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(54) PLANT FOR THE PRESSURE SLIP CASTING OF HYGIENIC-SANITARY ARTICLES

ANLAGE FÜR DEN DRUCKSCHLICKERGUSS VON HYGIENE- BZW. SANITÄRARTIKELN
INSTALLATION POUR LE COULAGE EN BARBOTINE SOUS PRESSION D'ARTICLES DU
DOMAINE HYGIÉNIQUE-SANITAIRE

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Description

Technical Field

[0001] The present invention relates to a plant for the pressure slip casting of hygienic-sanitary articles.

Background Art

[0002] Plants are known which, by means of the casting of ceramic material in the form of slip inside specific moulds, allow manufacturing hygienic-sanitary articles such as lavatory pans, WCs, bidets, washbasins or the like.

[0003] One particular type of plant is known from the document EP 0 885 701 which discloses all features of the preamble of claim 1. Such plant has a plurality of opening and closing moulds, each mould having a lower mould element, two side mould elements, an upper mould element and a cross mould element.

[0004] The closing of the side mould elements is by means of two special side cylinders which bring them together and keep them tight in an axial direction.

[0005] To tighten the upper and lower mould elements and secure these on the other mould elements, on the other hand, the plant envisages the use of specific vertical retention rods, which are integrated in the side mould elements and which, in the lower part, can be fastened to the lower mould elements, while in the upper part, they can be fastened to specific automated fastening devices.

[0006] Such automated fastening devices, in practice, consist of a through hole obtained at the top of the retention rods and in corresponding fork elements, mounted on the upper mould elements and having through openings placeable, in closed mould configuration, substantially coinciding with the holes of the retention rods, to allow fitting a link pin.

[0007] Such type of fastening, while on the one hand making it possible to firmly join together the side mould elements to the upper and lower mould elements, on the other hand has the drawback of not being able, alone, to ensure the perfect closing of the mould.

[0008] It must in fact be underscored that during casting, the ceramic material in the form of slip is initially introduced into the moulds at very low pressures, which increase considerably towards the end of the process.

[0009] It is fairly frequent in fact for mould elements to be tightly joined together at the start of the process but, afterwards, as a result of the internal pressure, to move from the initial position with the risk of creating fractures that can cause the formation of burrs on the end pieces or even the escape of the slip from the moulds.

[0010] To overcome this problem, the plant according to the document EP 0 885 701 envisages, for each mould, the use of an upper cylinder arranged vertically which, once the retention rods have been tightened, if necessary allows hydraulically pressing the upper mould element against the other mould elements to increase the closing

force of the mould.

[0011] This solution represents a very serious complication for the plant, from both a structural and functional viewpoint, inasmuch as it involves the use of particularly cumbersome upper mould elements, which are robust and difficult to lift and lower.

[0012] It must also be emphasised that the closing system of the side mould elements, which, as has been said, consists of two special side cylinders, is also particularly inconvenient because it uses release systems that place too much stress on the supporting structure.

[0013] It should not be forgotten, furthermore, that the above plant has rather high total manufacturing and installation costs and is affected by flaws and malfunctions which can occur during use, with consequent increase of production costs of the hygienic-sanitary articles which, inevitably, are passed onto the retail sales price, with the risk of making the manufactured products less attractive for customers.

[0014] Other technical solutions are described in the patent documents DE 21 43 132 and JP 2 022 810.

Description of the Invention

[0015] The main aim of the present invention is to provide a plant for the pressure slip casting of hygienic-sanitary articles which allows manufacturing products such as lavatory pans, WCs, bidets, washbasins or the like in a practical and easy way and which is particularly simple from both a structural and functional viewpoint.

[0016] One object of the present invention is to provide a plant with particularly low manufacturing, installation and running cost, so as to be very attractive from an economic viewpoint for the end user, both in terms of lower investment cost and less running expenses.

[0017] Another object of the present invention is to provide a plant for the pressure slip casting of hygienic-sanitary articles that allows overcoming the mentioned drawbacks of the state of the art within the ambit of a simple, rational, easy and effective to use solution.

[0018] The above objects are achieved by the present plant for the pressure slip casting of hygienic-sanitary articles according to claim 1.

Brief Description of the Drawings

[0019] Other characteristics and advantages of the present invention will become more evident from the description of a preferred, but not sole, embodiment of a plant for the pressure slip casting of hygienic-sanitary articles, illustrated purely as an example but not limited to the annexed drawings in which:

figure 1 is an axonometric view of the plant according to the invention in opening configuration;
figure 2 is a front view of the plant according to the invention in opening configuration;
figure 3 is an axonometric view of the plant according

to the invention in closing configuration;
 figure 4 is a front view of the plant according to the invention in closing configuration;
 figure 5 is a front view, on an enlarged and partially section view, of a detail of the plant according to the invention in closing configuration;
 figure 6 is a front view, on an enlarged and partially section view, of another detail of the plant according to the invention in closing configuration;
 figure 7 is a side view of the plant according to the invention in closing configuration.

Embodiments of the Invention

[0020] With particular reference to such figures, globally indicated by 1 is a plant for the pressure slip casting of hygienic-sanitary articles.

[0021] The plant 1, in particular, is suited for the production of hygienic-sanitary articles 2 of the type of lavatory pans, WCs, bidets, washbasins or the like.

[0022] For this purpose, the plant 1 comprises a base frame 3a, 3b split into a platform 3a, substantially horizontal, and a post 3b standing at one extremity of the platform 3a along a substantially vertical but slightly oblique direction.

[0023] On the base frame 3a, 3b are mounted two side mould elements 4, 5, of which one fixed side mould element 4 and one mobile side mould element 5, and two horizontal mould elements 6, 7, of which one lower horizontal mould element 6 and one upper horizontal mould element 7.

[0024] The mould elements 4, 5, 6, 7 are reciprocally mobile between an opening configuration, wherein they are substantially away from one another for picking up the hygienic-sanitary article 2 at the end of casting, and a closing configuration, wherein they are slotted near one another and define a whole mould with an inner cavity 27 for the pressure casting of the ceramic slip and forming of the hygienic-sanitary article 2.

[0025] In particular, each mould element 4, 5, 6, 7 is split into a shaped body 4a, 5a, 6a, 7a, which is made of porous material and has a particular forming print for obtaining the hygienic-sanitary article 2, and into a rigid frame 4b, 5b, 6b, 7b which supports the corresponding shaped body 4a, 5a, 6a, 7a.

[0026] More in detail, the fixed side mould element 4 is mounted directly on the base frame 3a, 3b, with the corresponding rigid frame 4b bolted onto the platform 3a and onto the base of the post 3b and the corresponding shaped body 4a extending overhanging on the platform 3a.

[0027] The mobile side mould element 5, on the other hand, is mounted on a first guiding structure 8 sliding on the platform 3a along a first substantially horizontal sliding direction A.

[0028] For this purpose, the platform 3a has a first longitudinal guide 9, made e.g. of a plurality of horizontal rails, and the first guiding structure 8 is defined by a carriage with wheels engaged along the horizontal rails 9.

riage with wheels engaged along the horizontal rails 9.

[0029] The first guiding structure 8 supports the rigid frame 5b of the mobile side mould element 5, which in turn supports the corresponding shaped body 5a extending overhanging on the platform 3a towards the fixed side mould element 4.

[0030] Similarly to the mobile side mould element 5, the lower horizontal mould element 6 is mounted on a second guiding structure 10 which slides along the first sliding direction A.

[0031] The second guiding structure 10, e.g., is made of a corresponding carriage with wheels engaged on the horizontal rails 9 and supports the rigid frame 6b of the lower horizontal mould element 6, which in turn supports the corresponding shaped body 6a turned upwards.

