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(54) FORMING GROUP FOR PRODUCING SANITARY ARTICLES

FORMGRUPPE ZUR HERSTELLUNG VON HYGIENEARTIKELN

GROUPE DE FORMAGE POUR LA PRODUCTION D'ARTICLES SANITAIRES

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a forming group for producing sanitary articles. More in detail, the present invention relates to a forming group for producing sanitary articles by pressure casting of slip inside a molding group.

STATE OF THE ART

[0002] The production of sanitary articles is carried out in lines wherein pressure casting of slip is carried out inside forming groups of the modular type: each of these groups comprises two or more portions which can be connected together to define a forming cavity, inside which slip (or barbotine that is, in jargon, a fluid mixture containing an aqueous part and a suspended ceramic part) is then pressure cast. The portions forming the forming group, and thus defining the cavity for slip casting, comprise respective molds which, mutually coupled to each other so as to abut against each other at certain junction areas, define the above-mentioned cavity inside which the fluid mixture is directly poured.

[0003] Upon performing the casting of the fluid mixture, the latter solidifies to produce the article having the desired shape: the individual portions of the forming group - bearing the respective molds - may be mutually distanced at this point, to allow the extraction of the article itself, which will then be subjected to firing to obtain the final product.

[0004] The molds can be made, for example, in porous resin, which has replaced the traditional gypsum over time.

[0005] In production lines of this type, several forming groups are usually connected to a support frame, in a hung configuration; more particularly, said forming groups are associated, in series, with a portal frame provided with at least one horizontal beam, to which the various forming groups are hanged side by side so as to be slidably longitudinally movable along the same.

[0006] In the different operating phases, the individual portions forming each forming group can be mutually approached and coupled in order to delimit the forming cavity, or mutually distanced to allow the extraction of the sanitary article, once solidified, from the group itself.

[0007] In preparation to the casting phase of the slip the various forming groups, being movable, are compacted against each other by means of suitable pressing means, associated with the opposed ends of the support frame.

[0008] The aforesaid pressing means are brought into direct contact, on opposite sides, with the lateral sides of the forming groups arranged at the ends of the series, and they exert a tightening action on the forming groups, having a horizontal direction (i.e., parallel to the axis of said support beam).

[0009] This results in an action counteracting the stresses caused by the pressure of the poured fluid mixture into the forming cavities of the line, which ensures the correct realization of the items by limiting mold deformations and hence all the problems that may result therefrom.

[0010] EP 1905561 A2 and WO 2011/095862 A1 describe the equipment for the production of sanitary articles by pressure casting of slip inside modular molds. In more detail, EP 1905561 A2 discloses a forming group for producing sanitary articles in accordance with the preamble of claim 1.

[0011] Still regarding the know art, in some cases - e.g., if the objects to be produced have relatively high dimensions, or if they have relatively complex shape - the tightening and lateral containment action effected by the pressing members of the support frame of the line may not in itself be sufficient to ensure the optimum contrast of the pressure of the poured fluid mixture into the forming cavities, in the various directions in which it is performed.

[0012] In fact, some areas of the molds, or some junction areas between them, may become particularly critical as relating to pressure stresses and consequent induced deformations, as well as with regard to the fluid seal of the molding chamber.

[0013] In some known production lines, to solve these problems, further containing means - having, for instance, a frame-like conformation - have been developed, which externally encircle some of the portions of the forming group to counteract the pressure of the fluid mixture and keep the molds in the correct position while molding the items.

[0014] A specific technical solution of this type provides that, between said containing means and some of the portions of the forming group, inflatable elements with appropriate geometry and size are interposed.

[0015] During casting, or in any case in preparation of the same, the inflatable elements are filled with a suitable liquid or gaseous fluid, having a pressure such as to counterbalance slip pressure: the stresses and the possible consequent deformations of the molds of the forming portions, including the stresses occurring along directions not parallel to the tightening action of the horizontal pressing members of the support frame, are thus allowed to be limited.

