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(54) **EQUIPMENT FOR THE PRODUCTION OF SANITARY WARE**

(57) The equipment (1) for the production of sanitary ware, comprising: a load-bearing structure (2); at least one forming mold (3) associated with the load-bearing structure (2) and comprising a plurality of forming portions (3a, 3b, 3c) movable closer to/away from an assembly area (25) between at least an open configuration, wherein they are moved away from each other, and a closed configuration, wherein they are moved close to each other to define at least one forming cavity (4) of a sanitary ware item; gripping means (6) of the removable type of the forming portions (3a, 3b, 3c), movable in relation to the load-bearing structure (2) in order to displace the forming portions (3a, 3b, 3c) in mutual approach/removal; wherein at least one of the forming portions (3a, 3b, 3c) comprises at least one supporting element (7) of the ferromagnetic type and the gripping means (6) comprise at least one gripping element (6b, 6c) of the magnetic type adapted to operate in conjunction with the supporting element (7).

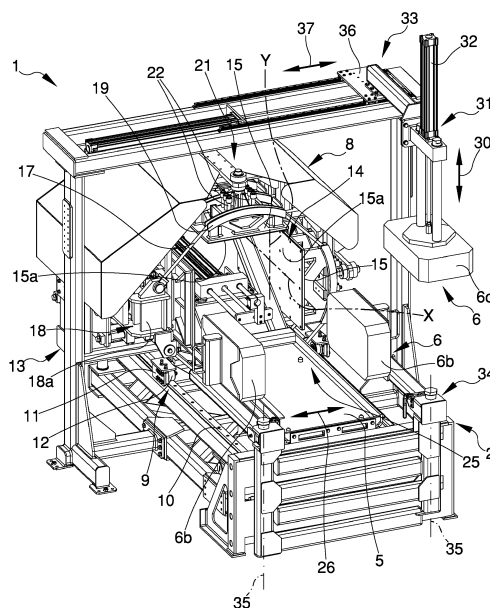


Fig.1

Description

[0001] The present invention relates to a piece of equipment for the production of sanitary ware.

[0002] More in detail, the present invention relates to a piece of equipment for the production of sanitary ware, such as e.g. washbasins, bidets, WCs, etc., by means of high pressure casting.

[0003] High pressure casting consists in the introduction, inside a special mold, of slip, a fluid ceramic mixture which, once shaped, is made to dry and then fired to obtain the desired manufactured product.

[0004] The molds are usually formed by a plurality of portions, brought close to each other to form a forming cavity of the ceramic product.

[0005] Unlike traditional casting, high pressure casting is more efficient but requires greater resistance of the molds to the stresses given by the pressing force.

[0006] In addition, the forming portions have to remain correctly in place during the casting operation to avoid aesthetic and functional defects in the finished manufactured product.

[0007] A machine is known from patent EP 2366517 for the production of ceramic products in which the portions of the mold are associated with gripping means which, after the portions of the mold themselves have been moved closer to each other to define the forming cavity, are introduced into a tubular clamping member adapted to contain them during the casting phase.

[0008] In particular, the portions of the mold are associated in a removable manner with corresponding supporting elements provided with sliding and positioning means, which allow them to be locked and removed.

[0009] The machine described by EP 2366517 also comprises inflatable elements, associated with the clamping element, which are filled during the casting phase to exert pressure on the gripping means, and consequently on the forming portions, to keep them in position.

[0010] However, this machine of known type has some drawbacks.

[0011] It is not easy to attach the forming portions to the corresponding gripping means, as they must be correctly aligned with the gripping means themselves in order to engage with the corresponding guides and must be made to slide relative thereto.

[0012] This process, in addition to being little practical, also requires the manufacture of a mutual sliding mechanism provided with reduced tolerances in order to achieve the correct positioning of the various forming portions. In fact, if the forming portions are not correctly positioned relative to each other, this could give rise to imperfections in the sanitary ware item thus obtained. This manufacturing complexity translates, as easily understandable, in an increase of production costs and, therefore, of sale to the final customer.

[0013] Another drawback consists in the fact that the known type of equipment described by EP 2366517 does

not allow for easy maintenance and inspection of the forming portions by the staff after they have been applied to the corresponding gripping means.

[0014] These operations are in fact necessary before proceeding with the casting phase, as residues or impurities may have been deposited inside the forming portions, which may then jeopardize the proper success of the sanitary ware item.

[0015] The machine described by EP 2366517 is also of considerable weight and encumbrance and the use of the inflatable elements requires the use of special filling means with a fluid under pressure and of pressure regulation means that affect the costs and structural complexity of the machine.

[0016] Furthermore, the pressure exerted by the inflatable elements is not precisely controllable and does not ensure an optimal contrast to the pressure exerted by the casting of the slip.

[0017] As a result, the portions of the mold may be subject to misalignment and displacement that can jeopardize the proper success of the product.

[0018] The main aim of the present invention is to devise a piece of equipment for the production of sanitary ware that allows the application and removal of the forming portions to the corresponding supporting elements in a practical and easy manner.

[0019] Within this aim, one object of the present invention is to devise a piece of equipment for the production of sanitary ware that allows a quick and precise positioning of the forming portions on the corresponding supporting elements and that, at the same time, is easier and cheaper to manufacture than the equipment of known type.

[0020] Another object of the present invention is to allow an easy and practical inspection and maintenance of the forming portions after they have been applied on the corresponding gripping means.

[0021] Last but not least, the object of the present invention is to effectively counteract the pressure exerted by the slip during the casting phase and in particular to exert an adequate counteracting force on each portion of the mold regardless of their mutual position.

[0022] Another object of the present invention is to devise a piece of equipment for the production of sanitary ware that allows overcoming the above mentioned drawbacks of the prior art within a simple, rational, easy, effective to use and low cost solution.

[0023] The objects set forth above are achieved by the present equipment for the production of sanitary ware having the characteristics of claim 1.