[0032] The upper horizontal mould element 7 is mounted on a third guiding structure 11 sliding on the post 3b along a second sliding direction B substantially vertical and parallel to the post 3b.

[0033] For this purpose, on the post 3b, a second guide 12 is envisaged, composed e.g. of a series of vertical profiles mounted on the opposite sides of the post 3b.

[0034] The third guiding structure 11 comprises a pair of support plates which are engaged sliding along the vertical profiles 12 and which support overhanging the rigid frame 7b of the upper horizontal mould element 7, with the corresponding shaped body 7a facing downwards.

[0035] For the correct shaping of the hygienic-sanitary article 2, the plant 1 shown in the illustrations also envisages a cross mould element 13, it too split into a shaped body 13a and into a rigid frame 13b supporting the shaped body 13a. The cross mould element 13 is mounted on a fourth guiding structure 14 associated with the second guiding structure 10 and sliding with respect to the base frame 3a, 3b along a third sliding direction C substantially horizontal but slightly oblique, which is at right angles both to the first sliding direction A and to the second sliding direction B.

[0036] Advantageously, the shaped body 13a of the cross mould element 13 can be moved near to the lower horizontal mould element 6 before the reciprocal closing of the side mould elements 4, 5, so as to fit it slotted between the shaped bodies 4a, 5a of the side mould elements 4, 5 in a special housing 15 obtained in it.

[0037] Usefully the plant 1 has tightening means 16, 17, 18 for tightening the side mould elements 4, 5 and the horizontal mould elements 6, 7 in the closing configuration.

[0038] The tightening means 16, 17, 18 comprise at least a retention tie-rod 16 which is mounted on at least one of the side mould elements 4, 5, i.e. horizontal mould elements 6, 7, and has two opposite extremities which can be fastened to the horizontal mould elements 6, 7, i.e. side mould elements 4, 5.

[0039] At least one of the opposite extremities of the retention tie-rod 16, furthermore, has a swelling 19 and the tightening means 16, 17, 18 comprise a swinging

bracket 17 mounted on at least one of the horizontal mould elements 6, 7, i.e., side mould elements 4, 5, and at least a hydraulic actuator 18, of the type of a jack operated by oil under pressure, suitable for moving the swinging bracket 17 between a first idle configuration and a second fastening-on configuration of the swelling 19.

[0040] In other words, the particular tightening means 16, 17, 18 envisaged on the plant 1 can also comprise only one retention tie-rod 16 mounted on the side mould elements 4, 5, in which case the corresponding swinging bracket 17 and the corresponding hydraulic actuator 18 are mounted on one of the horizontal mould elements 6, 7, or, vice versa, envisage just one retention tie-rod 16 mounted on the horizontal mould elements 6, 7, in which case the corresponding swinging bracket 17 and the corresponding hydraulic actuator 18 are mounted on one of the side mould elements 4, 5.

[0041] Preferably however, the tightening means 16, 17, 18 envisaged in the embodiment of the plant 1 shown in the illustrations comprise a plurality of retention tie-rods 16 and an equal number of swinging brackets 17 operated by corresponding hydraulic actuators 18.

[0042] Usefully, there are two retention tie-rods 16 for each side mould element 4, 5 and for each horizontal mould element 6, 7 and these are mounted in a floating way on the corresponding rigid frames 4b, 5b, 6b, 7b, by "floating" being meant the fact that the retention tie-rods 16 are mounted with play in specific longitudinal seats 4c, 5c, 6c, 7c obtained passing from side to side on the corresponding rigid frames 4b, 5b, 6b, 7b.

[0043] More in detail, the retention tie-rods 16 mounted on the side mould elements 4, 5 are substantially vertical and parallel to the second sliding direction B while those mounted on the horizontal mould elements 6, 7 are substantially horizontal and parallel to the first sliding direction A.

[0044] The swinging brackets 17 and the respective hydraulic actuators 18, on the other hand, are mounted on the upper horizontal mould element 7, for fastening the substantially vertical retention tie-rods 16 borne by the side mould elements 4, 5, and on the mobile side mould element 5, for fastening the substantially horizontal retention tie-rods 16 borne by the horizontal mould elements 6, 7. Advantageously, the swinging brackets 17 comprise a U extremity 20 which in the second fastening configuration is locatable astride the corresponding retention tie-rod 16 against the swelling 19 for the retention of the tie-rod itself. The swinging brackets 17 also comprise a substantially median portion which is hinged to the corresponding mould element 5, 7 while the corresponding hydraulic actuator 18 is suitable for pushing the swinging bracket 17 from the substantially opposite side of the U extremity 20 by leveraging on its hinge point 21.

[0045] Usefully, the swinging brackets 17 and the hydraulic actuators 18 mounted on the top of the mobile side mould element 5 and intended to fasten onto the retention tie-rods 16 of the upper horizontal mould ele-

ment 7 are associated together by means of a link pin 22 which is integral with the rod of the hydraulic actuator 18 and which is mounted with play in a hole of the swinging bracket 17 (figure 6).

[0046] The play defined between the link pin 22 and the relative hole, in actual fact, leaves the corresponding swinging brackets 17 with limited mobility though enough to ensure the correct alignment with respect to the retention tie-rods 16 of the upper horizontal mould element 7 and their relevant fastening.

[0047] The swinging brackets 17 and the remaining hydraulic actuators 18, i.e. those mounted on the upper horizontal mould element 7 as well as those mounted at the base of the mobile side mould element 5 and intended to fasten onto the retention tie-rods 16 of the lower horizontal mould element 6, are reciprocally connected by means of a return connecting rod 23 associated with play with the relative hydraulic actuator 18.

[0048] In particular, each return connecting rod 23 has a substantially curved shape and, at one extremity, it is hinged to the relative swinging bracket 17 in the proximity of its hinge point 21 and, at the opposite extremity, it has an elongated slot 24 wherein a pivot is engaged associated with the hydraulic actuator 18.

[0049] This particular mechanism, in practice, in the second fastening configuration, allows each hydraulic actuator 18 to come into contact directly with the swinging bracket 17, to push and lever on it, while in the first idle configuration it allows moving the hydraulic actuator 18 away and dragging with it the swinging bracket 17 thanks to the return connecting rod 23.

[0050] All this helps provide the corresponding swinging brackets 17 with a very large working stroke that permits ensuring the correct alignment with the corresponding retention tie-rods 16 and the necessary fastening onto the swellings 19.

[0051] In this respect, it is underlined that the figure 5 shows a detailed partially section view of the plant 1 in closed configuration wherein are visible two of the hydraulic actuators 18 mounted on the upper horizontal mould element 7, one of which is arranged in the first idle configuration while the other is placed in the second fastening configuration.

[0052] Usefully the extremities of the retention tie-rods 16 opposite the swellings 19 have a shoulder 25, substantially identical to the swellings 19.

[0053] Each shoulder 25 is intended to fasten onto a corresponding U body 26 fastened onto the rigid frame 4b, 6b of the adjacent mould element 4, 6 so that in the second fastening configuration the U body 26 is positioned astride the corresponding retention tie-rod 16 and against the shoulder 25.

[0054] The swellings 19 and the shoulders 25 are composed, e.g., of an equal number of large washers mounted on the retention tie-rods 16 in an adjustable way; in particular, the retention tie-rods 16 have an adjustment thread onto which the large washers 19, 25 can be screwed in order to be able to adjust their relative posi-

tion.

[0055] In practice, in closed configuration, the opposite extremities of the retention tie-rods 16 are to be fastened onto by the U extremities 20 and by the U bodies 26 and to be driven by means of the operation of the swinging brackets 17, so as to block the mould elements 4, 5, 6, 7 and keep the mould closed during casting. Usefully, the plant 1 has one or more pressure transducers 28 suited to detect the pressure in the inner cavity 27 defined in closing configuration of the mould during casting, and regulation means 29 which are suited to regulate the hydraulic pressure in the hydraulic actuators 18 and are interlocked to the pressure transducers 28.