[0016] The technical solution described above is not considered fully satisfactory under several points of view.

[0017] In fact, the use of inflatable elements requires, first of all, the provision of suitable means for feeding the filling fluid, which obviously significantly affects the cost, size and weight of the production line, and more generally the functional complexity of the same.

[0018] Moreover, the inflatable elements, being positioned in correspondence with mechanical parts in mutual movement, are subject to wear, and therefore they often must be replaced after a very limited number of production cycles. Additionally, the contrast to fluid pres-

sure effected with inflatable elements cannot, due to its nature, be controlled and fine-tuned.

[0019] Thus, situations may arise in which, even within the same forming group, the fluid pressure of the slip is well contrasted in certain areas but not in others, for example when the inflatable elements have sufficiently extended surfaces of contact with the molds: this may result in poorly uniform quality and homogeneity in the obtained products, or even residual stresses, breakage during extraction, and other drawbacks.

OBJECTS OF THE INVENTION

[0020] The technical task of the present invention is to improve the state of the art in the field of forming groups for producing sanitary articles.

[0021] Within the scope of this technical task, it is an object of the present invention to provide a forming group for producing sanitary articles to overcome the above-mentioned drawbacks.

[0022] Another object of the present invention is to provide a forming group for producing sanitary articles to effectively counteract the high pressure of the poured fluid mixture into the forming chambers to ensure the correct coupling between the molds.

[0023] Yet another object of the present invention is to provide a forming group for producing sanitary articles in which excessive deformations in the molds due to the high pressure at which the fluid mixture is cast are prevented.

[0024] A further object of the present invention is to provide a forming group for the manufacture of sanitary articles where the junction areas of the molds of the various forming groups are properly maintained in mutual contact during the flow of the fluid mixture.

[0025] Yet another object of the present invention is to provide a forming group for constructively simple and cost-effective sanitary articles.

[0026] An additional object of the present invention is to provide a forming group for producing sanitary articles that is easy to use.

[0027] This task and these objects are all achieved by a forming group for the manufacture of sanitary articles according to the appended claim 1.

[0028] The forming group comprises at least one support frame, at least one first portion and one second portion associated with the frame, respectively bearing at least one first mold and one second mold selectively connectable to each other, so as to define at least one forming cavity adapted to receive the casting of at least one pressurized fluid mixture which, once solidified, forms at least one sanitary article.

[0029] The first portion and the second portion are connected to the frame in the hung configuration and are able to be selectively and mutually approachable in a closed configuration, so as to bring into mutual contact the molds to define said forming cavity, and mutually movable away in an open configuration in order to allow the extraction of the sanitary article once it is formed inside the cavity.

[0030] According to the invention, at least the first portion of the forming group comprises a plurality of pressing members which abut against the perimeter surface of the first mold in said closed configuration, at least one flexible and non-extensible tightening element which encloses said pressing members, and traction means associated with the tightening element.

[0031] The dependent claims refer to preferred and advantageous embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] Further features and advantages of the present invention will become apparent from the detailed description of a preferred, non-exclusive embodiment of a forming group for producing sanitary articles illustrated by way of non-limiting example, in the appended drawings, wherein

Figure 1 is a frontal view of the forming group according to the present invention,
in an open configuration;
Figure 2 is a frontal view of the forming group, in a closed configuration;
Figure 3 is an axonometric view of the forming group in an open configuration;
Figure 4 is an axonometric view of the forming group from a different angle, in an open configuration;
Figure 5 is an axonometric view of the forming group in an open configuration, from a further angle;
Figure 6 is an axonometric view of the forming group in an open configuration, with some parts removed for greater clarity;
Figure 7 is an axonometric view of the forming group in an open configuration and for yet another angle, with some parts removed for greater clarity;
Figure 8 is a detailed axonometric view of the first portion of the forming group;
Figure 9 is a detailed axonometric view of the first portion of the forming group,
from a different angle;
Figure 10 is a side view of the first portion of the forming group;
Figure 11 is a top view of parts of the first portion of the forming group;
Figure 12 is a detailed side view of the first portion of the forming group, with some parts removed for greater clarity;
Figure 13 is an axonometric view of the forming group in an open configuration, with some parts removed for greater clarity and with the molds separated from their portion of the group;
Figures 14, 15 are details of Figure 6.

