membrane (6) étant partiellement recouverte avec une matière décorative sur le côté faisant face au deuxième poinçon (3) ;

- c) le fait d'amener la presse (1) dans ladite position rapprochée ;
d) le chargement du matériau céramique dans ladite cavité (4) et le fait de le soumettre à une compression pour former l'article ;
e) le fait de ramener ladite presse (1) dans sa position écartée et l'enlèvement de l'article en céramique décoré.
2. Procédé selon la revendication 1, dans lequel ledit premier poinçon (2) est composé de matériau poreux.
 3. Procédé selon la revendication 2, dans lequel, avant ladite étape c), le côté de la membrane (6) sans matière décorative est fait adhérer au premier poinçon (2) par une dépression appliquée audit premier poinçon (2).
 4. Procédé selon la revendication 1, dans lequel ledit deuxième poinçon (3) est de type hydrostatique.
 5. Procédé selon la revendication 4, dans lequel ledit deuxième poinçon (3) effectue ladite compression de l'étape d) en injectant un fluide pressurisé derrière une paroi élastique.
 6. Procédé selon la revendication 1, dans lequel ladite matière décorative comprend des couleurs céramiques.
 7. Procédé selon la revendication 6, dans lequel lesdites couleurs céramiques sont appliquées à la membrane (6) par sérigraphie.
 8. Procédé selon la revendication 7, dans lequel lesdites couleurs céramiques appliquées à la membrane (6) sont soumises à un jet de vapeur avant que ledit cadre (5) ne soit tiré sur le premier poinçon (2).
 9. Procédé selon la revendication 1, dans lequel ledit matériau céramique chargé dans l'étape d) est sous la forme de poudre atomisée.
 10. Procédé selon la revendication 1, dans lequel, durant le chargement du matériau céramique de l'étape d), ladite cavité (4) est mise sous vide en extrayant l'air contenu dans le matériau céramique.
 11. Procédé selon la revendication 1, dans lequel la compression du matériau céramique de l'étape d) est effectuée à une pression d'environ 400 bar.
 12. Procédé selon la revendication 1, dans lequel ledit article en céramique décoré résultant de l'étape e) est soumis à un émaillage final de manière que la décoration se trouve sous émail.
 13. Presse pour former et décorer simultanément des articles en céramique, comprenant un premier poinçon (2) et un deuxième poinçon (3) mobiles mutuellement entre une position écartée et une position rapprochée dans laquelle une cavité de moulage (4) est définie, une membrane déformable élastiquement (6), dans lequel ladite membrane (6) est fixée à un cadre (5), ladite membrane (6) étant au moins partiellement recouverte sur un seul côté avec une matière décorative, **caractérisée en ce qu'elle** comprend en outre des moyens pour tirer ladite membrane (6) sur ledit premier poinçon (2) de manière à se trouver dans ladite cavité (4) à l'intérieur de laquelle un matériau céramique destiné à former un article décoré est comprimé.
 14. Presse selon la revendication 13, dans laquelle ledit premier poinçon (2) est composé de matériau poreux.
 15. Presse selon la revendication 14, dans laquelle un système d'aspiration d'air est associé audit premier poinçon (2) pour créer le vide entre lui et la membrane tirée dessus (6).
 16. Presse selon la revendication 13, dans laquelle ledit deuxième poinçon (3) est de type hydrostatique.
 17. Presse selon la revendication 13, dans laquelle ladite membrane (6) est constituée d'un matériau polyuréthane ou silicone élastique.
 18. Presse selon la revendication 13, dans laquelle lesdits moyens pour tirer ladite membrane (6) sur ledit premier poinçon (2) comprennent un chariot (9) couissant à la fois dans une direction perpendiculaire et dans une direction parallèle à la direction dans laquelle les poinçons (2, 3) se déplacent, ledit chariot (9) comprenant des premiers et deuxièmes moyens de couplage, lesdits premiers moyens de couplage étant agencés pour prélever une membrane décorée (6) et l'amener à la cavité de moulage (4), lesdits deuxièmes moyens de couplage étant agencés pour prélever la membrane déjà utilisée (6) de ladite cavité (4) et la porter vers des moyens d'extraction.
 19. Presse selon la revendication 18, dans laquelle lesdits premiers et deuxièmes moyens de couplage comprennent un système de préhension de type à aimant (16).
 20. Presse selon la revendication 18, dans laquelle lesdits deuxièmes moyens de couplage sont munis d'une paire de roues (18) agencées pour coopérer avec des nervures en forme d'arc (17) de manière à renverser la membrane (6) avant qu'elle ne soit transférée aux moyens d'extraction.