[0024] Other characteristics and advantages of the present invention will be more evident from the description of a preferred, but not exclusive, embodiment of a piece of equipment for the production of sanitary ware, illustrated by way of an indicative, but non-limiting example, in the attached tables of drawings in which:

Figure 1 is an axonometric view of a piece of equip-

ment according to the invention without the forming mold;

Figure 2 is an axonometric view of the equipment in Figure 1 provided with the forming mold with the forming portions in open configuration;

Figure 3 is an axonometric view of the equipment in Figure 2 with the forming portions in closed configuration;

Figure 4 is an axonometric view of the equipment in Figure 2 with a gripping element in maintenance configuration;

Figure 5 is an axonometric view of the first displacement means of the equipment in Figure 2.

[0025] With particular reference to these figures, reference numeral 1 globally indicates a piece of equipment for the production of sanitary ware.

[0026] The equipment 1 for the production of sanitary ware comprises a load-bearing structure 2, at least one forming mold 3 associated with the load-bearing structure 2 and comprising a plurality of forming portions 3a,3b,3c movable in mutual approach/spacing apart to/from an assembly area 25.

[0027] The forming portions 3a,3b,3c are movable between at least one open configuration, wherein they are spaced apart from each other, and one closed configuration, wherein they approach each other so as to define at least one forming cavity 4 of a sanitary ware item. The forming portions 3a,3b,3c are spaced apart from the assembly area 25 in the open configuration and are approached to the assembly area 25 in the closed configuration.

[0028] By the term "assembly area" is meant the area of the load-bearing structure 2 where the forming portions 3a,3b,3c are approached to each other to define the forming cavity 4.

[0029] The forming mold 3 may comprise a number of forming portions 3a,3b,3c variable from two to six depending on the type of sanitary ware to be produced. In the embodiment shown in the figures, the forming mold 3 comprises four distinct and separate forming portions 3a,3b,3c, of which a lower portion 3a associated with a resting base 5 associated with the load-bearing structure 2, two lateral portions 3b and an upper portion 3c.

[0030] Advantageously, the equipment 1 comprises gripping means 6 of the removable type of at least some of the forming portions 3a,3b,3c, which are movable relative to the load-bearing structure 2 to displace the forming portions themselves in mutual approach/spacing apart.

[0031] These gripping means 6, therefore, allow locking and releasing the forming portions 3a,3b,3c, so that they can be quickly and easily positioned and replaced.

[0032] According to the invention, at least one of the forming portions 3a,3b,3c comprises at least one supporting element 7 of the ferromagnetic type and the gripping means 6 comprises at least one gripping element 6b,6c of the magnetic type adapted to operate in con-

junction with the supporting element 7.

[0033] Preferably, each of the lateral portions 3b and the upper portion 3c are provided with a corresponding supporting element 7 and the gripping means 6 comprise a lateral gripping element 6b for each of the lateral portions 3b and an upper gripping element 6c for the upper portion 3c.

[0034] Advantageously, the gripping means 6 also comprise control means, not shown in detail in the figures, which can be operated to activate/deactivate the magnetic field of the gripping element 6b,6c. By operating on the control elements, which can e.g. be of the electrical type, it is therefore possible to easily lock and release the gripping elements 6b,6c.

[0035] Advantageously, the lateral gripping elements 6b are associated movable in a sliding manner with the load-bearing structure 2 along a first substantially horizontal direction 26. The displacement of the lateral gripping elements 6b along the first direction 26 is therefore adapted to allow the lateral portions 3b to be mutually approached/spaced apart.

[0036] More particularly, the equipment 1 comprises first displacement means 27 of the lateral gripping elements 6b along the first direction 26. The first displacement means 27 may comprise e.g. at least one first actuator 28 operating on at least one of the lateral gripping elements 6b.

[0037] The first displacement means 27 may comprise a first actuator 28 for each lateral gripping element 6b or, alternatively, they may comprise a single first actuator 28 and connecting means 29 shifting along the first direction 26 of the lateral gripping elements 6b as shown in the embodiment represented in the figures.

[0038] More in detail, the connecting means 29 comprise at least one toothed belt kinematically connected to the lateral gripping elements 6b to allow them to be displaced in the mutual approach/spacing apart direction along the first direction 26. In other words, as a result of the action of the first actuator 28, the corresponding lateral gripping element 6b moves along the first direction 26, thus also dragging the other lateral gripping element 6b in its displacement by means of the toothed belt 29 with which both the lateral gripping elements 6b are associated.

[0039] In turn, the upper gripping element 6c is also movable sliding relative to the load-bearing structure 2 along a second, substantially vertical, direction 30. The upper gripping element 6c is therefore movable approaching/spacing apart from the resting base 5.

[0040] More particularly, the equipment 1 comprises second displacement means 31 of the upper gripping element 6c along the second direction 30. The second displacement means 31 are e.g. of the type of a second actuator 32. Advantageously, the equipment 1 also comprises positioning means 33 of at least one of the gripping elements 6b,6c between an operating position, wherein it is arranged at an assembly area 25 of the forming mold 3, and a maintenance position, wherein it is spaced apart

from the assembly area 25 and is accessible from the outside.

[0041] In the operating position, therefore, the gripping elements 6b,6c are movable between the closed configuration and the open configuration, so that their mutual orientation is the final one, that is the one that allows the definition of the forming cavity 4 in the closed configuration as a result of their mutual approach. In the maintenance configuration, on the contrary, the gripping elements 6b,6c are moved away from the assembly area 25 and, in particular, are displaced towards the outside of the load-bearing structure 2 in order to be easily accessible by an operator.

[0042] In the preferred embodiment shown in the figures, the positioning means 33 comprise rotation means 34 for rotating at least one of the lateral gripping elements 6b around a relevant axis 35.