EMBODIMENTS OF THE INVENTION

[0033] With reference to the attached figures, a forming group for producing sanitary articles is generally indicated with the reference number 1.

[0034] The forming group 1 comprises a support frame 2.

[0035] Furthermore, the forming group 1 comprises at least one first portion 3 and one second portion 4.

[0036] The first portion 3 and the second portion 4 are associated with the frame 2.

[0037] The first portion 3 and the second portion 4 respectively have a first mold 5 and a second mold 6, respectively.

[0038] The first mold 5 and the second mold 6 can be replaced, for example, for maintenance purposes or to produce a different sanitary article.

[0039] The first mold 5 and the second mold 6 can be selectively linked together so as to define at least one forming cavity 7.

[0040] More particularly, the first mold 5 and the second mold 6 can be coupled to each other at one or more junction surfaces, delimiting the forming cavity 7.

[0041] The forming cavity 7 is suitable for receiving the casting of at least one pressurized fluid mixture which, once solidified, forms at least one sanitary article.

[0042] The sanitary article realized by group 1 can be of any kind; in some embodiments of the invention, the sanitary article can be, for example, a toilet bowl, a bidet, a rinsing tank for a toilet bowl, or the like, without any particular limitation.

[0043] The first portion 3 and the second portion 4 are connected to the frame 2 in the hung configuration, as will be further clarified in the following.

[0044] The first portion 3 and the second portion 4 are selectively and mutually approachable in a closed configuration so as to bring into mutual contact at least the first mold 5 and the second mold 6 to define the above forming cavity 7 (as shown in figure 2).

[0045] The first mold 5 - as visible, for example, in Figure 3 or in Figure 7 - has a front surface 5a, in which at least a recess 8 is provided helping to define the forming cavity 7 of the sanitary article, as will be better explained in the following. Moreover, the first mold 5 has a perimeter surface 5b which does not help to define the forming cavity 7, but which performs other functions, as will be better described later.

[0046] Thus, the first mold 5 has a parallelepiped conformation or substantially parallelepiped, in which therefore the perimeter surface 5b is composed of four flat or substantially flat surfaces.

[0047] The first portion 3 and the second portion 4 are also mutually movable away in an open configuration - shown, for example, in Figure 1 - to allow the extraction of the sanitary article, once it is formed inside the forming cavity 7.

[0048] According to the invention, at least the first portion 3 of the forming group 1 comprises a plurality of pressing members 9, 10, 11, which abut against the perimeter surface 5b of the first mold 5 in the aforesaid closed configuration. Moreover, according to the invention, the first portion 3 comprises at least one flexible and non-extensible tightening element 12.

[0049] Such tightening element 12, in said closed configuration, is tensioned, and externally encircles the pressing members 9, 10, 11, so as to effectively counteract the pressure of the fluid mixture inside the forming cavity 7.

[0050] Thanks to this solution, and as will become clearer hereinafter, the first mold 5 and the second mold 6 are correctly maintained in mutual contact during the casting phase and subsequent solidification of the fluid mixture inside the forming cavity 7, without risks that the high pressure of the fluid itself can deform or locally damage the molds 5, 6, compromising the quality of the realized products. The frame 2 comprises at least one horizontal or substantially horizontal structure 13.

[0051] The horizontal structure 13 is connected, in the hung configuration, at least to the first portion 3 and the second portion 4, according to the modes best described below.

[0052] The first portion 3 of the forming group 1 comprises a first support reinforcement 14.

[0053] The first reinforcement 14 comprises at least four consecutive sections 14a, 14b, 14c, 14d, connected to each other at reciprocal junctions, so as to conform a substantially square frame structure.