[0056] The pressure transducers 28, e.g., are arranged between the shaped bodies 4a, 5a, 6a, 7a and the corresponding rigid frames 4b, 5b, 6b and 7b.

[0057] The regulation means 29, on the other hand, consist e.g. of a hydraulic unit for the management and control of the supply in the hydraulic actuators 18, which allows increasing or reducing the pressure exercised by the hydraulic actuators 18 on the swinging brackets 17 and, consequently, the closing force of the mould elements 4, 5, 6, 7.

[0058] During casting, in fact, the pressure of the slip injected into the mould can vary considerably and the pressure transducers 28 detect these variations; the hydraulic unit 29, connected to the pressure transducers 28, reacts accordingly allowing the hydraulic actuators 18 to produce an offset force proportionate to the pressure inside the mould and, therefore, ensure the correct positioning of the mould elements 4, 5, 6, 7 during the entire casting operation without the risk of any movements of the mould determining the escape of the slip and/or the formation of burrs.

[0059] It has in fact been ascertained how the described invention achieves the proposed objects.

[0060] In this respect, it is underlined that the particular solution of envisaging a swinging bracket that can be operated by means of a hydraulic actuator for fastening onto the retention tie-rods permits obtaining a particularly simple, compact and functional plant, with a particularly reduced fabrication, installation and running cost.

[0061] Subordinately, it is also emphasized that the particular solution of envisaging a plurality of retention tie-rods arranged horizontally and vertically for the reciprocal tightening of the side mould elements and of the horizontal mould elements permits considerably reducing the structural complexity of traditional plants.

Claims

1. Plant (1) for the pressure slip casting of hygienic-sanitary articles, comprising a base frame (3a, 3b) supporting at least two side mould elements (4, 5) and two horizontal mould elements (6, 7), one of which lower (6) and one upper (7), said mould elements (4, 5, 6, 7) being reciprocally mobile between

an opening configuration and a closing configuration in which said mould elements (4, 5, 6, 7) define an inner cavity (27) for the pressure slip casting of ceramic material and the forming of hygienic-sanitary articles (2), and tightening means (16, 17, 18) of said mould elements (4, 5, 6, 7) in said closing configuration which comprise at least a retention tie-rod (16) which is mounted on at least one of said side mould elements (4, 5), or horizontal mould elements (6, 7), and having two opposite extremities that can be fastened onto said horizontal mould elements (6, 7), or side mould elements (4, 5), at least one of said opposite extremities comprising at least one swelling (19), **characterised by** the fact that:

- said tightening means (16, 17, 18) comprise at least a swinging bracket (17) mounted on at least one of said horizontal mould elements (6, 7), or side mould elements (4, 5), and at least a hydraulic actuator (18) suitable for operating said swinging bracket (17) between a first idle configuration and a second fastening configuration of said swelling (19), said swinging bracket (17) comprising at least a U extremity (20) which in said second fastening configuration can be placed astride said retention tie-rod (16) against said swelling (19); and

- said plant (1) comprises at least a pressure transducer (28) suitable for detecting the pressure in said inner cavity (27) during said slip casting and regulation means (29) for regulating the hydraulic pressure in said hydraulic actuator (18) interlocked to said pressure transducer (28).

2. Plant (1) according to claim 1, **characterised by** the fact that said swinging bracket (17) comprises a substantially median portion which is hinged to at least one of said horizontal mould elements (6, 7), or side mould elements (4, 5), said hydraulic actuator (18) being suitable for pushing said swinging bracket (17) on a substantially opposite part of said U extremity (20).

3. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that said hydraulic actuator (18) and said swinging bracket (17) are reciprocally connected by means of a return connecting rod (23) associated with play with at least one between said hydraulic actuator (18) and said swinging bracket (17).

4. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that said extremity of the retention tie-rod (16) opposite said swelling (19) comprises at least a shoulder (25) fastenable to at least a U body (26) mounted on the adjacent mould element (4, 5, 6, 7), in said second fastening

configuration said U body (26) being placeable astride said retention tie-rod (16) against said shoulder (25).

5. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that said swelling (19) is mounted on said retention tie-rod (16) in an adjustable way.
6. Plant (1) according to claim 4 or to claim 5 when it depends on claim 4, **characterised by** the fact that said shoulder (25) is mounted on said retention tie-rod (16) in an adjustable way.
7. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that one of said side mould elements (4) is fixed and mounted on said base frame (3a, 3b), the other of said side mould elements (5) being mobile and mounted on a first guiding structure (8) sliding on said base frame (3a, 3b) along a first substantially horizontal sliding direction (A).
8. Plant (1) according to claim 7, **characterised by** the fact that said lower horizontal mould element (6) is mounted on a second guiding structure (10) sliding on said base frame (3a, 3b) along said first sliding direction (A).
9. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that said upper horizontal mould element (7) is mounted on a third guiding structure (11) sliding on said base frame (3a, 3b) along a second substantially vertical sliding direction (B).
10. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that it comprises at least a cross mould element (13) mounted on a fourth guiding structure (14) sliding with respect to said base frame (3a, 3b) along a third sliding direction (C) substantially oblique and at right angles to said first sliding direction (A).
11. Plant (1) according to one or more of the preceding claims, **characterised by** the fact that said tightening means (16, 17, 18) comprise a plurality of said retention tie-rods (16), of which at least one mounted substantially vertical on each of said side mould elements (4, 5) and at least one mounted substantially horizontal on each of said horizontal mould elements (6, 7).
12. Plant (1) according to claim 11, **characterised by** the fact that said tightening means (16, 17, 18) comprise a plurality of said swinging brackets (17) and of said hydraulic actuators (18) mounted on said upper horizontal mould element (7), to fasten onto said

substantially vertical retention tie-rods (16), and on said mobile side mould element (5), to retain said substantially horizontal retention tie-rods (16).

- 5 13. Plant (1) according to claim 11 or 12, **characterised by** the fact that said retention tie-rods (16) are two for each side mould element (4, 5) and for each horizontal mould element (6, 7).

Patentansprüche

1. Anlage (1) Druckschlickerguss von Hygiene-Sanitärartikeln, mit einem Grundrahmen (3a, 3b), der wenigstens zwei seitliche Formelemente (4, 5) und zwei horizontale Formelemente (6, 7) trägt, eines von diesen tiefer (6) und eines höher (7), wobei die Formelemente (4, 5, 6, 7) wechselseitig zwischen einer Öffnungskonfiguration und einer Verschlusskonfiguration beweglich, in welcher die Formelemente (4, 5, 6, 7) einen Innenraum (27) für das Druckschlickergießen von keramischem Material und das Formen von Hygiene-Sanitärartikeln (2) bilden, und Dichtungsmitteln (16, 17, 18) der Formelemente (4, 5, 6, 7) in der Verschlusskonfiguration, welche wenigstens eine Retentions-Spannstange (16) umfassen, welche auf wenigstens einem der seitlichen Formelemente (4, 5) oder horizontalen Formelemente (6, 7) angebracht ist und zwei entgegengesetzte Enden hat, die an den horizontalen Formelementen (6, 7) oder den seitlichen Formelementen (4, 5) befestigt werden können, wobei wenigstens eines der entgegengesetzten Enden wenigstens eine Verdickung (19) umfasst, **gekennzeichnet durch** die Tatsache, dass

- die Dichtungsmittel (16, 17, 18) umfassen wenigstens einen Schwinghalter (17), der auf wenigstens einem der horizontalen Formelemente (6, 7) oder seitlichen Formelemente (4, 5) angebracht ist, und wenigstens ein hydraulisches Stellglied (18), das zum Betätigen des Schwinghalters (17) zwischen einer ersten betriebsfreien Konfiguration und einer zweiten Befestigungskonfiguration der Verdickung (19) geeignet ist, wobei der Schwinghalter (17) wenigstens ein U-Ende (20) umfasst, welches in der zweiten Befestigungskonfiguration rittlings auf der Retentions-Spannstange (16) an der Verdickung (19) platziert werden kann; und
- die Anlage (1) wenigstens einen Druckwandler (28) umfasst, der zum Erfassen des Drucks in dem Innenraum (27) während des Schlickergießens geeignet ist, und Stellmittel (29) zum Regulieren des hydraulischen Drucks in den mit dem Druckwandler (28) verriegelten hydraulischen Stellglied (18).

