

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 561 613 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
11.06.1997 Bulletin 1997/24

(51) Int. Cl.⁶: **B28B 7/00**, B28B 1/26

(21) Application number: **93301988.7**

(22) Date of filing: **16.03.1993**

(54) Moulding apparatus

Formgebungsvorrichtung

Dispositif de moulage

(84) Designated Contracting States:
**AT BE CH DE DK ES FR GB GR IE IT LI LU NL PT
SE**

(30) Priority: **18.03.1992 GB 9205838**

(43) Date of publication of application:
22.09.1993 Bulletin 1993/38

(73) Proprietor: **British Ceramic Research Limited
Stoke-on-Trent Staffordshire ST4 7LQ (GB)**

(72) Inventors:
• **Twentyman, Maurice Edward
Newcastle, Staffordshire (GB)**
• **Turner, John Barrie
Endon, Stoke-on-Trent (GB)**

(74) Representative: **Sales, Robert Reginald et al
Swindell & Pearson,
48 Friar Gate
Derby DE1 1GY (GB)**

(56) References cited:
**EP-A- 0 317 720 AT-A- 327 077
DE-A- 1 940 527 DE-A- 3 508 892
FR-A- 2 602 452 US-A- 4 259 279
US-A- 4 954 062**

• **PATENT ABSTRACTS OF JAPAN vol. 7, no. 120
(M-217)25 May 1983 & JP-A-58 038 118 (TOYODA
GOSEI KK) 5 March 1983**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 561 613 B1

Description

This invention concerns improvements in or relating to moulding apparatus, and particularly but not exclusively moulding apparatus for use in pressure slip casting of ceramic articles.

In pressure slip casting a mould is filled with slip and pressure is applied to the slip. Pressure casting provides for a number of advantageous features relative to conventional slip casting. However, in pressure casting particular attention must be paid to clamping together the parts of the mould. The current method of clamping together pressure casting moulds uses hydraulic rams. This method demands very expensive machinery, and for high casting pressures also demands very rigid and hence expensive support frames for the mould. Whilst attempts have been made to use multi part moulds, the closing of moulds by hydraulic rams is commercially still limited to two part moulds. Such moulds may be used to form lavatory basins or simple tableware shapes. Even for small shapes the clamping of multi part moulds with hydraulic rams tends to be prohibitively expensive and/or too cumbersome to be viable.

GB2196288 discloses a pressure slip casting installation wherein the mould parts are located within a pressure resisting container. During casting elevated pressure is provided in the interior and exterior of the mould parts. A plurality of inflatable bladders are provided to position the mould parts correctly. In view of the elevated pressure within the container, the bladders are only required to provide a positioning role, rather than a clamping role resisting the elevated pressure within the mould.

US4259279 discloses a non-pressure casting installation where an inflatable member is provided on one interior side of an openable frame.

The term "inflatable" when hereinafter used in this specification is to be understood as referring to a closed flexible member which can be filled and thus expanded with a fluid, whether it be liquid or gas.

According to the present invention there is provided pressure slip casting moulding apparatus comprising a rigid support member, a plurality of mould pieces cooperating together to define a closed mould with means permitting the mould to be filled with fluid, the mould pieces being locatable between opposing parts of the support member, characterised in that the apparatus comprises an inflatable member which is locatable between at least one of the mould pieces and the support member to substantially cover at least one side of the mould pieces, with an opposite side being supported substantially wholly thereacross, whether by the same or a further inflatable member or the support member wherein the inflatable member can be filled with fluid to clamp the mould pieces together.

The support member is preferably shaped to at least partially surround the mould pieces. The support member can desirably encircle the mould pieces.

The support member may include end portions. Corresponding inflatable members may be provided for each end portion.

The apparatus may comprise means which permit the mould pieces to be tilted.

The apparatus may be arranged such that mould pieces can be moved into position between the opposing parts of the support member.

One or more of said opposing parts may be selectively movable to permit movement of the mould pieces to between said opposing parts. Said one or more of the opposing parts may be pivotally movable.