[0043] The lateral gripping elements 6b are therefore able to rotate around a relevant axis 35 to displace from the operating position to the maintenance position and vice versa. Figure 4 shows one of the lateral gripping elements 6b in the maintenance position. As can be easily seen, in this position the corresponding lateral portion 3b can be easily inspected by an operator.

[0044] Furthermore, the positioning means 33 also comprise a shifting assembly 36 of the upper gripping element 6c along a third direction 37 transverse to said second direction 30.

[0045] The equipment 1 then, comprises at least one containment device 8 of the forming portions 3a,3b,3c in the closed configuration, associated with the load-bearing structure 2, where the forming mold 3 and the containment device 8 are mutually movable between a release configuration, wherein the forming mold 3 and the containment device 8 are spaced apart from each other, and a containment configuration wherein the forming mold 3 is inserted inside the containment device 8. The containment device 8 is adapted to contain the forming mold 3 during the casting phase so as to counteract the thrust exerted by the pressure inside the forming cavity 4 and which tends to move the corresponding forming portions 3a,3b,3c away from each other.

[0046] Between the load-bearing structure 2 and at least one of either the forming mold 3 or the containment device 8, movement means 9 are therefore interposed which are adapted to allow their corresponding displacement between the release configuration and the containment configuration.

[0047] In the preferred embodiment shown in the figures, the movement means 9 comprise a pair of straight guides 10, e.g. consisting of elongated crossbars that extend horizontally, associated with the load-bearing structure 2 and a pair of sliding elements 11, each provided with a plurality of rolling elements 12, associated with the containment device 8 and which engage with a corresponding straight guide 10. The sliding elements 11 are therefore able to move relative to the load-bearing structure 2 along the direction defined by the longitudinal

extension of the straight guides 10.

[0048] Advantageously, the containment device 8 comprises at least one containment frame 13, containment means 14 associated with the containment frame 13 and comprising in turn a plurality of pressing bodies 15 adapted to contact the forming portions 3a,3b,3c.

[0049] More particularly, each of the pressing bodies 15 defines at least one relevant stop surface 15a adapted to contact a corresponding outer surface 16 of the forming portions 3a,3b,3c.

[0050] Depending on the number and conformation of the forming portions 3a,3b,3c, the stop surfaces 15a of some pressing bodies 15 may also contact the outer surfaces 16 of the same forming portion 3a,3b,3c.

[0051] In the embodiment shown in the figures, each of the stop surfaces 15a is adapted to interact with the outer surface 16 of a corresponding forming portion 3a, 3b,3c.

[0052] In particular, the outer surface 16 of the forming portions 3b,3c is defined by the corresponding supporting element 7.

[0053] Advantageously, the pressing bodies 15 are positioned on the containment frame 13 so as to enclose the forming mold 3.

[0054] In the embodiment shown in the figures, the pressing bodies 15 are positioned in such a way that their stop surfaces 15a are oriented substantially at right angle relative to the stop surfaces 15a of the adjacent pressing bodies 15.

[0055] The containment means 14 then comprise at least one tensioning element 17 associated by wrapping with the pressing bodies 15 and the containment device 8 is provided with traction means 18 operable to move the tensioning element 17 so as to approach the pressing bodies 15 to the forming portions 3a,3b,3c. More in particular, the tensioning element 17 is of the type of an inextensible rope or cable that, when brought into traction by the traction means 18, exerts such a force on the pressing bodies 15 so as to cause their displacement when approaching the forming portions 3a,3b,3c.

[0056] Appropriately, each of the pressing bodies 15 comprises at least one guide element 19 of the tensioning element 17, the latter being associated sliding with the guide element itself.

[0057] Advantageously, the traction means 18 comprise at least one traction element 18a associated movable with the containment frame 13 shifting along a direction of sliding, identified in the figures with the double arrow 20, approaching/spacing apart from the forming mold 3 with the latter in the containment configuration. In particular, as a result of its moving away from the forming mold 3, the traction element 18a displaces the ends of the tensioning element 17 so as to bring the pressing bodies 15 closer to the forming mold 3. The greater the displacement of the traction element 18a away from the forming mold 3, the greater the pressure exerted by the pressing bodies 15 on the respective forming portions 3a,3b,3c.

[0058] In the preferred embodiment shown in the figures, the traction element 18a is associated with one of the pressing bodies 15.

[0059] More specifically, the traction means 18 comprise an actuating element (not visible in detail in the figures), e.g. of the type of a fluid-operated cylinder, associated with the traction element 18a to move it along the direction of sliding 20.

[0060] Advantageously, the containment device 8 comprises oscillation means 21 placed between the containment frame 13 and the containment means 14, where such oscillation means 21 are adapted to move in rotation at least one of the pressing bodies 15 relative to the containment frame 13 around at least a first axis X.

[0061] In the preferred embodiment shown in the figures, the oscillation means 21 are positioned between the containment frame 13 and each of the pressing bodies 15, with the exception of the pressing body 15 associated with the traction element 18a.

[0062] The oscillation means 21 are adapted to allow the pressing bodies 15 and, in particular, the corresponding stop surfaces 15a, to follow the inclination of the outer surface 16 of the corresponding forming portion 3a,3b,3c. In fact, since, as anticipated, the forming mold 3 is composed of a plurality of forming portions 3a,3b,3c separate from each other, it follows that, in the closed configuration, the corresponding outer surfaces 16 can be misaligned with each other or have different inclinations. The oscillation means 21 thus allow the stop surfaces 15a of the pressing bodies 15 to follow the inclination of the corresponding outer surface 16 with which they operate in conjunction, so that they can optimally counteract the pressure that is exerted on the forming portions 3a,3b,3c during the casting phase.

[0063] More particularly, the first axis X is arranged substantially parallel to the stop surface 15a of the corresponding pressing body 15.

[0064] Preferably, the oscillation means 21 are adapted to allow the rotation of the corresponding pressing body 15 around at least one second axis Y transverse to the first axis X, wherein both the first axis X and the second axis Y are substantially parallel to the corresponding stop surface 15a.