2. Anlage (1) nach Anspruch 1, **gekennzeichnet durch** die Tatsache, dass der Schwinghalter (17) einen im Wesentlichen mittleren Bereich umfasst, der mit wenigstens einem der horizontalen Formelemente (6, 7) oder seitlichen Formelemente (4, 5) gelenkig verbunden ist, wobei das hydraulische Stellglied (18) zum Drücken des Schwinghalters (17) auf ein im Wesentlichen gegenüberliegendes Teil des U-Endes (20) geeignet ist. 5
3. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass das hydraulische Stellglied (18) und der Schwinghalter (17) wechselseitig mithilfe einer Umkehr-Verbindungsstange (23) verbunden sind, die mit dem hydraulischen Stellglied (18) und/oder dem Schwinghalter (17) verbunden ist. 10
4. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass das Ende der Retentions-Spannstange (16) gegenüber der Verdickung (19) wenigstens eine Schulter (25) umfasst, die an wenigstens einem U-Körper (26) festlegbar ist, der auf dem angrenzenden Formelement (4, 5, 6, 7) angebracht ist, wobei der U-Körper (26) in der zweiten Befestigungskonfiguration rittlings auf der Retentions-Spannstange (16) an der Schulter (25) platziert werden kann. 20
5. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass die Verdickung (19) auf der Retentions-Spannstange (16) in einer einstellbaren Weise angebracht ist. 25
6. Anlage (1) nach Anspruch 4 oder Anspruch 5, wenn dieser von Anspruch 4 anhängig ist, **gekennzeichnet durch** die Tatsache, dass die Schulter (25) auf der Retentions-Spannstange (16) in einer einstellbaren Weise angebracht ist. 30
7. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass eines der seitlichen Formelemente (4) auf dem Grundrahmen (3a, 3b) befestigt und angebracht ist, wobei das andere der seitlichen Formelemente (5) beweglich ist und auf einer ersten Führungsstruktur (8) angebracht ist, die auf dem Grundrahmen (3a, 3b) entlang einer ersten im Wesentlichen horizontalen Gleitrichtung (A) gleitet. 35
8. Anlage (1) nach Anspruch 7, **gekennzeichnet durch** die Tatsache, dass das untere horizontale Formelement (6) auf einer zweiten Führungsstruktur (10) angebracht ist, die auf dem Grundrahmen (3a, 3b) entlang der ersten Gleitrichtung (A) gleitet. 40
9. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass das obere horizontale Formelement (7) auf einer dritten Führungsstruktur (11) angebracht ist, die auf dem Grundrahmen (3a, 3b) entlang einer zweiten im Wesentlichen vertikalen Gleitrichtung (B) gleitet. 45
10. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass diese wenigstens ein Quer-Formelement (13) umfasst, das auf einer vierten Führungsstruktur (14) angebracht ist, die in Bezug auf den Grundrahmen (3a, 3b) entlang einer dritten Gleitrichtung (C) im Wesentlichen schräg und unter rechtem Winkel zu der ersten Gleitrichtung (A) gleitet. 50
11. Anlage (1) nach ein oder mehreren der vorhergehenden Ansprüche, **gekennzeichnet durch** die Tatsache, dass die Dichtungsmittel (16, 17, 18) eine Mehrzahl der Retentions-Spannstangen (16) umfassen, von denen wenigstens eine im Wesentlichen vertikal auf jedem der seitlichen Formelemente (4, 5) angebracht ist und wenigstens eine im Wesentlichen horizontal auf jeder der horizontalen Formelemente (6, 7) angebracht ist. 55
12. Anlage (1) nach Anspruch 11, **gekennzeichnet durch** die Tatsache, dass die Dichtungsmittel (16, 17, 18) eine Mehrzahl von Schwinghaltern (17) und auf dem oberen horizontalen Formelement (7) angebrachter hydraulischer Stellglieder (18) umfassen, um auf den im Wesentlichen vertikalen Retentions-Spannstangen (16) und auf dem beweglichen seitlichen Formelement (5) festzuliegen und die im Wesentlichen horizontalen Retentions-Spannstangen (16) festzuhalten.
13. Anlage (1) nach Anspruch 11 oder 12, **gekennzeichnet durch** die Tatsache, dass die Retentions-Spannstangen (16) zwei für jedes seitliche Formelement (4, 5) und für jedes horizontale Formelement (6, 7) sind.

Revendications

1. Installation (1) pour le coulage en barbotine sous pression d'articles hygiéniques et sanitaires, comprenant un cadre de base (3a, 3b), portant au moins deux éléments de moule latéraux (4, 5) et deux éléments de moule horizontaux (6, 7) dont l'un est l'élément inférieur (6) et l'autre l'élément supérieur (7), lesdits éléments de moule (4, 5, 6, 7) étant mobiles réciproquement entre une configuration d'ouverture et une configuration de fermeture dans laquelle lesdits éléments de moule (4, 5, 6, 7) définissent une cavité interne (27) pour le coulage en barbotine sous pression d'un matériau de céramique et la formation

d'articles hygiéniques et sanitaires (2), et des moyens de serrage (16, 17, 18) desdits éléments de moule (4, 5, 6, 7) dans ladite configuration de fermeture qui comprennent au moins un tirant de maintien (16) qui est monté sur au moins l'un desdits éléments de moule latéraux (4, 5), ou desdits éléments de moule horizontaux (6, 7), et qui comporte deux extrémités opposées qui peuvent être fixées sur lesdits éléments de moule horizontaux (6, 7), ou lesdits éléments de moule latéraux (4, 5), au moins l'une desdites extrémités opposées comprenant au moins un renflement (19), **caractérisée par le fait que** :

- lesdits moyens de serrage (16, 17, 18) comprennent au moins un support pivotant (17) monté sur au moins l'un desdits éléments de moule horizontaux (6, 7), ou desdits éléments de moule latéraux (4, 5), et au moins un dispositif d'actionnement hydraulique (18) adapté pour faire fonctionner ledit support pivotant (17) entre une première configuration de repos et une deuxième configuration de fixation dudit renflement (19), ledit support pivotant (17) comprenant au moins une extrémité en U (20) qui, dans ladite deuxième configuration de fixation, peut être placée à cheval sur ledit tirant de maintien (16) contre ledit renflement (19) ; et

- ladite installation (1) comprend au moins un transducteur de pression (28), adapté pour détecter la pression dans ladite cavité interne (27) pendant ledit coulage en barbotine, et des moyens de régulation (29), pour réguler la pression hydraulique dans ledit dispositif d'actionnement hydraulique (18) imbriqué avec ledit transducteur de pression (28).