The support member may comprise a movable base support upon which the mould pieces are locatable. A track may be provided along which said base support is movable. A plurality of base supports may be provided to enable mould pieces to be placed on a one thereof whilst moulding takes place in mould pieces located on another thereof. The track may extend from opposite sides of the support member so that base supports from opposite sides may alternately comprise part of the support member.

The base support may comprise a sprung wheel means arrangement constructed such that when a predetermined downward force is applied thereto the arrangement retracts such that the whole of said force is not borne thereby.

The inflatable member may be shaped to substantially line the inside of the support member.

The support member may comprise an open frame with the inflatable member engagable against an engagement surface provided on the frame.

A plurality of inflatable members may be provided.

Alternatively the support member may be cylindrical and the inflatable member may comprise a cylindrical sleeve.

Alternatively, the inflatable member may comprise an elongate member which may be wrapped around the mould pieces or around the inside of the support member.

The mould pieces are preferably made of a porous plastics material and desirably polymethylmethacrylate.

Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic cross sectional side view of a first embodiment of the present invention in use;

Fig. 2 is a similar view of a second embodiment according to the present invention;

Fig. 3 is an end view of a further embodiment according to the invention;

Fig. 4 is a view along the line X-X in Fig. 3;

Fig. 5 is a cross-sectional end view of a similar apparatus to Fig. 3 but with a more complex item

being - moulded; and

Fig. 6 is a view along the line Y-Y in Fig. 5.

Fig. 1 shows moulding apparatus 10 for use in pressure slip casting of ceramic items. The apparatus 10 comprises a two part cylindrical mould 12 defining an inner moulding cavity 14. The mould 12 is made for example of a porous plastics material such as polymethylmethacrylate.

Inlet tubes 16A and 16B extend through the mould 12 into the cavity 14 to permit entry of slip, air and pressure thereto. A network of pipes (not shown) extends through each of the mould parts 12 which connect with pipes 18 extending from the mould parts 12 for connection to pressurized air for releasing a cast item from the mould 12.

The mould 12 is coaxially located in a steel cylinder 20 with a clearance of approximately two centimetres. The cylinder 20 is capable of withstanding internal pressures of in the order of $2 \cdot 10^6$ Pa (300 psi). An inflatable rubber bag 22 is provided around the inside of the cylinder 20. A pipe 24 leads into the bag 22 to permit pressurized fluid to be supplied thereto. The bag 22 is held on the cylinder 20 by retaining rings 26.

In use, the two parts of the mould 12 are strapped together and placed inside the cylinder 20. Pressurized fluid, which may be air or water, is then pumped into the bag 22 to clamp the mould parts 12 together within the cylinder 20. The mould 12 is then filled with casting slip through tube 16A and pressure is applied thereto. After a required interval of time the slip pressure through the tube 16A is released and air is blown through the pipe 16B while the slip drains and for a further time to firm up the cast. The bag 22 is then allowed to deflate permitting the mould 12 to be removed from the cylinder 20 for demoulding.

The cast is demoulded by connecting the tubes 18 to an air supply. Air is applied to one half of the mould at the same time as the mould is parted. This causes a thin film of water to be formed at the mould cast interface and promotes release of the first mould half. The cast is then removed from the second half by application of air to the second mould half.

If required, a further mould could be placed in the cylinder 20 and the process repeated whilst the demoulding continues with the original mould 12. The fluid pressure in the bag 22 is preferably at least as great if not greater than the fluid pressure of slip in the cavity 14. If required, the cylinder 20 may be pivoted as required during casting or draining.

Fig. 2 shows moulding apparatus 30 usable for example in slip casting a pitcher with a foot. A similar arrangement could also be used for a WC. In this instance a four part mould 32 is used, comprising two side portions 34, a top portion 36 and a base portion 38 which define an inner mould cavity 40. Again a cylinder 20 is provided with a bag 22. However, in this instance a top retaining plate 42 is provided across the top of the

cylinder 20 with a corresponding bag 44, and also a base retaining plate 46. The top plate 42 and bag 44 could be replaced by a flexible bellows clamp or other clamping arrangement. Suitable tubes and pipes are again provided extending into the mould 32 and cavity 40.