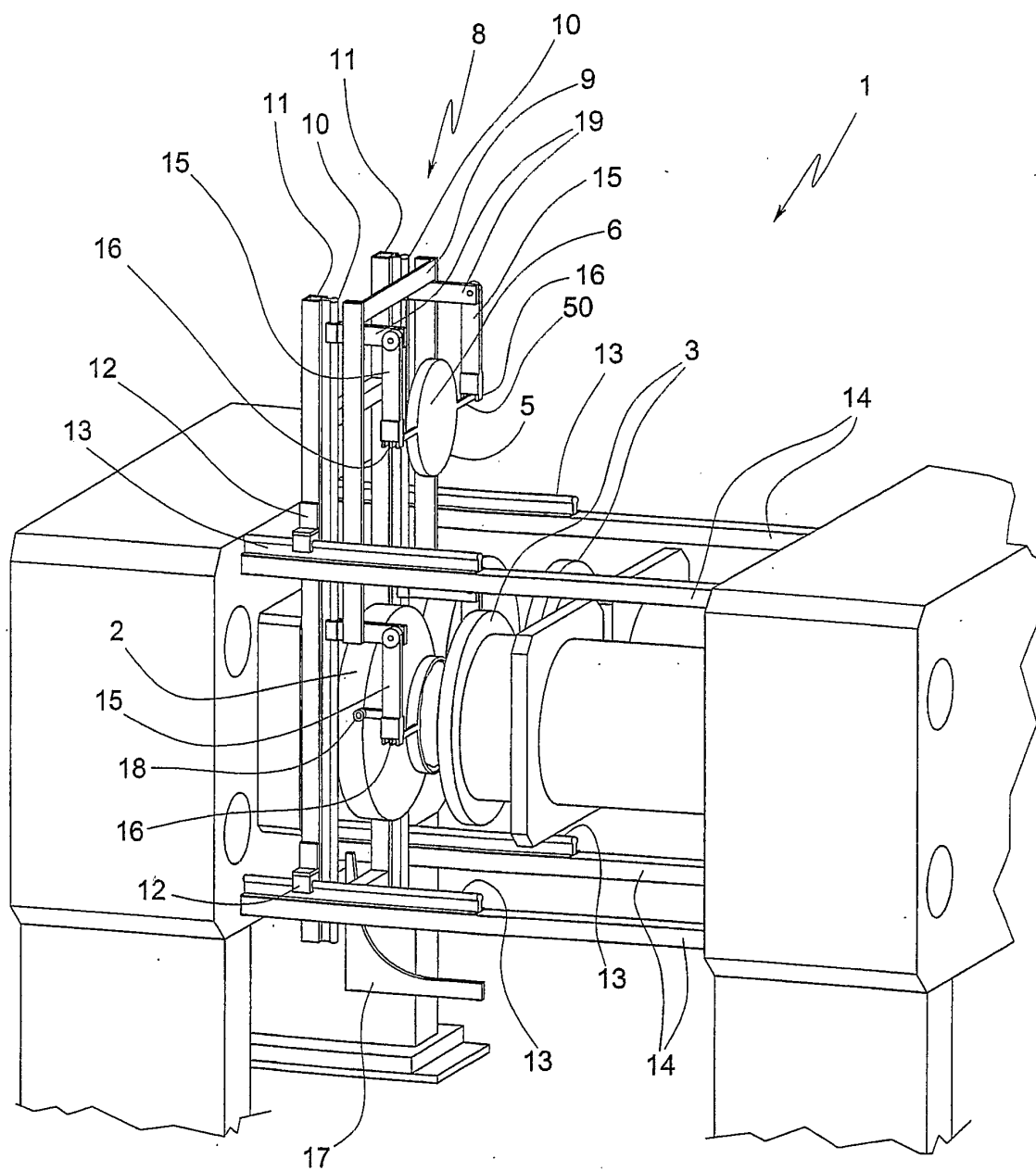


FIG.1