[0054] In particular, the first support reinforcement 14 comprises: a first section 14a, a second section 14b, a third section 14c and a fourth section 14d, connected to each other in succession.

[0055] The first section 14a of the first reinforcement 14, which is arranged superiorly in use, is intended for the hung connection to the horizontal structure 13 of the frame 2.

[0056] The conformation of the first support reinforcement 14 of the first portion 3 may, however, be different from the one described, in relation to specific application needs, without any particular limitations.

[0057] The first support reinforcement 14 of the first portion 3 is connected to the horizontal structure 13 of the frame 2 by means of at least a first carriage element 15 and a second carriage element 16.

[0058] The first carriage element 15 and the second carriage element 16 are movable along respective rails of the horizontal structure 13 so that the first portion 3 can be translated along a first direction A.

[0059] The first carriage element 15 and the second carriage element 16 are provided with respective rolling wheels or rollers 15a, 16a along the rails of the horizontal structure 13.

[0060] According to one aspect of the invention, at least the first carriage element 15 is selectively movable from a working position of coupling to the horizontal structure 13 to an idle position of free decoupling of the first portion 3 from the horizontal structure 13 itself.

[0061] In other words, at least the first carriage element 15, when necessary, may be selectively disengaged from the respective rail to remove the first portion 3 from the forming group 1, for example for replacement, maintenance or other reasons. The first carriage element 15 and the second carriage element 16 are associated with a first beam 17 to which, in turn, the first section 14a of the first support reinforcement 14 is fixed.

[0062] The first mold 5 is connected to the first support reinforcement 14.

[0063] More in detail, and as will become clearer hereinafter, the pressing elements 9, 10, 11 of the first portion 3 provide for retaining the first mold 5 in the correct molding position.

[0064] According to the invention, the tightening element 12 is selected from a cable, a chain, a belt, a strap or a combination of the aforementioned elements, or a combination of distinct portions or sections constituted by the aforesaid elements.

[0065] The tightening element 12 can be made of any material suitable for supporting the tensile stresses to which it is subjected during the forming phase; the material with which the tightening element 12 is made can also be a composite material. According to another aspect of the invention, the tightening element 12 comprises a first end 12a and a second end 12b which are opposite to each other.

[0066] At least one of the first end 12a and the second end 12b is associated with traction means, indicated as a whole with 18, provided in the first portion 3 of the forming group 1.

[0067] More particularly, in the embodiment shown in the figures, both the first end 12a and the second end 12b are associated with said traction means 18, provided in the first portion 3.

[0068] The traction means 18 comprise at least one actuator 19, provided with a fixed element 19a joined to the first portion 3, and with a movable element 19b joined to the first end 12a and/or to the second end 12b of the tightening element 12; preferably, the movable element 19b of the actuator 19 is joined to both the first end 12a and the second end 12b of the tightening element 12.

[0069] In this way, the tightening element 12 is substantially closed in a loop around the pressing members 9, 10, 11 (as shown, for example, in Figure 12).

[0070] In the embodiment shown in the figures, the traction means 18 comprise two actuators 19, arranged in parallel.

[0071] In other embodiments of the invention, however, the traction means 18 could comprise a single actuator 19, having suitable characteristics.

[0072] The actuator 19 (or the actuators 19, if present in a number greater than one) may be, for example, of a pneumatic type, wherein the fixed element 19a comprises a cylinder, and the movable element 19b by the relative stem, sliding with respect to the cylinder.

[0073] In other embodiments, the actuator 19 (or the actuators 19) could be of different types, for example, electromechanical, oleodynamic.

[0074] As can be seen, for example, in Figure 8, the fixed elements 19a of the actuators 19 are associated with a plate 19c fixed, in turn, to the fourth section 14d of the first support reinforcement 14.

[0075] The traction means 18 further comprise one traction member 20.

[0076] The traction member 20 has a central portion to which the movable element 19b (or the movable elements 19b) is connected; the traction member 20 further comprises two opposite peripheral portions, to which the first end 12a and the second end 12b of the tightening element 12 are respectively fixed.