Figs. 3 and 4 show further moulding apparatus 50 usable in pressure slip casting of ceramic items. In the present instance a wash basin 52 is being cast.

The apparatus 50 comprises a rigid open metal frame 54 capable of withstanding considerable force. The frame 54 comprises a substantially square base 56 from which extends side walls 58 and end walls 60. The end walls 60 are pivotally mounted to the side walls 58 by pivots 62 which permit the end walls to be opened to allow loading of the apparatus. Locking pins 64 are provided for securing the end walls 60 in a closed position.

The base 56 is mounted on a ground engaging support 66. The base 56 is mounted on one side to the support 66 by a pivotal mounting 68 and on the other side by a pair of hydraulic rams 70. A track 72 extends through the frame 54 and beyond each end thereof. The track extends immediately above the base 56. One or more trolleys 74 is mountable on the track 72. The trolleys 74 have a flat support surface 76 upon which moulds can be supported. A plurality of sprung wheels 78 are provided on the underside of the trolley 74 engageable on the track 72.

Plattens 80 are provided on each end wall 60 and an air bag 82 is provided overlying one of the plattens 80. Two horizontal cross members 84 extend between the tops of the side walls 58.

In use, a multi-part mould such as the two part mould 86 shown in Figs. 3 and 4 is placed on the support surface 76 of the trolley 74 whilst the trolley 74 is located towards one end of the track 72. A respective one of the end walls 60 is opened and the trolley 74 is pushed into the frame 54 and the respective end wall 60 is closed. The air bag 82 is then inflated clamping the parts of the mould 86 together. Pressure slip casting can then take place. If required, the rams 70 can be actuated to tilt the frame 54 and hence trolley 74 to provide the required angle for the mould to ensure correct slip drainage.

After casting, if required the rams 70 are lowered and the air bag 82 is emptied. Either one of the end walls 60 is then opened and the trolley moved out of the frame 54 for demoulding. The provision of the track 72 extending from each end of the frame 54 means it would be possible for two or more trolleys 74 to be used, with trolleys 74 being fed in from alternate ends thereby permitting demoulding and loading of the moulds on to the trolleys 74 to be carried out whilst casting is taking place.

Figs. 5 and 6 show a similar apparatus 96 but being used with a more complicated multi-part mould 88 usable for making a W.C. In this instance a platten 90 is provided on the underside of the cross members 84. Further plattens 92 are also provided on each of the

side walls 58. Respective air bags 94 are provided for each of the plattens 90, 92. Casting will take place in a similar manner with the extra air bags 94 holding the various parts of the mould 88 together.

A further feature of the apparatus 96 is that the wheels 78 of the trolley 74 are sprung such that when a predetermined downward force is applied thereto by for example the respective air bag 94 engaging against the platten 90 the wheels 78 contract. In such an instance the underside of the trolley 74 engages directly against upstanding projections 98 provided on the base 56.

There is thus described moulding apparatus which permits mould parts to be firmly clamped together during pressure casting. The apparatus is of relatively simple construction and can thus be inexpensively and robustly manufactured. This apparatus readily lends itself to use with moulds comprising more than two parts. The apparatus permits relatively large items to be cast and with regard to the first type of apparatus described cylinders with a diameter of one metre or so could readily be used. The cost of providing a cylinder of this size is much less than that for providing the relatively large rams that would be required otherwise.

The apparatus also readily lends itself to automation of the various stages. The use of the support members described frees the top and bottom of the mould for easy application of an axial clamping force thus permitting further mould parts to be used, thereby enabling relatively complex shapes to be cast. A single support member could be used for casting many different shapes. This arrangement would permit experimental multi part mould systems to be developed relatively cheaply. This apparatus is complementary to the present pressure casting battery machines.