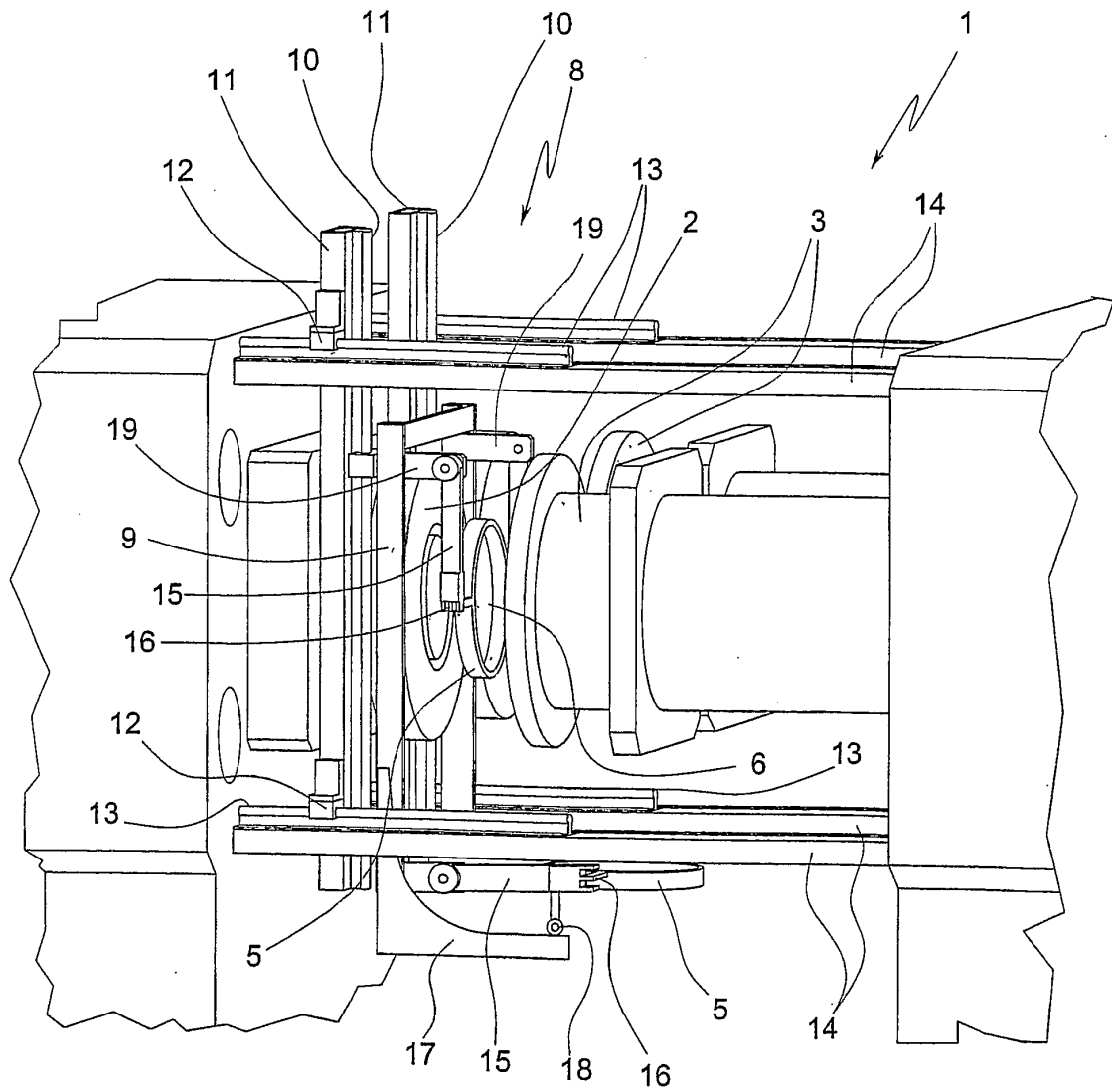


FIG.2

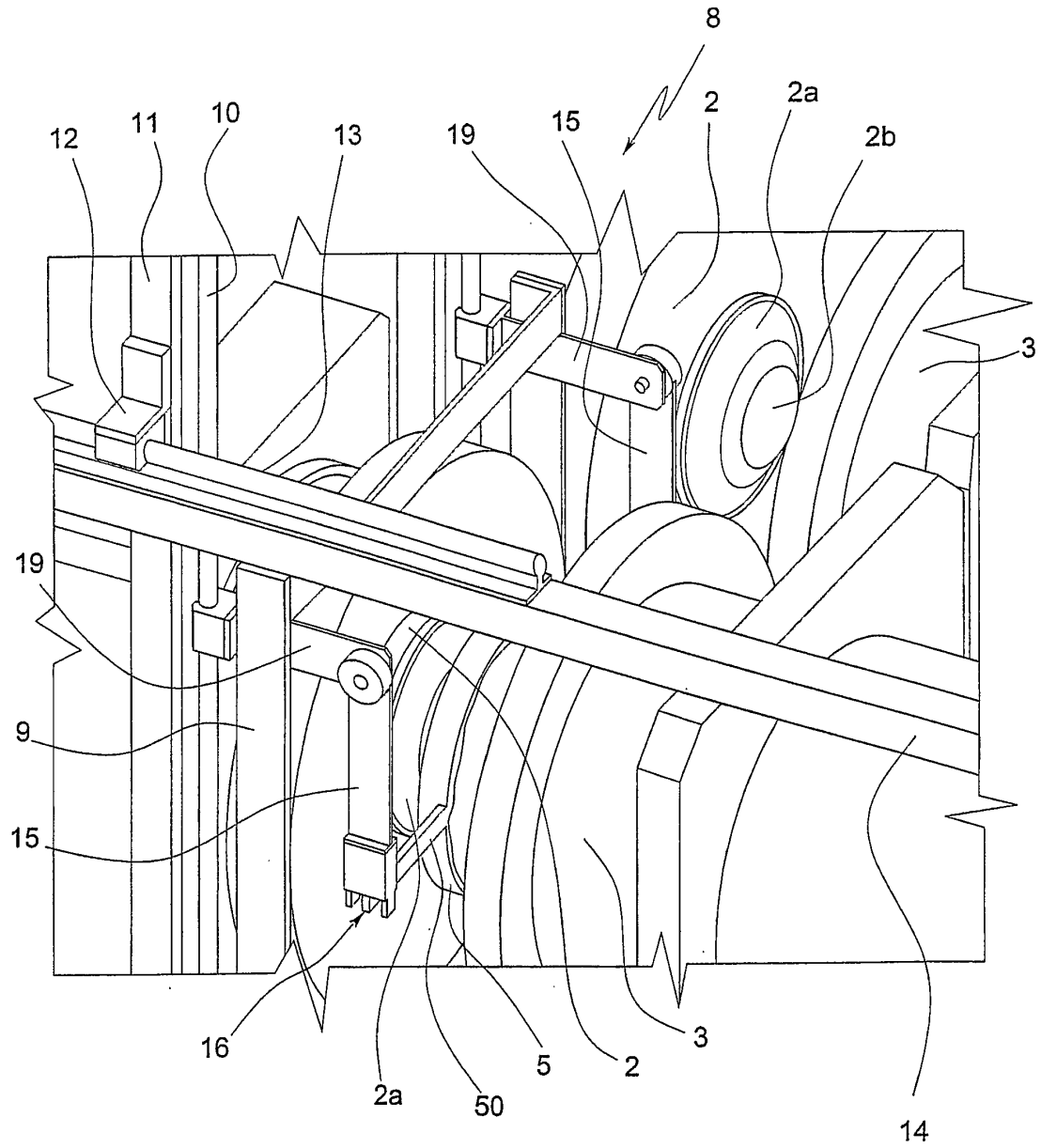