[0065] Appropriately, the oscillation means 21 comprise a plurality of oscillation elements 22 made of elastically yielding material, so as to allow the rotation of the corresponding pressing body 15 around the corresponding axis X, Y and to allow its return to a neutral position the instant when the force that caused the rotation thereof is no longer present. In particular, the oscillation means 21 comprise one or more pairs of oscillation elements 22 arranged on opposite sides relative to a median plane Xa,Ya containing the relative axis of rotation X,Y.

[0066] Alternative embodiments to those described and represented here and of a type known to the technician of the sector, such as, e.g., a spherical joint or the like cannot however be ruled out.

[0067] In a preferred embodiment, the containment de-

vice 8 is adapted to contain the containment elements 6b, 6c in the containment configuration. The gripping elements 6b, 6c therefore remain associated with the corresponding forming portions 3b, 3c during the entire casting phase.

[0068] In this embodiment, the pressing bodies 15 therefore interact with the gripping elements 6b, 6c in the containment configuration and during the casting phase.

[0069] In an alternative embodiment, the gripping elements 6b, 6c are deactivated, so that the relevant forming portions 3b, 3c are released, substantially at the same time as the forming mold 3 is inserted into the containment device 8 to achieve the containment configuration. During the casting phase, only the forming mold 3 is contained inside the containment device 8, while the gripping elements 6b and 6c remain outside the containment device itself. In this embodiment, therefore, the gripping elements 6b, 6c are disengaged from the corresponding forming portions 3b, 3c in the containment configuration, and the forming portions 3b, 3c interact directly with the pressing bodies 15.

[0070] The operation of the present invention is as follows.

[0071] The forming portions 3b,3c are initially associated with the gripping means 6. In particular, the magnetic fields of the gripping elements 6b,6c are activated by operating on the above mentioned control means, which interact with the supporting elements 7 of the forming portions 3a,3b,3c by blocking them. In turn, the lower portion 3a is constrained to the resting base 5.

[0072] The gripping elements 6b and 6c, initially arranged in the operating position and in the open configuration, can be moved to the relevant maintenance positions by means of the positioning means 33, to allow the inspection thereof and possible maintenance work by an operator.

[0073] Then the gripping elements 6b and 6c can be moved along the first direction 26 and along the second direction 30 respectively, approaching the assembly area 25 in order to achieve the closed configuration.

[0074] Once the closed configuration is achieved, the containment device 8 is made to slide relative to the forming mold 3, using the handling equipment 9, in order to bring it from the release configuration to the containment configuration.

[0075] When the containment configuration is achieved, the traction means 18 are activated to tension the tensioning element 17 in order to bring the pressing bodies 15 closer to the forming mold 3.

[0076] As a result of this approach, the stop surfaces 15a contact the respective outer surfaces 16 of the forming portions 3a,3b,3c. The stop surface 15a of the pressing body 15 associated with the traction element 18a serves as a reference surface.

[0077] The stop surfaces 15a of the other pressing bodies 15, as a result of their progressive approach to the respective outer surfaces 16 take, by means of the oscillation means 21, the same inclination as the outer

surfaces themselves.

[0078] In fact, since the outer surfaces 16 of the various forming portions 3a,3b,3c can take different inclinations, as a result of their displacement in the closed configuration, the oscillation means 21 allow the respective stop surfaces 15a to rotate around the first and the second axis X and Y in such a way as to align with the outer surfaces 16 with which they come into contact.

[0079] In particular, when the stop surface 15a of a pressing body 15 interacts with an outer surface 16 that is inclined relative to the home position of the stop surface itself, the latter rotates around a corresponding axis X, Y as a result of the action of the tensioning element 17 and thanks to the compliance of the oscillation elements 22, until it is coplanar with the corresponding outer surface 16. This way, the stop surfaces 15a contact the corresponding outer surface 16 with all their available extension, thus succeeding in effectively counteracting the thrust exerted by the pressure inside the forming cavity 4 during the casting phase.

[0080] The oscillation elements 22 may then be compressed or extended depending on their position relative to the median plane Xa,Ya containing the axis of rotation X,Y.

[0081] Once the casting phase has been finished, the traction means 18 interrupt their action on the tensioning element 17, so that the pressing bodies 15 are moved away from the forming mold 3.

[0082] The containment device 8 can be moved again to the release configuration, so that the forming portions 3a,3b,3c can be moved to the open configuration to allow the extraction of the sanitary ware item.

[0083] At this point the forming portions 3b and 3c may be removed from the corresponding gripping elements 6b and 6c by operating again on the control elements in order to deactivate the corresponding magnetic fields.

[0084] It has in practice been ascertained that the described invention achieves the intended objects and in particular the fact is underlined that the equipment to which the present invention relates, allows, thanks to the presence of the supporting elements and of the magnetic gripping elements, an easy and rapid positioning and removal of the forming portions, in order to speed up the manufacturing process of the sanitary ware and thus reduce the corresponding production costs. This way, the mold change operations are considerably simplified, compared to the known type of equipment.

[0085] Moreover, the possibility to move the gripping elements between the operating position and the maintenance position considerably facilitates, compared to the known type of equipment, the inspection and maintenance operations of the forming portions both before and after the casting operations.

[0086] Furthermore, the presence of the pressing bodies and of the oscillation means associated therewith, allows effectively counteracting the pressure acting on the forming portions during the casting phase.

[0087] In particular, thanks to the oscillation means,

the stop surfaces of the pressing bodies are able to modify the inclination thereof so that they are coplanar to the outer surfaces of the forming portions.