Various other modifications may be made without departing from the scope of the invention as defined in the appended claims. For example, whilst the described examples have been involved with relatively large articles, similar apparatus could be used to make relatively small articles such as tableware and in particular handles. Apparatus according to the invention could in fact be used with a wide range of ceramic products and particularly the whole range of sanitary ware. Instead of inflatable bags, elongate inflatable members could be used which could either be wrapped around the moulds or wrapped around the inside of the support member. The inflatable bags or members can be inflated with air or other gases, or liquids such as water.

The apparatus is usable with plaster of paris moulds as well as plastic moulds. The support members may have shapes other than those described and could be made from for example reinforced concrete. The apparatus and particularly apparatus of the type shown in Figs. 3 to 6 could be used simultaneously with a plurality of moulds, the moulds being stacked side-by-side or on top of each with the respective inflatable member or members clamping the moulds together and closed. In the case of moulds for W.C.s a plurality could be stacked together by a single air bag with individual

air bags for the top of each mould and/or the sides thereof.

Claims

1. Pressure slip casting moulding apparatus (10, 50, 96) comprising a rigid support member (20, 54), a plurality of mould pieces (12, 34, 36, 86, 88) co-operable together to define a closed mould (12, 32, 86, 88) with means permitting the mould to be filled with fluid, the mould pieces being locatable between opposing parts of the support member, characterised in that the apparatus comprises an inflatable member (22, 82, 94) which is locatable between at least one of the mould pieces and the support member to substantially cover at least one side of the mould pieces, with an opposite side being supported substantially wholly thereacross, whether by the same or a further inflatable member or the support member, wherein the inflatable member (22, 82, 94) can be filled with fluid to clamp the mould pieces (12, 34, 36, 86, 88) together.
2. Apparatus according to claim 1, characterised in that the support member (20, 54) is shaped to at least partially surround the mould pieces (12, 34, 36, 86, 88).
3. Apparatus according to claims 1 or 2, characterised in that the support member (20, 54) includes end portions (36, 38, 56, 84).
4. Apparatus according to claim 3, characterised in that corresponding inflatable members (44, 94) are provided for each end portion (36, 38, 56, 84).
5. Apparatus according to any of the preceding claims, characterised in that the apparatus (50, 96) comprises means (70) which permit the mould pieces (12, 34, 36, 86, 88) to be tilted.
6. Apparatus according to any of the preceding claims, characterised in that the apparatus (10, 50, 96) is arranged such that mould pieces (86, 88) can be moved into position between the opposing parts of the support member (54).
7. Apparatus according to claim 6, characterised in that one or more of said opposing parts is selectively movable to permit movement of the mould pieces (86, 88) to between said opposing parts.
8. Apparatus according to any of the preceding claims, characterised in that the support member (54) comprises a movable base support (74) upon which the mould pieces are locatable.
9. Apparatus according to claim 8, characterised in that a track (72) is provided along which said base

support (74) is movable.

10. Apparatus according to claims 8 or 9, characterised in that a plurality of base supports (74) are provided to enable mould pieces (86, 88) to be placed on a one thereof whilst moulding takes place in mould pieces located on another thereof. 5
11. Apparatus according to claim 10, characterised in that the track (72) extends from opposite sides of the support member (54) so that base supports (74) from opposite sides may alternately comprise part of the support member. 10
12. Apparatus according to any of claims 8 to 11, characterised in that the base support (74) comprises a sprung wheel means arrangement (78) constructed such that when a predetermined downward force is applied thereto the arrangement retracts such that the whole of said force is not borne thereby. 15 20
13. Apparatus according to any of the preceding claims, characterised in that the inflatable member (22) is shaped to substantially line the inside of the support member (20). 25
14. Apparatus according to any of the preceding claims, characterised in that the support member comprises an open frame (54) with the or each inflatable member (82, 94) engagable against an engagement surface (90, 92) provided on the frame. 30
15. Apparatus according to any of the preceding claims, characterised in that the apparatus (10, 50, 96) is arranged such that a closed mould (12, 32, 86, 88) can readily be removed from the support member (20, 54) to permit further mould pieces (12, 34, 36, 86, 88) to be located thereat, whereby to allow casting in said further mould pieces whilst said closed mould is demoulded. 35 40
16. Apparatus according to any of the preceding claims, characterised in that a plurality of inflatable members (22, 82, 94) are provided. 45
17. Apparatus according to any of the preceding claims, characterised in that the inflatable member comprises an elongate member which may be wrapped around the mould pieces (12, 34, 36, 86, 88) or around the inside of the support member (20, 54). 50
18. Apparatus according to any of the preceding claims, characterised in that the mould pieces (12, 34, 36, 86, 88) are made of a porous plastics material. 55