FIG.3

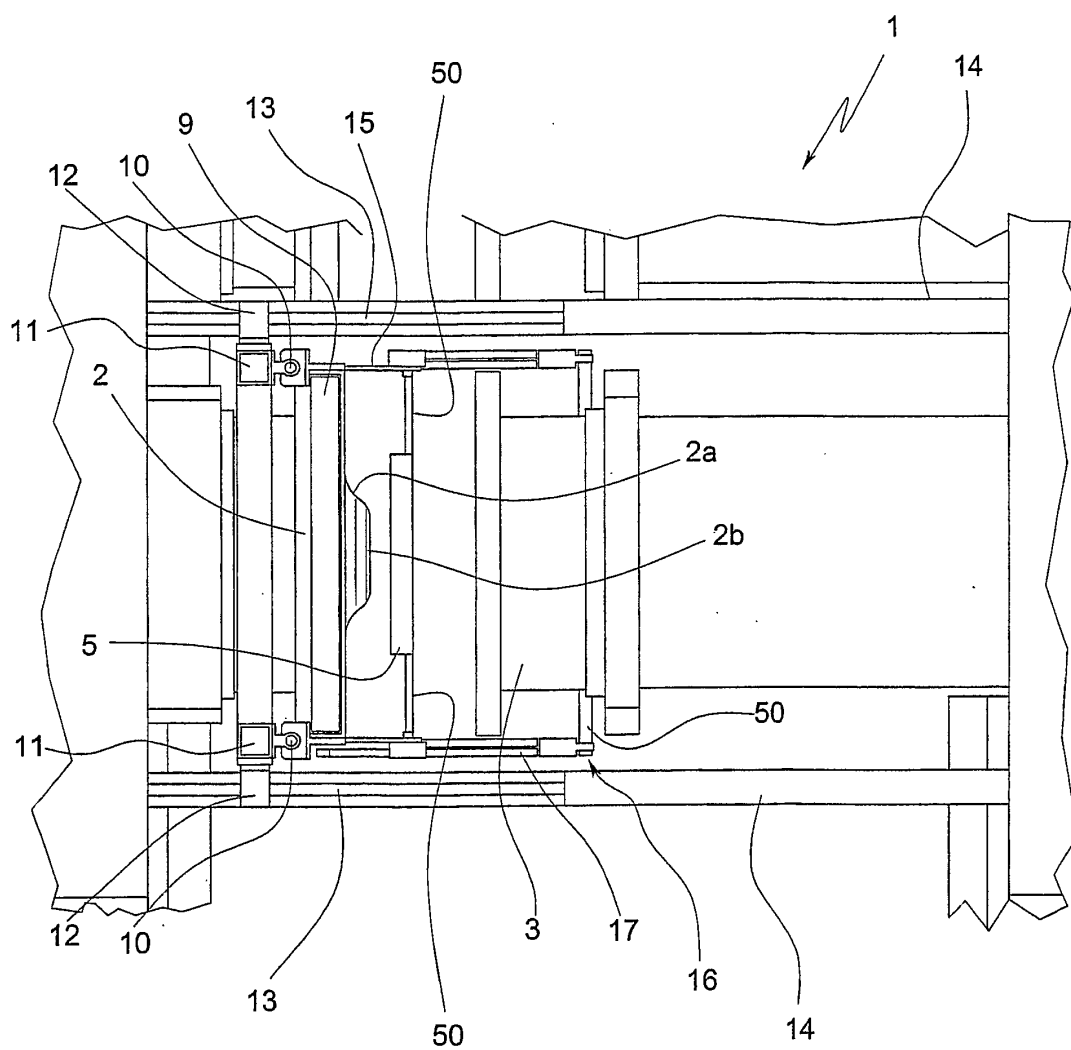


FIG.4