[0077] The first end 12a of the tightening element 12 is connected to the traction member 20 in a rigid manner (as shown, for example, in Figure 10, through threaded connection members, or the like).

[0078] The second end 12b, on the other hand, is connected to the traction member 20 by means of an articulated coupling 21: allowing to compensate for any small misalignments in the assembly of the parts that constitute the first portion 3 and/or the traction means 18.

[0079] According to another aspect of the invention, each of the pressing members 9, 10, 11 comprises a respective external portion 22 provided with means 23 for coupling with the tightening element 12.

[0080] Said coupling means 23 are adapted to allow the relative sliding of the tightening element 12 with respect to the external portion 22 of each of the pressing members 9, 10, 11.

[0081] Said coupling means 23 comprise, for example, a plurality of wheels 24, rotatably supported in the external portion 22 of each of the pressing members 9, 10, 11. Each of said wheels 24 comprising a respective peripheral portion 24a, in which the tightening element 12 is engaged.

[0082] According to another aspect of the invention, the traction means 18 comprise a first transmission roller 25 and a second transmission roller 26, associated with the first portion 3 (more in detail, associated with the fourth section 14d of the first support reinforcement 14).

[0083] The tightening element 12 is engaged in the aforesaid transmission rollers 25, 26; the transmission rollers 25, 26 are therefore interposed between the pressing members 9, 10, 11 and the actuator 19 (or the actuators 19).

[0084] In the embodiment illustrated in the figures, which is of particular practical interest, the traction means 18 comprise two identical tightening elements 19, which engage in respective coupling means 23 provided in the pressing members 9, 10, 11.

[0085] More specifically, the coupling means 23 consequently comprise a plurality of pairs of wheels 24 which are coaxial to each other (as shown, for example, in Figure 11), in which the two tightening elements 12 are respectively engaged. The traction member 20 is also shaped so as to make the connection to both tightening elements 12.

[0086] There are therefore provided, in the traction member 20, two zones for rigid connection to the first ends 12a of the two tightening elements 12, and two articulated couplings 21 to the second ends 12b of said tightening elements 12.

[0087] In other words, the traction means 18 comprise two parts specular to each other with respect to an ideal vertical and front-back symmetry plane of the first portion 3, each of which comprising a proper tightening element 12 and the respective means 23 for coupling to the pressing members 9, 10, 11.

[0088] This particular solution allows to distribute in a more uniform manner the tension exerted by the traction means 18 on the pressing members 9, 10, 11, and therefore the contact pressure of the same on the perimeter surface 5b of the first mold 5.

[0089] In other embodiments of the invention, however, the traction means 18 could comprise a single tightening element 12, with corresponding coupling means 23 comprising a single row of coplanar wheels 24 (for example, in the case of molds 5, 6 not particularly extensive in the sense of depth).

[0090] Still with reference to the embodiment shown in the figures, the aforesaid pressing members 9, 10, 11 comprise, more particularly, a first pressing member 9, a second pressing member 10 and a third pressing member 11.

[0091] The first, second, third pressing members 9, 10, 11 are respectively arranged on three consecutive sides of a rectangle, or a square; at the fourth side of said rectangle or square (and therefore in correspondence with the fourth section 14d of the first support reinforcement 14) the aforesaid traction means 18 are provided.

[0092] Each of the pressing members 9, 10, 11 comprises a respective operating portion 27 for abutting against the perimeter surface 5b of said the first mold 5, and the aforementioned external portion 22 which cooperates with the tightening element 12 (or the tightening elements 12).

[0093] The operating portion 27 can be flat, or it may also have a different conformation. The external portion 22 of each of the pressing members 9, 10, 11 comprises a respective substantially arc-shaped profile 28.

[0094] The means 23 for coupling to the tightening element 12 (i.e., for example, the wheels 24) are arranged along said profile 28.