Patentansprüche

1. Formgebungsvorrichtung (10,50,96) für den Schlickerguß unter Anwendung von Druck, mit einem starren Halteglied (20,54) und einer Mehrzahl von zusammenwirkenden Formstücken (12,34,36,86, 88) zur Bildung einer geschlossenen Form (12,32,86,88) mit Mitteln zum Füllen der Form mit Fluid, wobei die Formstücke zwischen entgegengesetzten Teilen des Halteglieds anordenbar sind, dadurch gekennzeichnet, daß die Vorrichtung ein aufblasbares Glied (22,82,94) enthält, das zwischen mindestens einem der Formstücke und dem Halteglied anordenbar ist, um mindestens eine Seite der Formstücke im wesentlichen zu bedecken, wobei eine entgegengesetzte Seite im wesentlichen vollständig über sie hinweg entweder durch das gleiche oder ein weiteres aufblasbares Glied oder das Halteglied gehalten wird, wobei das aufblasbare Glied (22,82,94) zum Zusammenspannen der Formstücke (12,34,36,86,88) mit Fluid gefüllt werden kann.
2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Halteglied (20,54) so geformt ist, daß es mindestens zum Teil die Formstücke (12,34,36,86,88) umgibt.
3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Halteglied (20,54) Endbereiche (36,38,56,84) enthält.
4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß für jeden Endbereich (36,38,56,84) entsprechende aufblasbare Glieder (44,94) vorgesehen sind.
5. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Vorrichtung (50,96) Mittel (70) zum Schrägstellen der Formstücke (12,34,36,86,88) enthält.
6. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Vorrichtung (10,50,96) so ausgebildet ist, daß die Formstücke (86,88) in eine Position zwischen den entgegengesetzten Teilen des Halteglieds (54) bewegt werden können.
7. Vorrichtung nach Anspruch 6, dadurch gekennzeichnet, daß eines oder mehrere der entgegengesetzten Teile selektiv bewegbar ist, um eine Bewegung der Formstücke (86,88) zwischen die entgegengesetzten Teile zu ermöglichen.
8. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das Halteglied (54) einen bewegbaren Basishalter (74) enthält, auf dem die Formstücke anordenbar sind.

9. Vorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß eine Laufbahn (72) vorgesehen ist, entlang der der Basishalter (74) bewegbar ist.
10. Vorrichtung nach Anspruch 8 oder 9, dadurch gekennzeichnet, daß eine Mehrzahl von Basishaltern (74) vorgesehen ist, so daß es möglich ist, Formstücke (86,88) auf einen von ihnen zu stellen, während in auf einem anderen von ihnen angeordneten Formstücken ein Formvorgang stattfindet.
11. Vorrichtung nach Anspruch 10, dadurch gekennzeichnet, daß sich die Laufbahn (72) von entgegengesetzten Seiten des Halteglieds (54) aus erstreckt, so daß Basishalter (74) von entgegengesetzten Seiten her abwechselnd einen Teil des Halteglieds bilden können.
12. Vorrichtung nach einem der Ansprüche 8 bis 11, dadurch gekennzeichnet, daß der Basishalter (74) eine Anordnung (78) von federnden Radmitteln enthält, die so konstruiert ist, daß die Anordnung, wenn eine vorbestimmte Kraft nach unten hin darauf ausgeübt wird, so nachgibt, daß nicht die gesamte Kraft dadurch aufgenommen wird.
13. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das aufblasbare Glied (22) so geformt ist, daß es die Innenseite des Halteglieds (20) im wesentlichen auskleidet.
14. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das Halteglied einen offenen Rahmen (54) mit dem oder jedem aufblasbaren Glied (82,94) enthält, das gegen eine am Rahmen vorgesehene Anlagefläche (90,92) abstützbar ist.
15. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Vorrichtung (10,50,96) so ausgebildet ist, daß eine geschlossene Form (12,32,86,88) leicht aus dem Halteglied (20,54) entfernt werden kann, damit weitere Formstücke (12,34,36,86,88) dort angeordnet werden können, wodurch ein Gießen in den weiteren Formstücken ermöglicht wird, während die geschlossene Form geöffnet wird.
16. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß eine Mehrzahl von aufblasbaren Gliedern (22,82,94) vorgesehen ist.
17. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das aufblasbare Glied ein längliches Glied enthält, das um die Formstücke (12,34,36,86,88) oder um die Innenseite des Halteglieds (20,54) gewickelt werden kann.

18. Vorrichtung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Formstücke (12,34,36,86,88) aus einem porösen Kunststoffmaterial hergestellt sind.

Revendications

1. Appareil de moulage (10, 50, 96) par coulée en barbotine sous pression, comprenant un élément de support rigide (20, 54), une pluralité de parties de moule (12, 34, 36, 86, 88) pouvant coopérer pour définir un moule fermé (12, 32, 86, 88) avec des moyens permettant au moule d'être rempli de fluide, les parties de moule pouvant être placées entre des parties opposées de l'élément de support, caractérisé en ce que l'appareil comprend un élément gonflable (22, 82, 94) pouvant être placé entre au moins l'une des parties de moule et l'élément de support, afin de sensiblement recouvrir au moins un côté des parties de moule, un côté opposé étant supporté sensiblement complètement à travers cet ensemble, soit par le même élément gonflable, soit par un autre, soit par l'élément de support, l'élément gonflable (22, 82, 94) pouvant être rempli de fluide afin de serrer les parties de moule (12, 34, 36, 86, 88) ensemble.
2. Appareil selon la revendication 1, caractérisé en ce que l'élément de support (20, 54) est formé de telle sorte qu'il entoure, au moins partiellement, les parties de moule (12, 34, 36, 86, 88).
3. Appareil selon les revendications 1 ou 2, caractérisé en ce que l'élément de support (20, 54) comprend des parties terminales (36, 38, 56, 84).
4. Appareil selon la revendication 3, caractérisé en ce que des éléments gonflables (44, 94) correspondants sont prévus pour chaque partie terminale (36, 38, 56, 84).
5. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'appareil (50, 96) comprend des moyens (70) qui permettent aux parties de moule (12, 34, 36, 86, 88) d'être retournées.
6. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'appareil (10, 50, 96) est conçu pour que les parties de moule (86, 88) puissent être mises en place entre les parties opposées de l'élément de support (54).
7. Appareil selon la revendication 6, caractérisé en ce que l'une des parties opposées, ou plusieurs d'entre elles, peuvent être déplacées de façon sélective afin que les parties de moule (86, 88) puissent venir se placer entre les parties opposées.

8. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'élément de support (54) comprend un support formant base (74) mobile sur lequel les parties de moule peuvent être placées. 5
9. Appareil selon la revendication 8, caractérisé en ce qu'est prévue une glissière (72) le long de laquelle le support formant base (74) peut se déplacer. 10
10. Appareil selon les revendications 8 ou 9, caractérisé en ce qu'une pluralité de supports formant base (74) sont prévus pour permettre aux parties de moule (86, 88) d'être placées sur l'un d'entre eux, tandis que le moulage est réalisé dans des parties de moule placées sur un autre support. 15
11. Appareil selon la revendication 10, caractérisé en ce que la glissière (72) s'étend à partir de côtés opposés de l'élément de support (54), de telle sorte que les supports formant base (74) de côtés opposés peuvent, en alternance, comprendre une partie de l'élément de support. 20
12. Appareil selon l'une quelconque des revendications 8 à 11, caractérisé en ce que le support formant base (74) comprend un dispositif à roue suspendu sur ressorts (78) conçu pour que, lorsqu'une force prédéterminée dirigée vers le bas est appliquée sur celui-ci, le dispositif se rétracte afin que la force ne soit pas supportée en totalité par lui. 25 30
13. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'élément gonflable (22) présente une forme lui permettant de garnir sensiblement l'intérieur de l'élément de support (20). 35
14. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'élément de support comprend un cadre ouvert (54), l'élément gonflable (82, 94) ou chaque élément gonflable pouvant s'appuyer contre une surface d'appui (90, 92) prévue sur le cadre. 40 45
15. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'appareil (10, 50, 96) est conçu pour qu'un moule fermé (12, 32, 86, 88) puisse être facilement retiré de l'élément de support (20, 54), afin de permettre à d'autres parties de moule (12, 34, 36, 86, 88) d'y être placées, pour permettre la coulée dans ces autres parties de moule tandis que le moule fermé est démoulé. 50
16. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce qu'une pluralité d'éléments gonflables (22, 82, 94) sont prévus. 55
17. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que l'élément gonflable comprend un élément allongé pouvant être enroulé autour des parties de moule (12, 34, 36, 86, 88) ou autour de l'intérieur de l'élément de support (20, 54). 18. Appareil selon l'une quelconque des revendications précédentes, caractérisé en ce que les parties de moule (12, 34, 36, 86, 88) sont faites en une matière plastique poreuse.