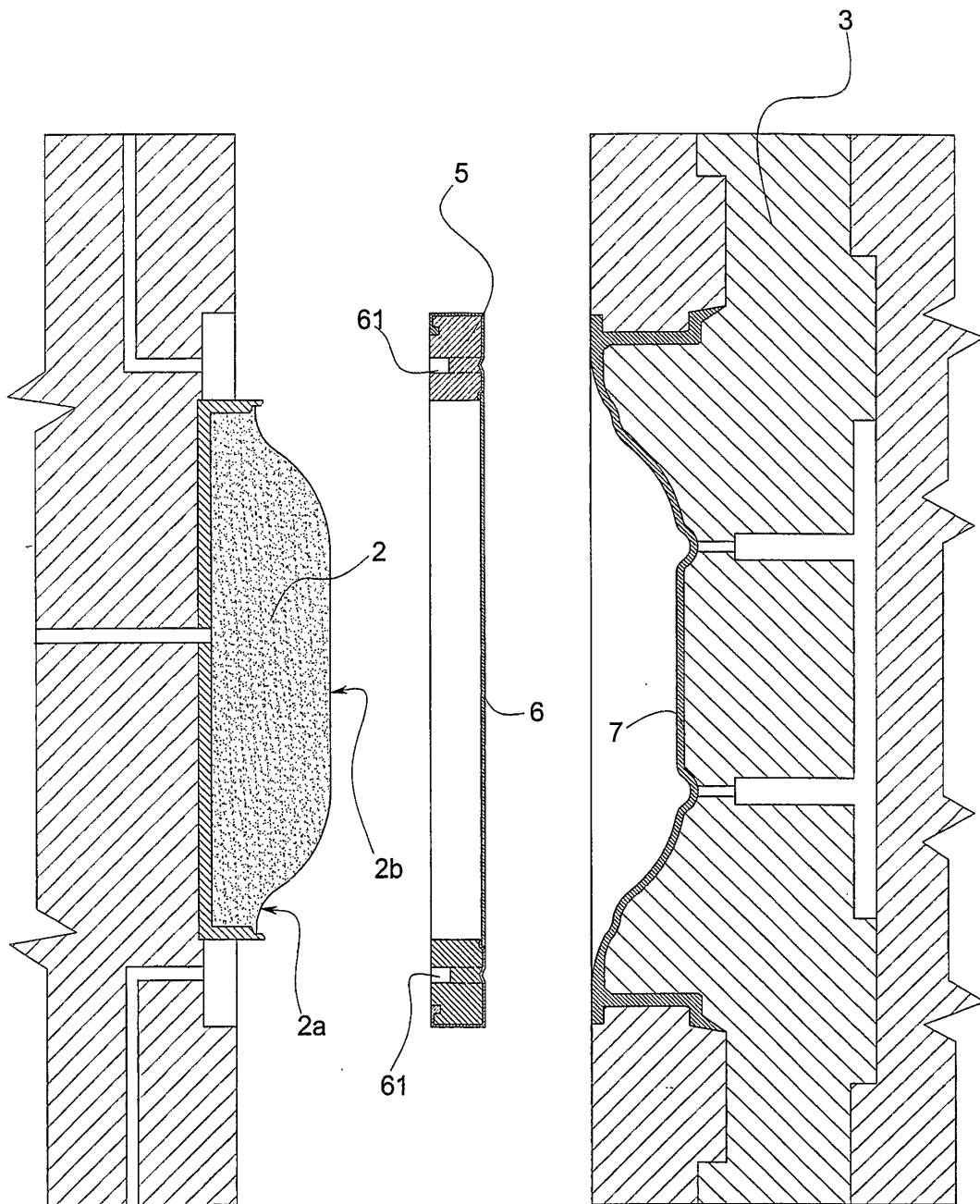


FIG.5