[0095] The profile 28 can be made with different dimensional or shape characteristics so as to obtain, correspondingly, different pressure conditions of each of the pressing members 9, 10, 11 on the perimeter surface 5b of the first mold 5.

[0096] The first mold 5 is, more particularly, a female mold, while the second mold 6 is a male mold.

[0097] In other words, the first mold 5 comprises at least one recess 8, while the second mold 6 comprises, correspondingly, at least one relief 29.

[0098] The coupling of the relief 29 inside the recess 8 defines the forming cavity 7 for the realization of the objects.

[0099] In the specific embodiment shown in the figures - and merely by way of non-limiting example - the first mold 5 comprises three recesses 8, while the second mold 6 comprises, correspondingly, three reliefs 29.

[0100] The conformation of the molds 5, 6 can however be of any kind, without limitations to the purposes of the present invention.

[0101] However, the embodiment shown in the figures is of particular practical interest, in which the first mold 5 - on which the peripheral surface 5b, act, in fact, the pressing members 9, 10, 11 - comprises one or more recesses 8 - i.e., is a female mold - in that it defines the outermost portion of the forming cavity 7.

[0102] The first pressing member 9 is arranged, in use, above the first mold 5. Moreover, the second pressing member 10 is disposed, in use, laterally with respect to the same first mold 5.

[0103] Finally, the third pressing member 11 is arranged, in use, below the first mold 5. According to an aspect of the invention, each of the pressing members 9, 10, 11 is selectively movable, i.e. adjustable in position, with respect to the first support reinforcement 14 of the first portion 3.

[0104] This allows, first of all, to lock the first mold 5, with respect to the first support reinforcement 14, in its correct operating position, and in any case in an adjustable manner.

[0105] Moreover, the first portion 3 comprises first, second, third elastic connection means 30, 31, 32 respectively of the first pressing member 9, of the second pressing member 10 and of the third pressing member 11 to the first support reinforcement 14.

[0106] The first, second, third elastic connection means 30, 31, 32, during the mixture casting phase, operate in contrast to the tension exerted, on the pressing members 9, 10, 11 by the traction means 3.

[0107] As a result, when solidification of the mixture occurs - that is when the traction means 18 can be released because there is no longer the risk of deformation of the molds 5, 6 - the elastic connection means 30, 31, 32 provide to spontaneously bring the pressing members 9, 10, 11 back in their respective rest positions: in such configuration, the realized article can easily be extracted from the forming cavity 7.

[0108] The first elastic connection means 30 comprise first threaded bars 33, with respective first ends connected - in an adjustable manner - to the first pressing member 9, and slidably engaged inside respective first seats 34 associated with the first section 14a of the first support reinforcement 14.

[0109] Between the second ends - above, in use - of the aforementioned first threaded bars 33, and the respective first seats 34, there are provided respective first helical springs 35, inserted along the first bars 33 themselves.

[0110] The first springs 35 therefore oppose the movement away of the first pressing member 9 from the first

section 14a of the first support reinforcement 14 - that is, they oppose the descent of the first pressing member 9 - so as to maintain the first pressing member 9 itself hanging from the aforementioned first section 14a.

[0111] The first portion 3 further comprises first means 36 for adjusting the position of the first pressing member 9 with respect to the first support reinforcement 14.

[0112] The first adjustment means 36 comprise, in more detail, the first threaded rods 37 having their respective first ends connected - in an adjustable manner - to the first pressing member 9, and the second ends adapted to abut against respective first stop portions 38 provided in the first section 14a of the first support reinforcement 14.

[0113] The first adjustment means 36 allow to obtain the desired rest position - that is at which no traction is exerted - of the first pressing member 9 with respect to the first support reinforcement 14.

[0114] Therefore, when the first elastic connection means 30 tend to retract the first pressing member 9 towards the first section 14a of the first support reinforcement 14, the first stop portions 38 constitute, in practice, an end-stop which determines, in fact, the rest position of the first pressing member 9.