2. Installation (1) selon la revendication 1, **caractérisée par le fait que** ledit support pivotant (17) comprend une partie sensiblement médiane qui est articulée par rapport à au moins l'un desdits éléments de moule horizontaux (6, 7), ou desdits éléments de moule latéraux (4, 5), ledit dispositif d'actionnement hydraulique (18) étant adapté pour pousser ledit support pivotant (17) sur une partie sensiblement opposée de ladite extrémité en U (20).
3. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** ledit dispositif d'actionnement hydraulique (18) et ledit support pivotant (17) sont reliés réciproquement au moyen d'une tige de liaison de retour (23) associée avec jeu à au moins l'un des deux parmi ledit dispositif d'actionnement hydraulique (18) et ledit support pivotant (17).
4. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** ladite extrémité du tirant de maintien (16) opposée

audit renflement (19) comprend au moins un épaulement (25) qui peut être fixé à au moins un corps en U (26) monté sur l'élément de moule adjacent (4, 5, 6, 7), ledit corps en U (26) pouvant, dans ladite deuxième configuration de fixation, être placé à cheval sur ledit tirant de maintien (16), contre ledit épaulement (25).

5. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** ledit renflement (19) est monté sur ledit tirant de maintien (16) d'une manière ajustable.
6. Installation (1) selon la revendication 4 ou selon la revendication 5 lorsque celle-ci dépend de la revendication 4, **caractérisée par le fait que** ledit épaulement (25) est monté sur ledit tirant de maintien (16) d'une manière ajustable.
7. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** l'un desdits éléments de moule latéraux (4) est fixé et monté sur ledit cadre de base (3a, 3b), l'autre desdits éléments de moule latéraux (5) étant mobile et monté sur une première structure de guidage (8) coulissant sur ledit cadre de base (3a, 3b) le long d'une première direction de coulissement (A) sensiblement horizontale.
8. Installation (1) selon la revendication 7, **caractérisée par le fait que** ledit élément de moule horizontal inférieur (6) est monté sur une deuxième structure de guidage (10) coulissant sur ledit cadre de base (3a, 3b) le long de ladite première direction de coulissement (A).
9. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** ledit élément de moule horizontal supérieur (7) est monté sur une troisième structure de guidage (11) coulissant sur ledit cadre de base (3a, 3b) le long d'une deuxième direction de coulissement (B) sensiblement verticale.
10. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait qu'**elle comprend au moins un élément de moule transversal (13) monté sur une quatrième structure de guidage (14) coulissant par rapport audit cadre de base (3a, 3b) le long d'une troisième direction de coulissement (C) sensiblement oblique et formant des angles droits avec ladite première direction de coulissement (A).
11. Installation (1) selon une ou plusieurs des revendications précédentes, **caractérisée par le fait que** lesdits moyens de serrage (16, 17, 18) comprennent une pluralité desdits tirants de maintien (16), parmi

lesquels l'un au moins est monté de manière sensiblement verticale sur chacun desdits éléments de moule latéraux (4, 5) et l'un au moins est monté de manière sensiblement horizontale sur chacun desdits éléments de moule horizontaux (6, 7).

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12. Installation (1) selon la revendication 11, **caractérisée par le fait que** lesdits moyens de serrage (16, 17, 18) comprennent une pluralité desdits supports pivotants (17) et desdits dispositifs d'actionnement hydraulique (18) montés sur ledit élément de moule horizontal supérieur (7), afin d'y fixer lesdits tirants de maintien (16) sensiblement verticaux, et sur ledit élément de moule latéral mobile (5), afin de maintenir lesdits tirants de maintien (16) sensiblement horizontaux.
13. Installation (1) selon la revendication 11 ou 12, **caractérisée par le fait que** lesdits tirants de maintien (16) sont au nombre de deux pour chaque élément de moule latéral (4, 5) et pour chaque élément de moule horizontal (6, 7).

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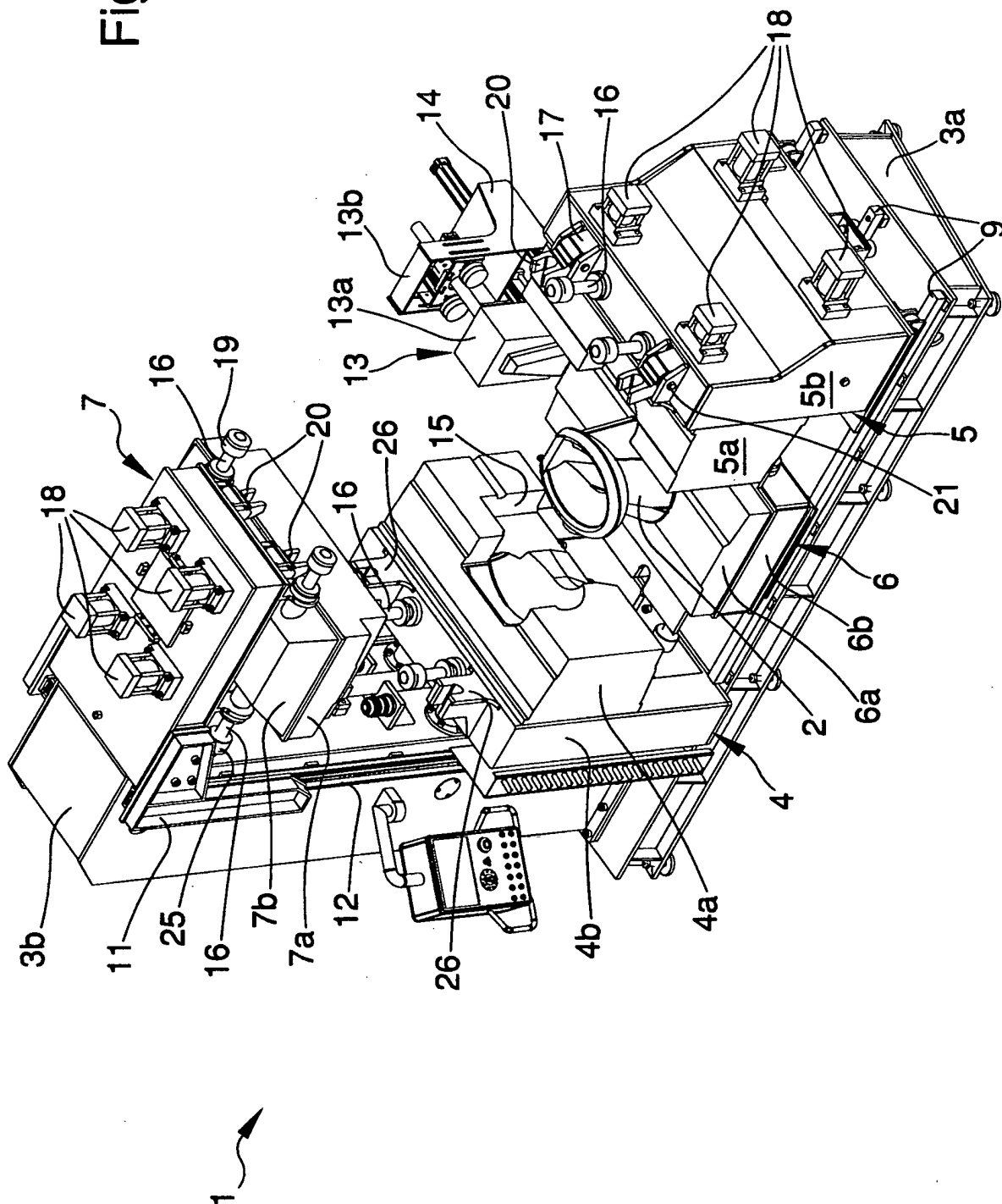