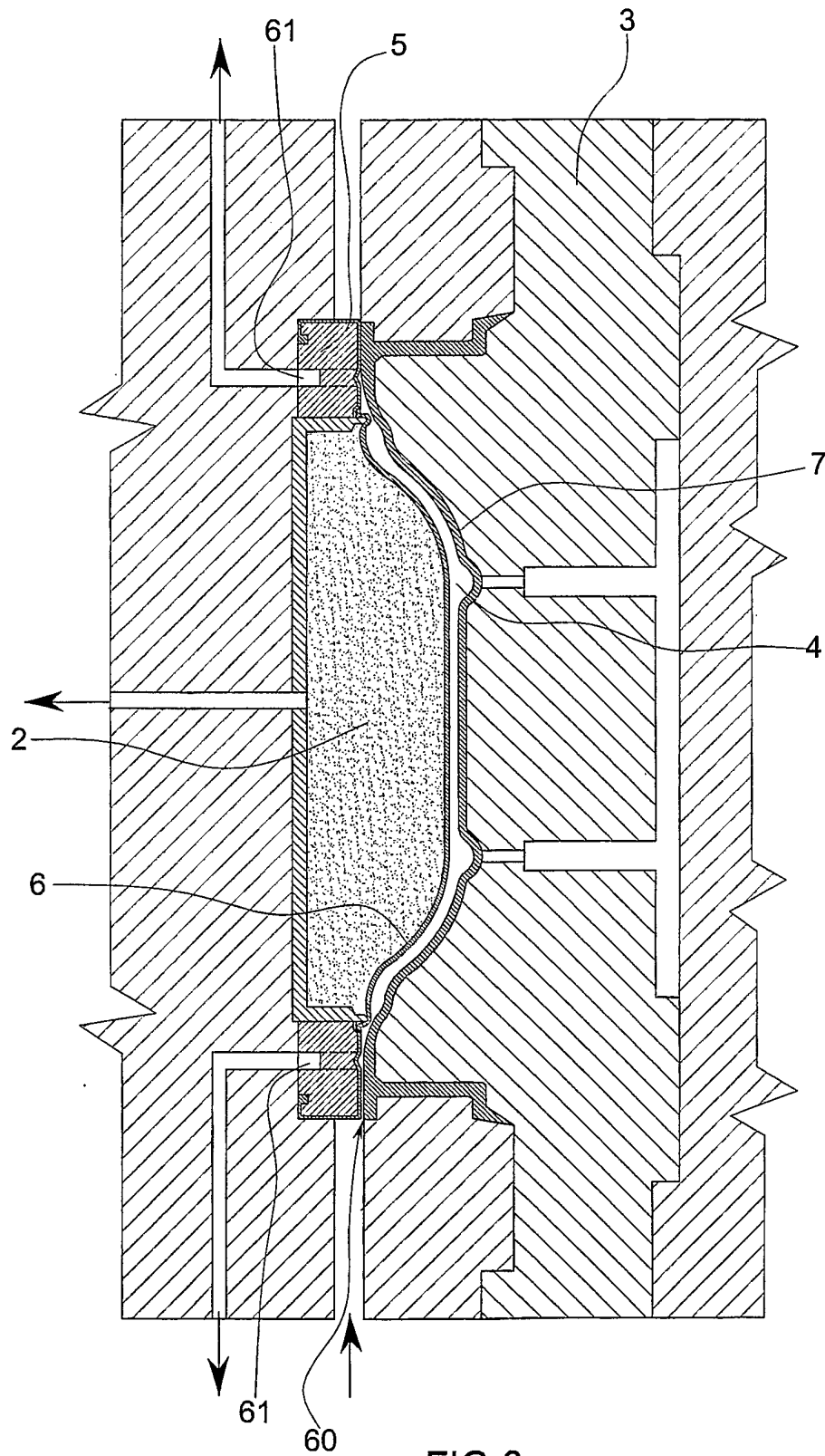


FIG.6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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