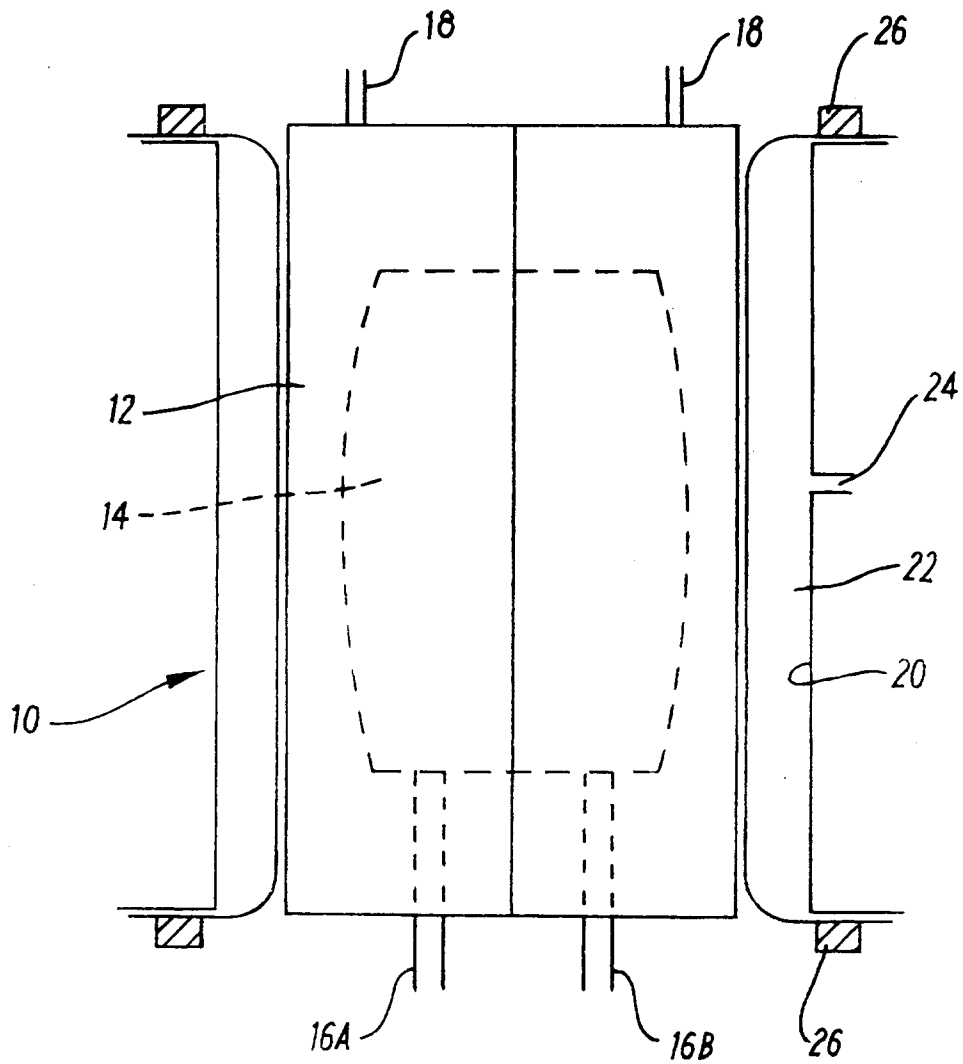


Fig. 1

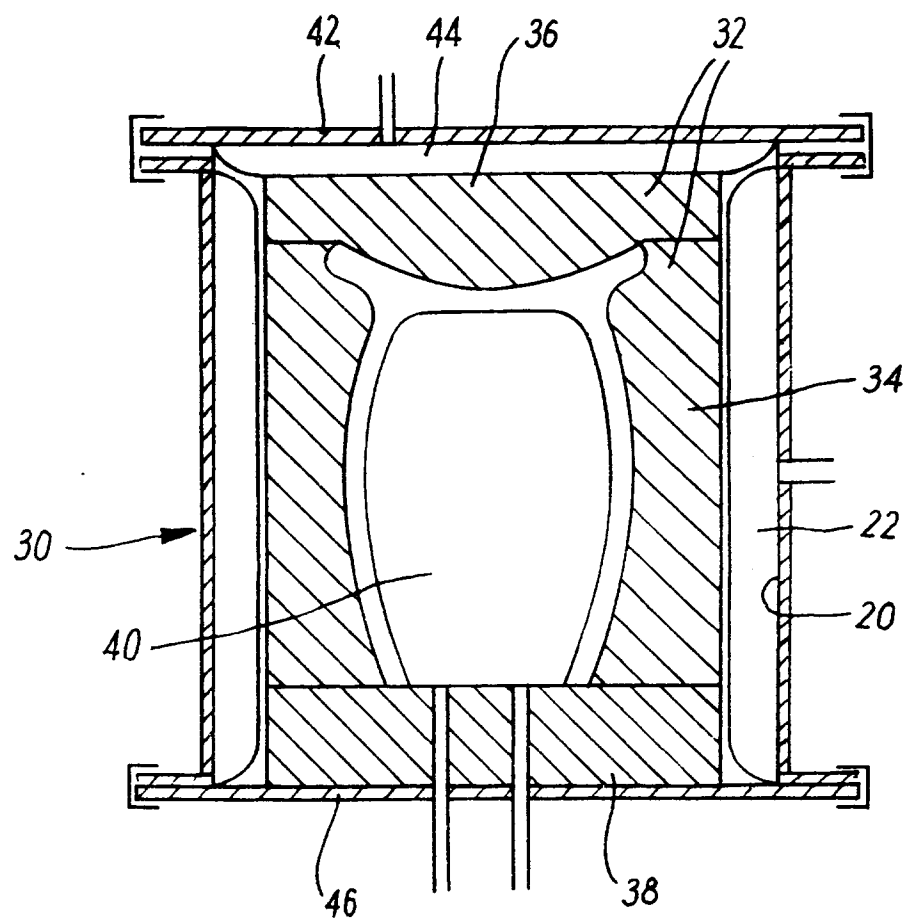


FIG 2