Claims

1. Equipment (1) for the production of sanitary ware, comprising:

- a load-bearing structure (2);
- at least one forming mold (3) associated with said load-bearing structure (2) and comprising a plurality of forming portions (3a, 3b, 3c) movable closer to/away from an assembly area (25) between at least an open configuration, wherein they are moved away from each other, and a closed configuration, wherein they are moved close to each other to define at least one forming cavity (4) of a sanitary ware item;
- gripping means (6) of the removable type of said forming portions (3a, 3b, 3c), movable in relation to said load-bearing structure (2) in order to displace said forming portions (3a, 3b, 3c) in mutual approach/removal;

characterized by the fact that at least one of said forming portions (3a, 3b, 3c) comprises at least one supporting element (7) of the ferromagnetic type and said gripping means (6) comprise at least one gripping element (6b, 6c) of the magnetic type adapted to operate in conjunction with said supporting element (7).

2. Equipment (1) according to claim 1, **characterized by** the fact that said gripping means (6) comprise control means operable to activate/deactivate the magnetic field of said gripping element (6b, 6c).

3. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said forming portions (3a, 3b, 3c) comprise a lower portion (3a), two lateral portions (3b) and an upper portion (3c), wherein at least one of said lateral portions (3b) and said upper portion (3c) is provided with said supporting element (7) and wherein said lower portion (3a) is arranged resting on a resting base (5) associated with said load-bearing structure (2).

4. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that each of said lateral portions (3b) and said upper portion (3c) are provided with said supporting element (7) and by the fact that said gripping means (6) comprise two lateral gripping elements (6b), each of which is adapted to interact with one respective of said lateral portions (3b), and an upper gripping element (6c) adapted to operate in conjunction with said upper

portion (3c).

5. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said lateral gripping elements (6b) are associated movable in a sliding manner with said load-bearing structure (2) along a substantially horizontal first direction (26). 5
6. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises first displacement means (27) of said lateral gripping elements (6b) along said first direction (26). 10
7. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said first displacement means (27) comprise connection means (29) in translation of said lateral gripping elements (6b) along said first direction (26). 15
8. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said upper gripping element (6c) is sliding movable in relation to said load-bearing structure (2) along a substantially vertical second direction (30). 20
9. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises second displacement means (31) of said upper gripping element (6c) along said second direction (30). 25
10. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises positioning means (33) of said at least one gripping element (6b, 6c) between an operating position, wherein it is placed at an assembly area of said forming mold (3) and a maintenance position wherein it is moved away from said assembly area and is accessible from the outside. 30
11. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said positioning means (33) comprise rotating means (34) of at least one of said lateral gripping elements (6b) around a relevant axis (35). 35
12. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that said positioning means (33) comprise a shifting assembly (36) of said upper gripping element (6c) along a third direction (37) transverse to said second direction (30). 40
13. Equipment (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises at least one containment device (8) of said forming portions (3a, 3b, 3c) in the closed configuration, 45

associated with said load-bearing structure (2), wherein said forming mold (3) and said containment device (8) can be mutually movable between a release configuration, wherein said forming mold (3) and said containment device (8) are moved away from each other, and a containment configuration wherein said forming mold (3) is inserted into said containment device (8).

14. Equipment (1) according to claim 13, **characterized by** the fact that said at least one gripping element (6b, 6c) is contained into said containment device (8) in the containment configuration, said gripping element (6b, 6c) maintaining engaged with the relevant forming portion (3b, 3c). 50
15. Equipment (1) according to claim 13, **characterized by** the fact that said at least one gripping element (6b, 6c) is positioned outside said containment device (8) in the containment configuration, wherein said gripping element (6b, 6c) is disengaged from the relevant forming portion (3b, 3c). 55