Fig. 2

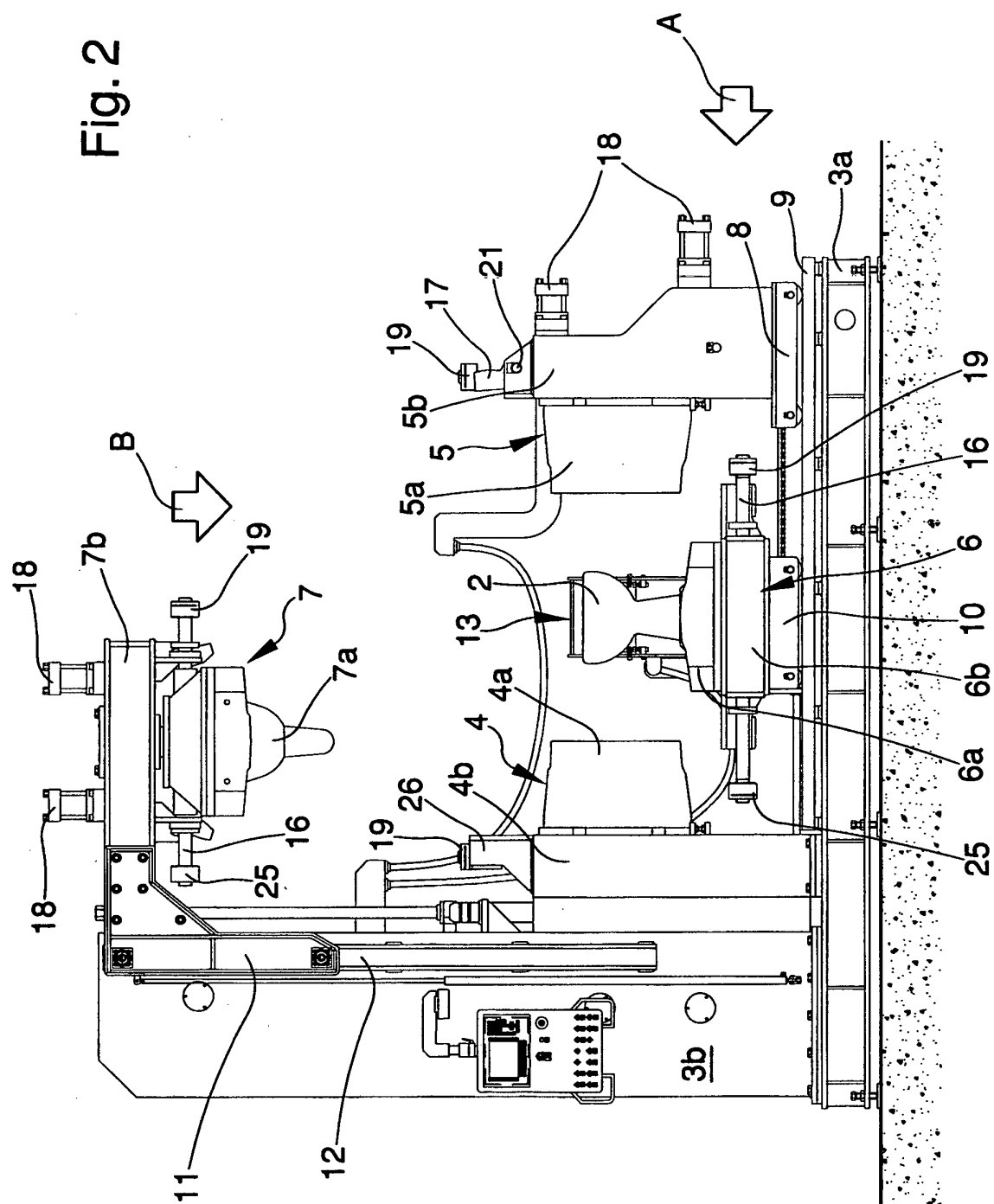


Fig. 3

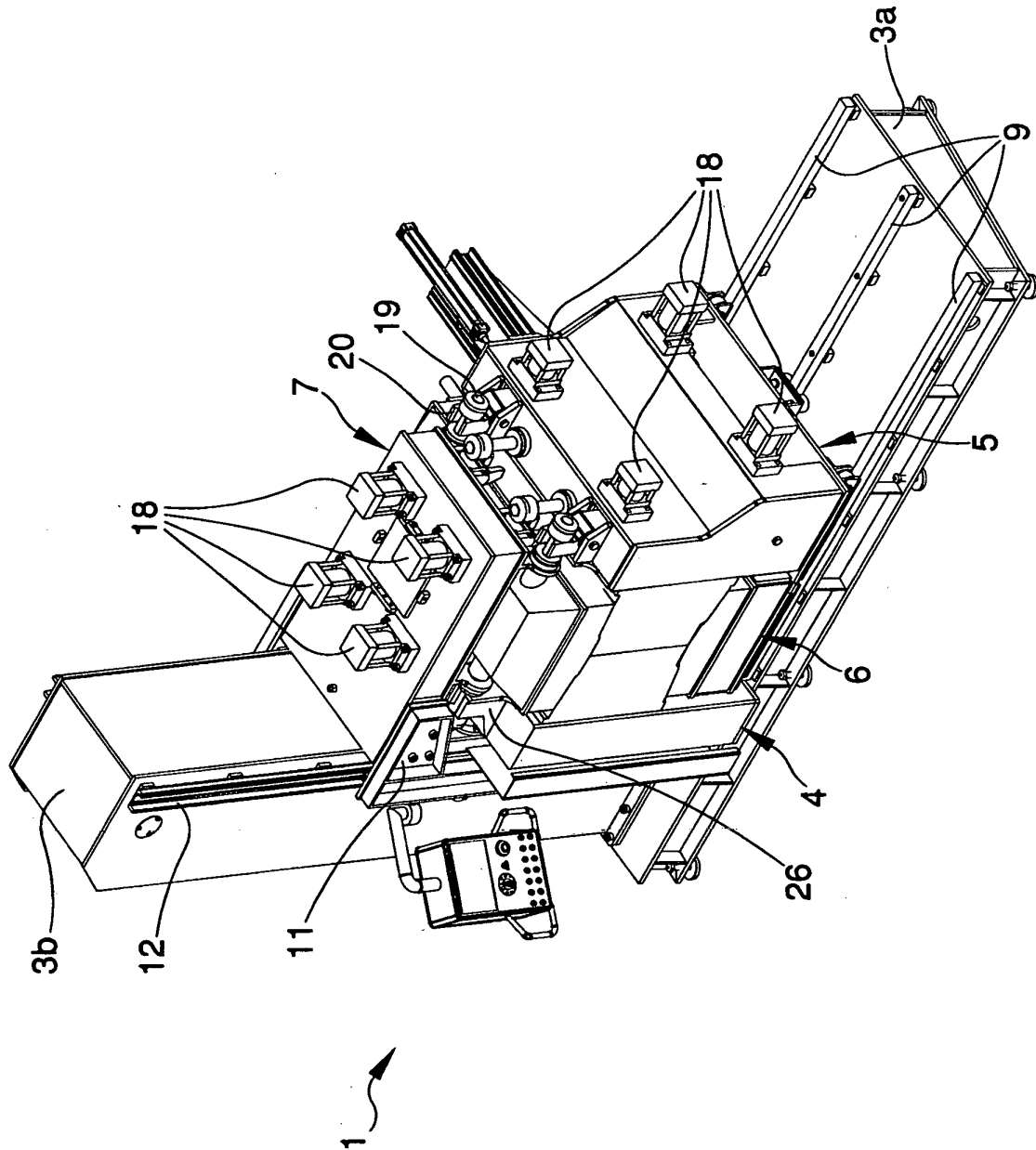