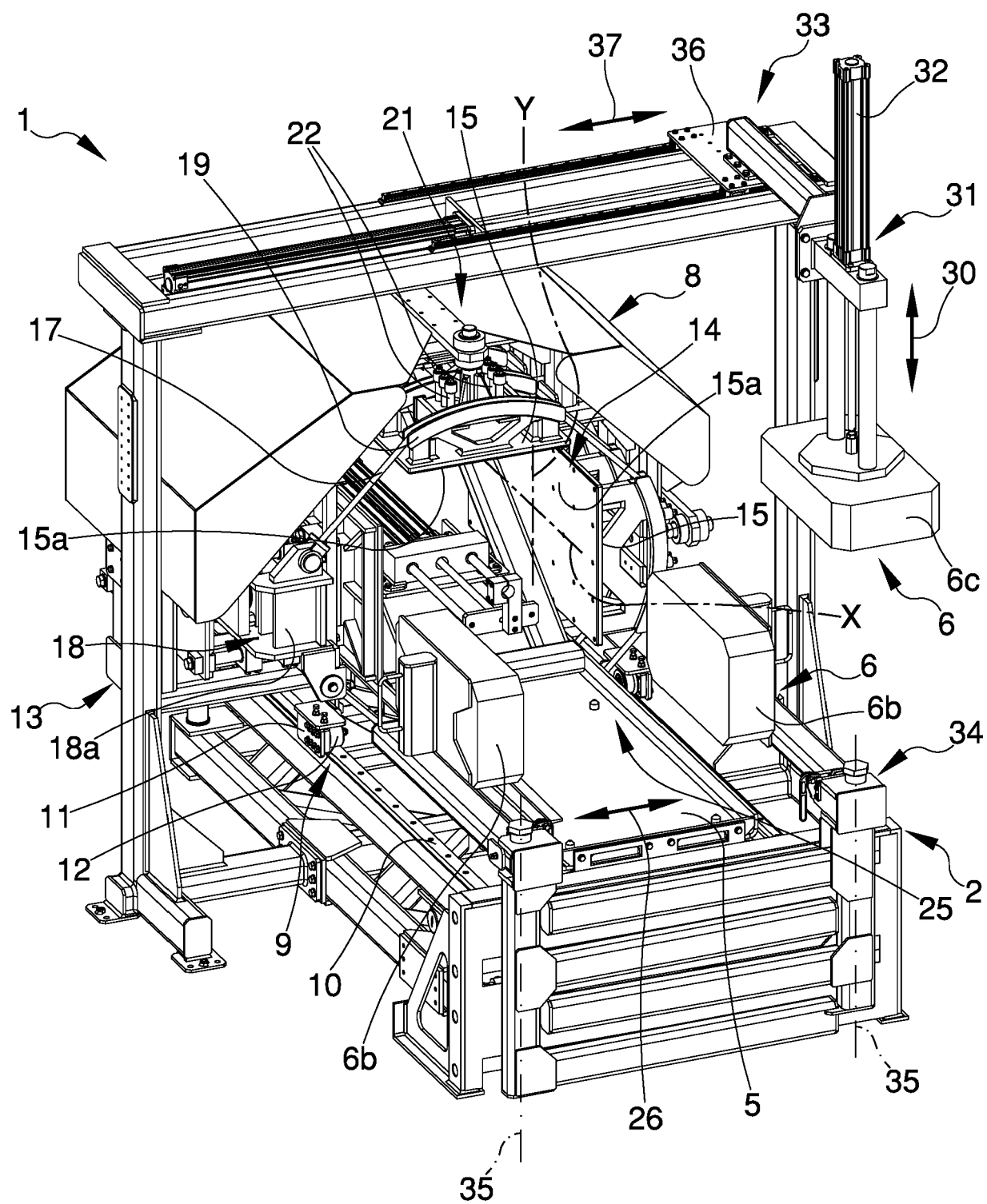


Fig.1

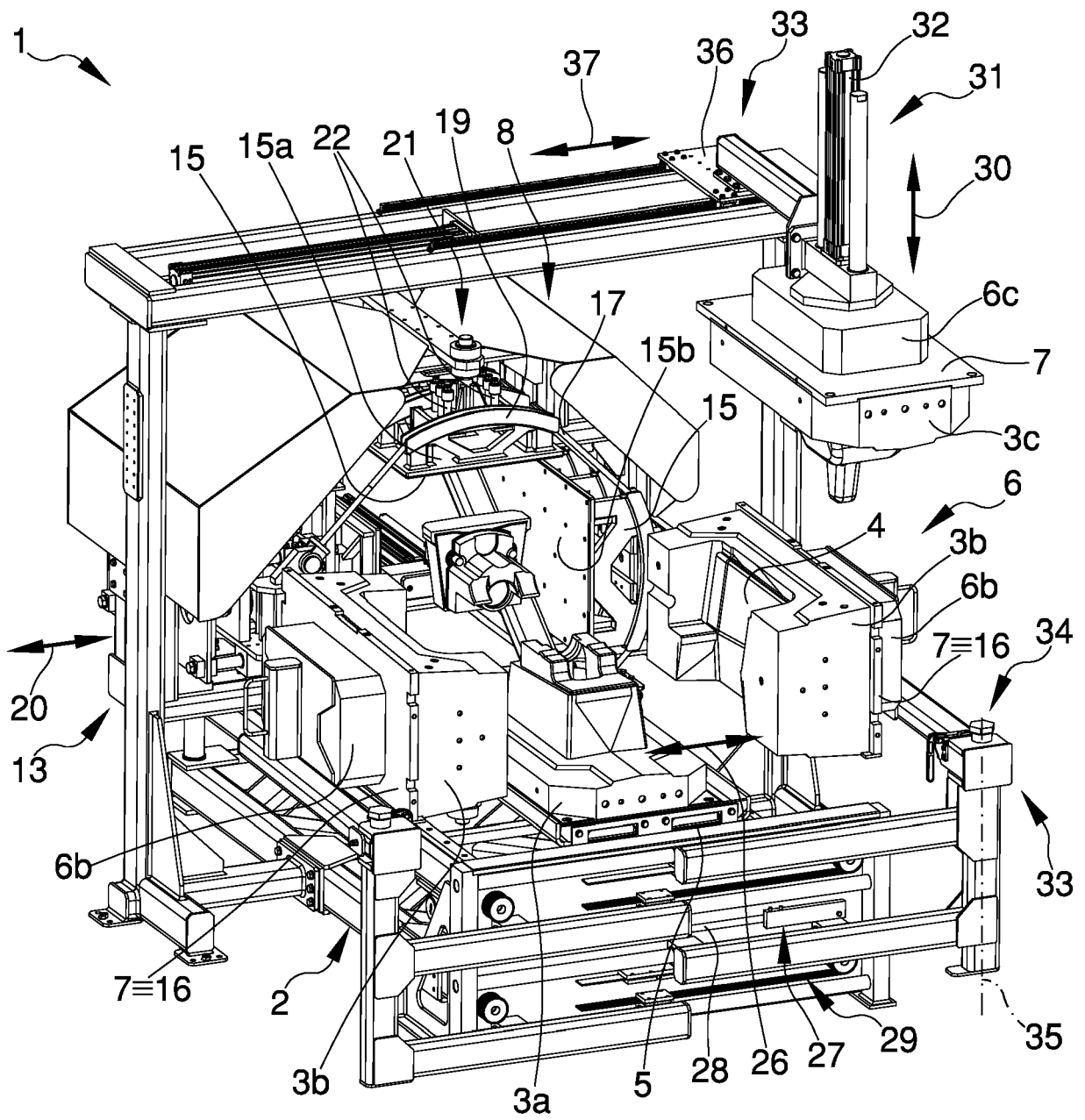


Fig.2

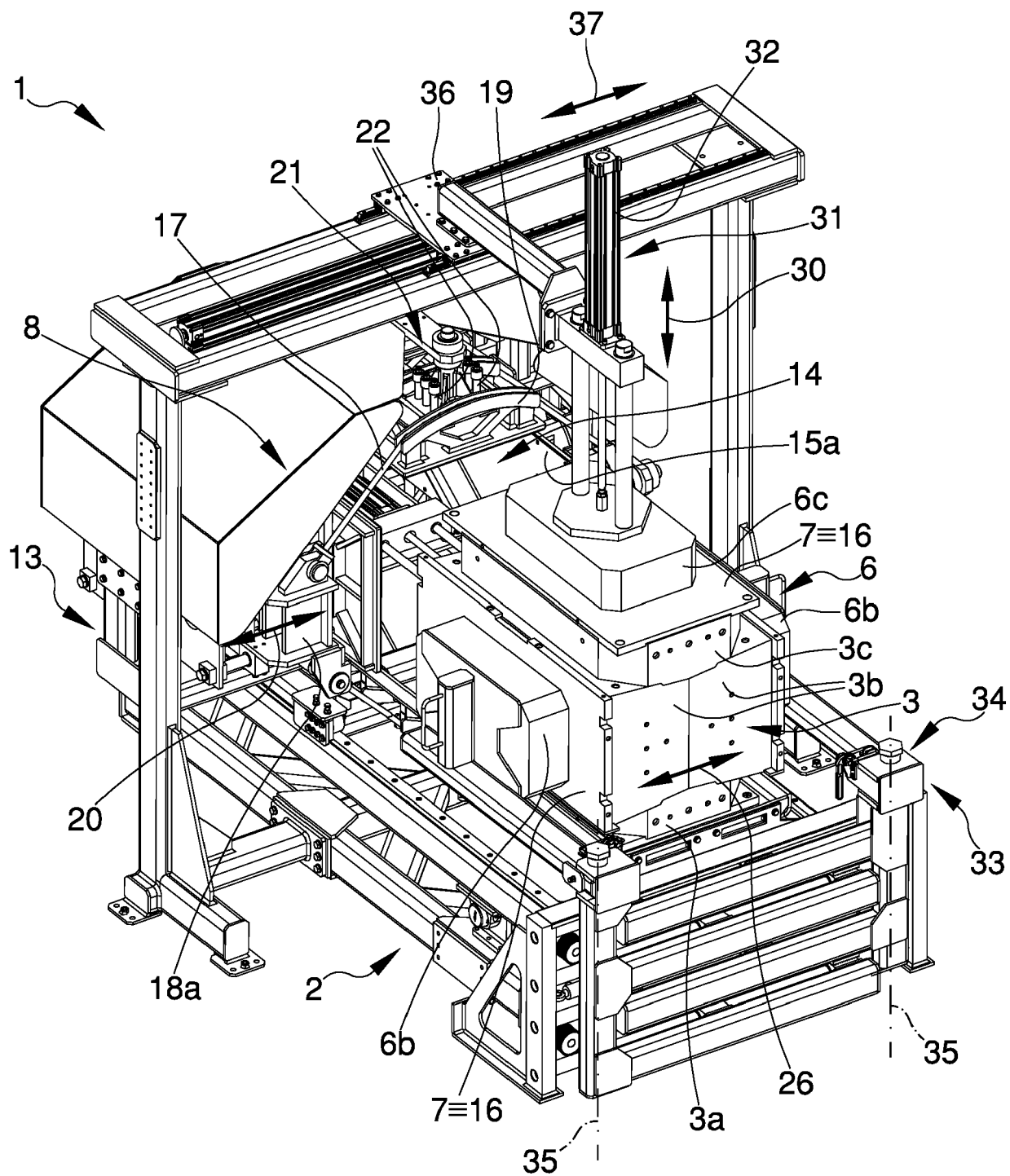


Fig.3

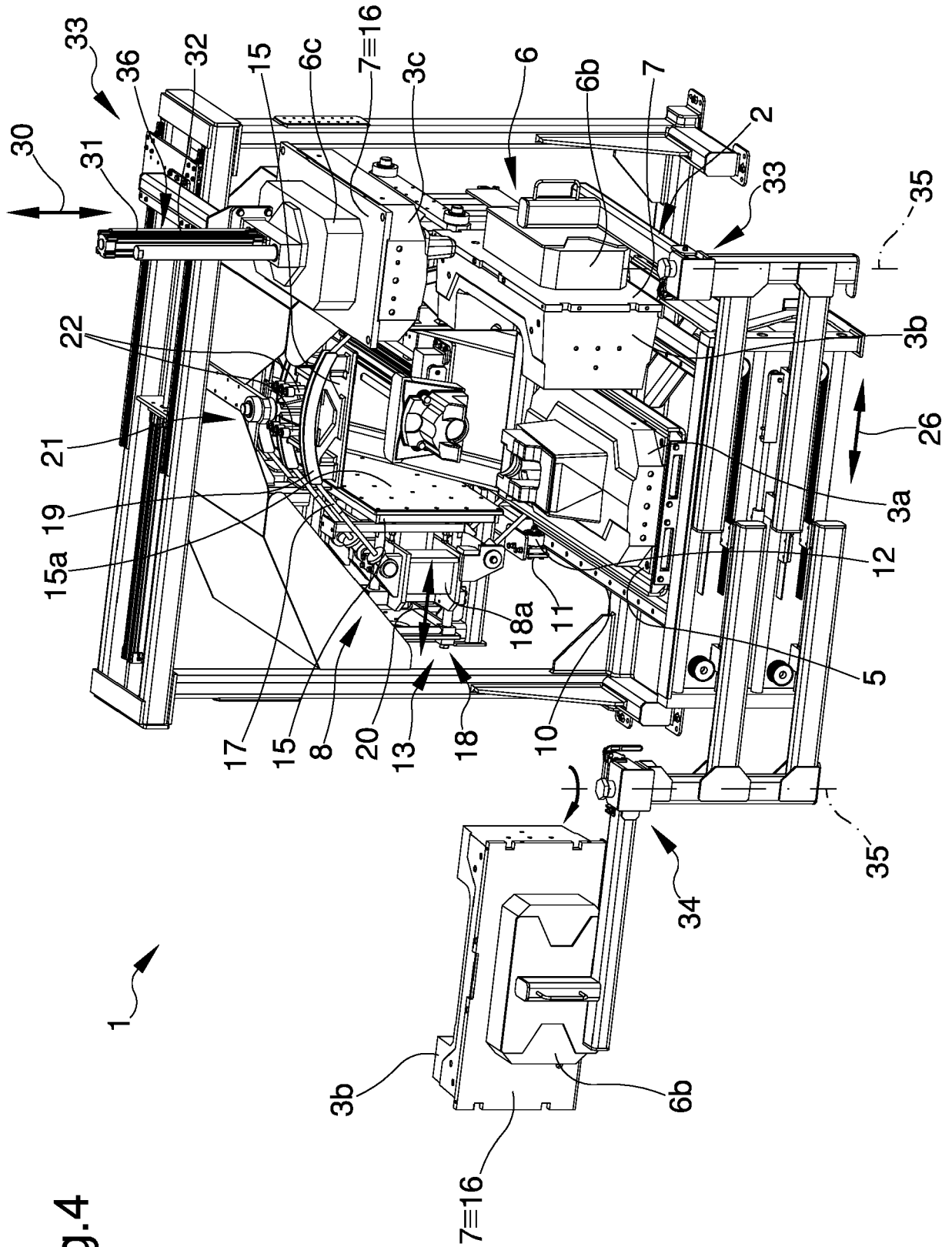


Fig. 4

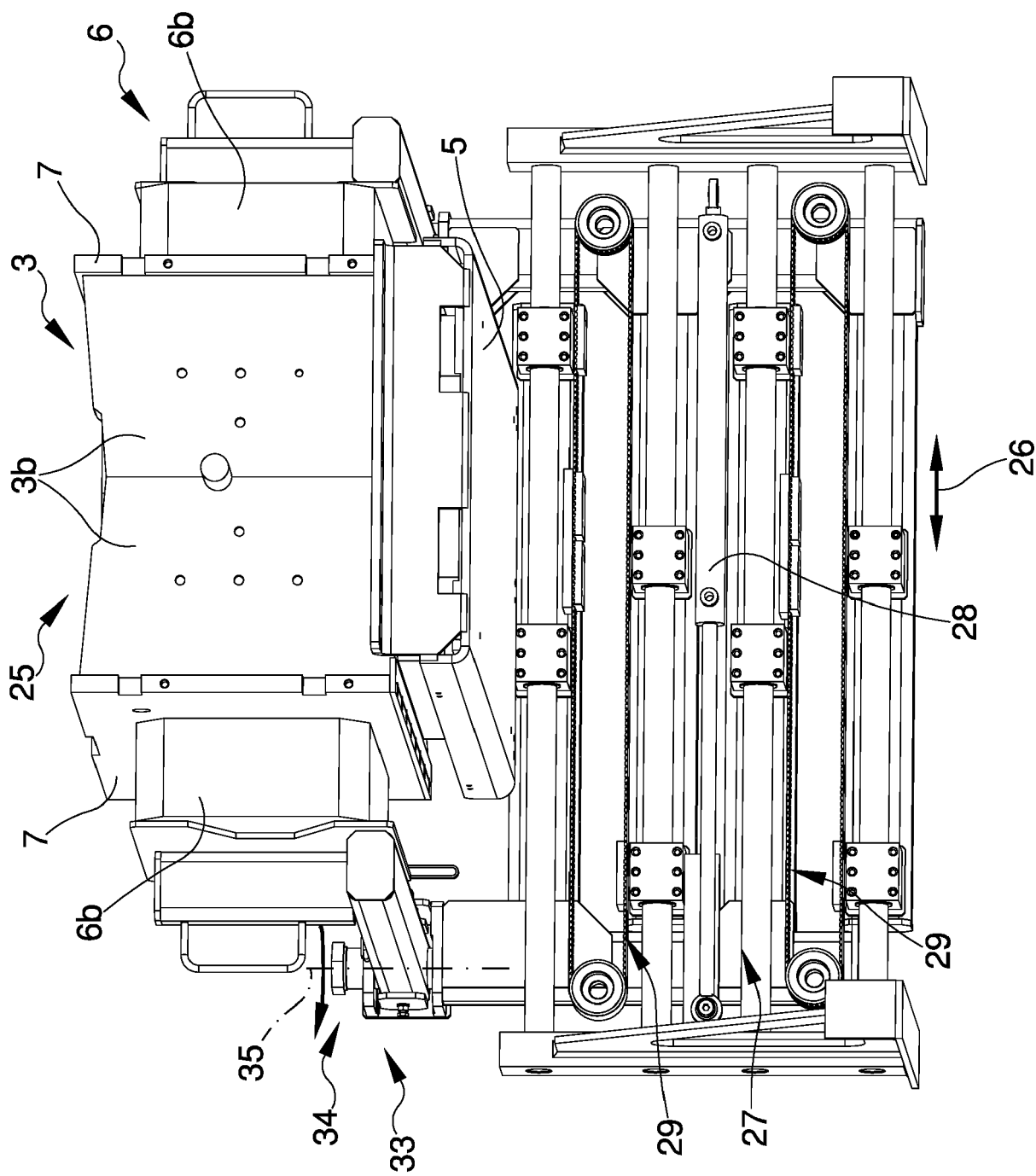


Fig.5



EUROPEAN SEARCH REPORT

Application Number
EP 20 19 6765

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 42 16 212 C1 (NETZSCH GMBH & CO HOLDING E) 29 April 1993 (1993-04-29) * figures 1-6 * * column 3, line 23 - column 4, line 7 * -----	1-10, 12-14 11,15	INV. B28B1/26 B28B7/00
			TECHNICAL FIELDS SEARCHED (IPC)
			B28B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 10 February 2021	Examiner Voltz, Eric
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Patent documents cited in the description

- EP 2366517 A [0007] [0009] [0013] [0015]