Fig. 4

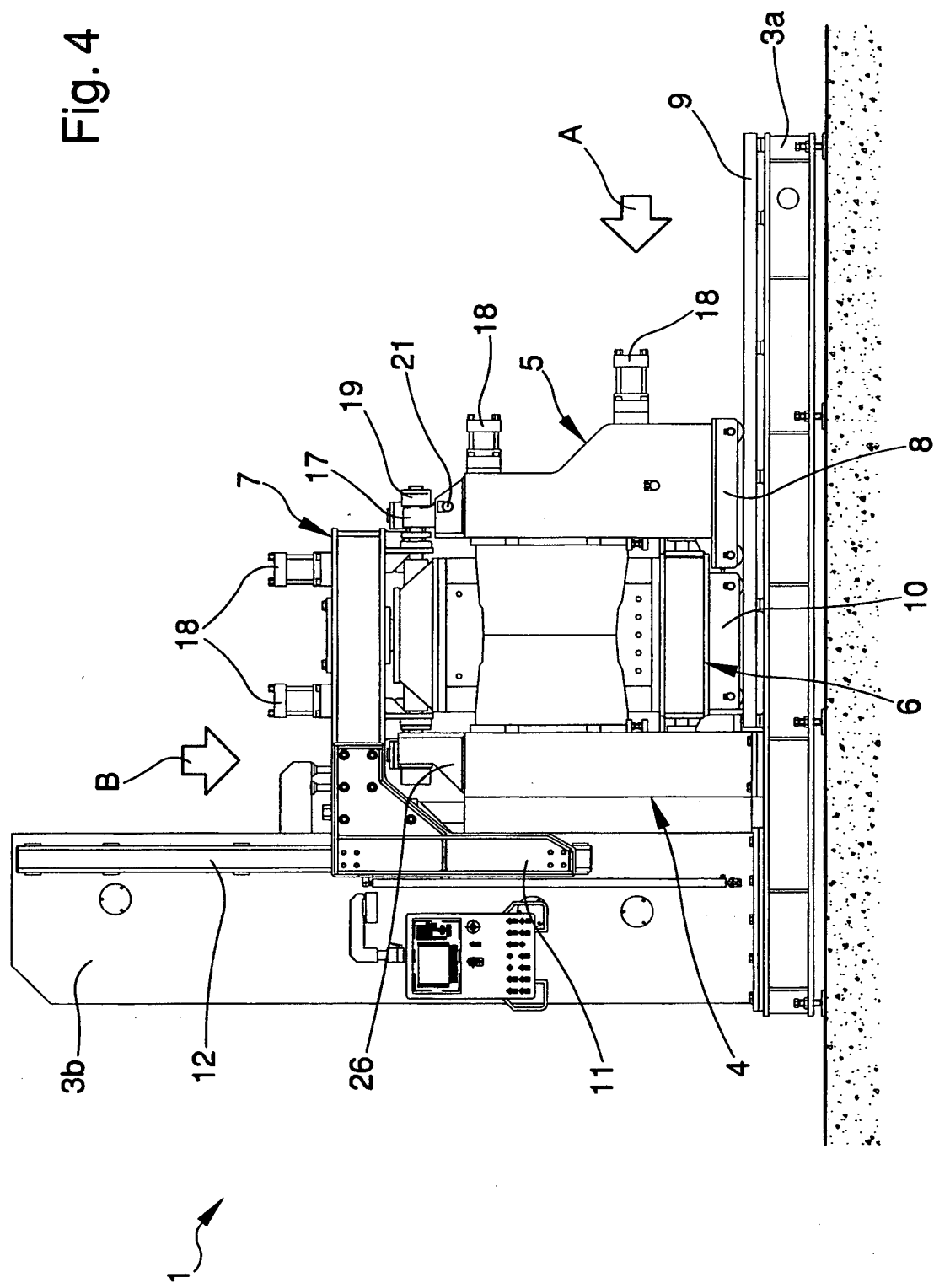
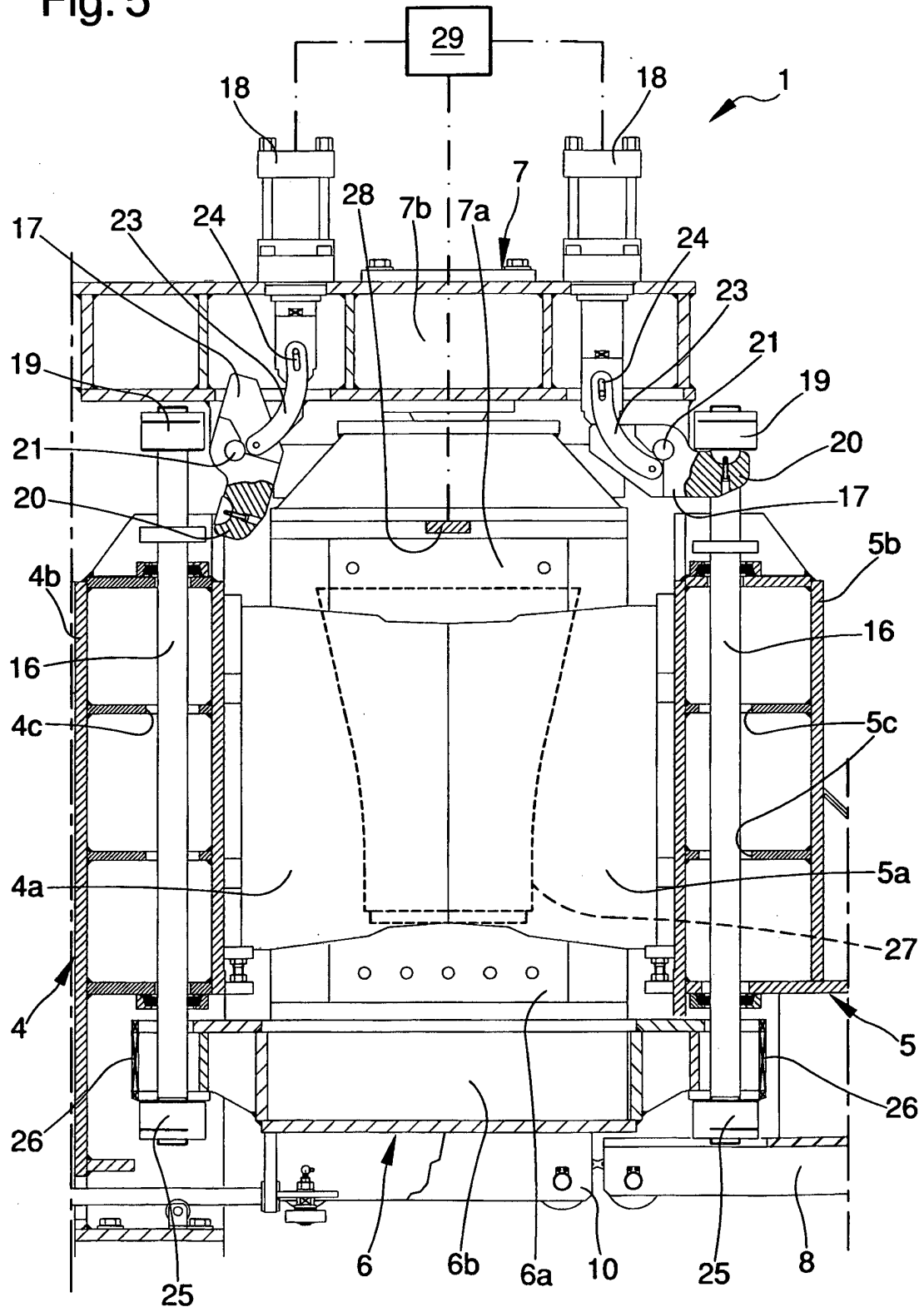


Fig. 5



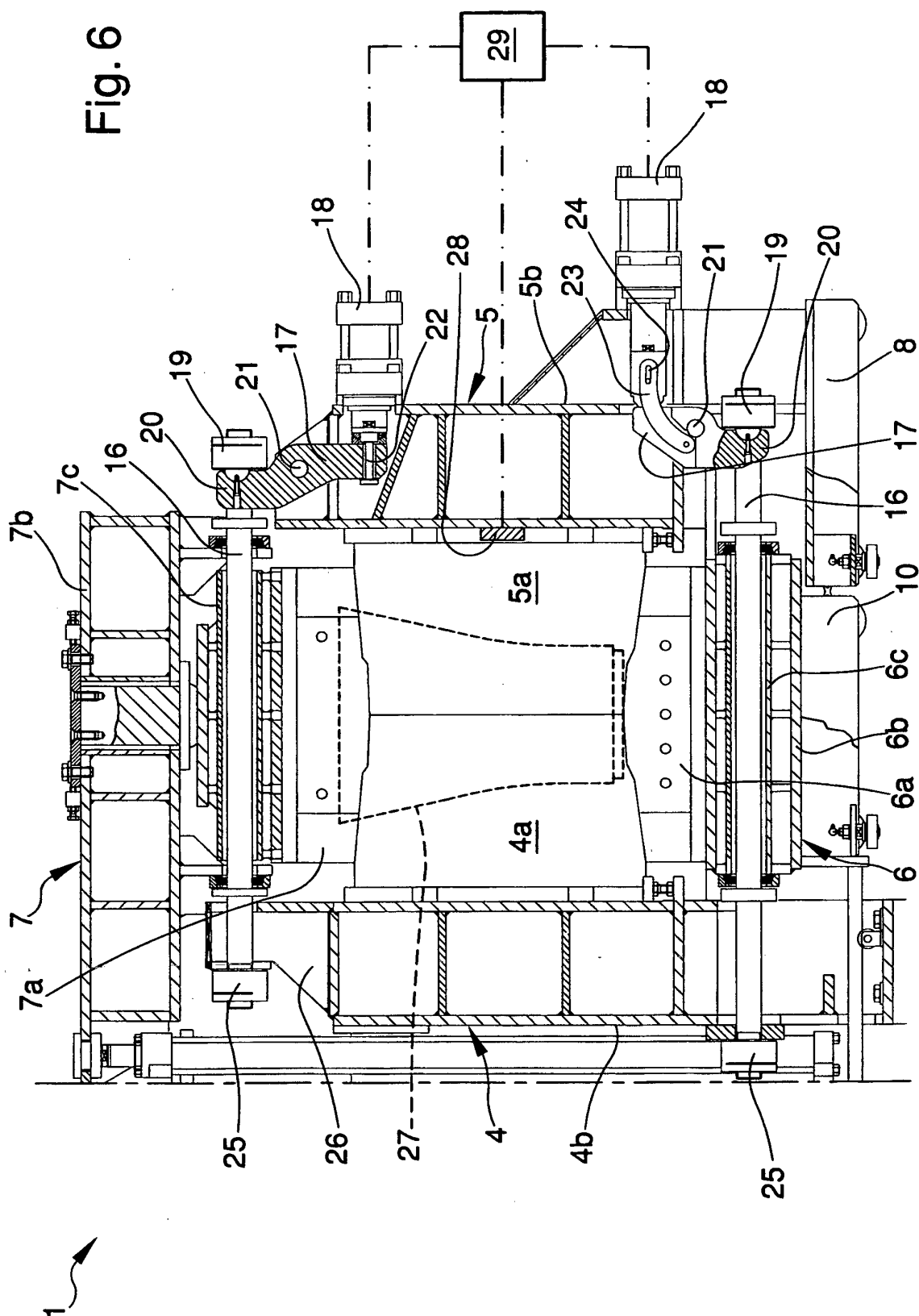
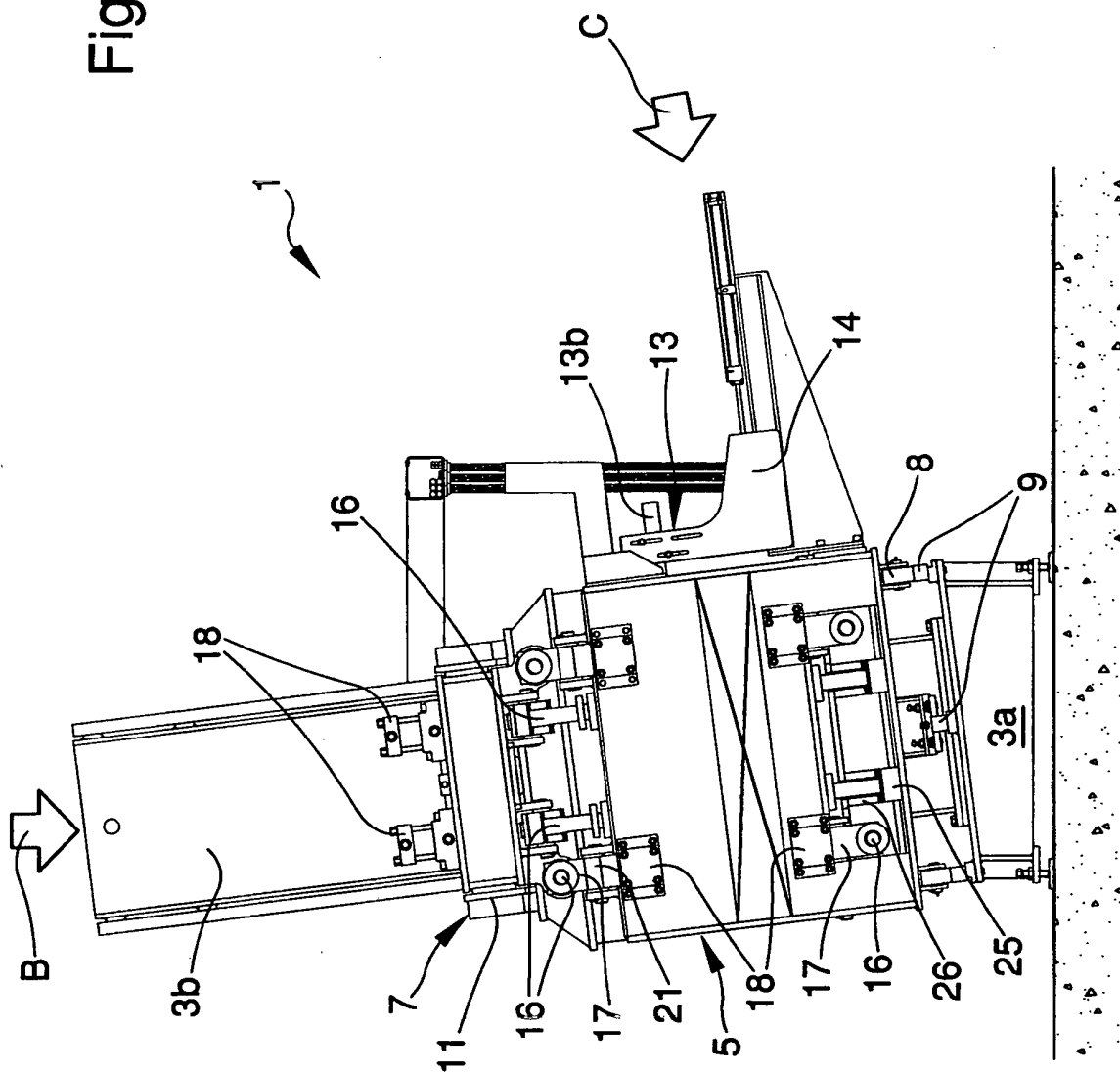


Fig. 7



REFERENCES CITED IN THE DESCRIPTION

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