[0115] The second elastic connection means 31 comprise second threaded bars 39, having the respective first ends connected - in an adjustable manner - to the second pressing member 10, and slidably engaged inside respective second seats 40 associated with the second section 14b of the first support reinforcement 14.

[0116] Between the second ends - in use, facing outwards - of said second threaded bars 39, and the respective second seats 40, respective second helical springs 41 are provided, inserted along the second bars 39 themselves.

[0117] The second springs 41 therefore oppose the movement away of the second pressing member 10 from the second section 14b of the first support reinforcement 14.

[0118] The third elastic connection means 32 comprise third threaded bars 42, with respective first ends connected - in an adjustable manner - to the third pressing member 11, and slidably engaged inside respective third seats 43 associated with the third section 14c of the first support reinforcement 14.

[0119] Between the first ends - above, in use - of said third threaded bars 42, and the respective third seats 43, there are provided respective third helical springs 44, inserted along the third bars 42 themselves.

[0120] Since the third pressing member 11 is positioned, in use, below the first mold 5, the third elastic connection means 32 acts, in practice, by shock-absorbing elements which accompany the descent of the third pressure element 11 into the respective rest position, when the action of the traction means 18 ceases, so as to avoid collisions.

[0121] According to another aspect of the invention, the first portion 3 comprises second means 45 for adjusting the position of the third pressing member 11 with respect to the first support reinforcement 14.

[0122] The second adjustment means 45 comprise, in more detail, second threaded rods 46 having their respective first ends connected - in an adjustable manner - to the third pressing member 11, and the second ends adapted to abut against respective second stop portions 47 provided in the second section 14c of the first support reinforcement 14.

[0123] The second adjustment means 45 allow to obtain the desired rest position of the third pressing member 11 with respect to the first support reinforcement 14.

[0124] The back - or rear face - of the first mold 5 is associated with a respective first rigid plate-shaped support 48, which is therefore opposed to the forming cavity 7. The second portion 4 of the forming group 1 comprises a second support reinforcement 49.

[0125] The second support reinforcement 49 has a conformation which, in use, is substantially shaped as a laying down "C", with its opening facing downwards. The second support reinforcement 49 comprises a central section 49a and two lateral sections 49b, 49c opposite to each other.

[0126] The second support reinforcement 49 of the second portion 4 is connected to the horizontal structure 13 of the frame 2 by means of a third carriage element 50 and a fourth carriage element 51.

[0127] The third carriage element 50 and the fourth carriage element 51 are movable along the above-mentioned rails of the horizontal structure 13 so that the second portion 4 can be translated along a horizontal direction.

[0128] The third carriage element 50 and the fourth carriage element 51 are provided with respective rolling wheels or rollers 50a, 51a along the rails of the horizontal structure 13.

[0129] According to one aspect of the invention, at least the third carriage element 50 is selectively movable from a working position of coupling to the horizontal structure 13 to an idle position of free decoupling of the second portion 4 from the horizontal structure 13 itself.

[0130] In other words, at least the third carriage element 50, when necessary, may be selectively disengaged from the respective rail to remove the second portion 4 from the forming group 1, for example for replacement, maintenance or other reasons.

[0131] The third carriage element 50 and the fourth carriage element 51 are associated with a second beam 52 to which, in turn, the central section 49a of the second support reinforcement 49 is fixed.

[0132] According to an aspect of the invention, the second portion 4 of the forming group 1 comprises rotation means 53 of the second mold 6 from a substantially vertical forming position in use, to a substantially horizontal discharge position in use of the formed article.

[0133] In detail, the rotation means 53 comprise at least one table 54, to which the back of the second mold 6 is fixed; the table 54 is hinged to the second support

reinforcement 49 at a first axis 55.

[0134] The rotation means 53 further comprise rotary actuator means 56, adapted for rotating said table 54 from the substantially vertical position to the substantially horizontal position, and vice versa.

[0135] The rotary actuator means 56 comprise, more particularly, at least one linear actuator 57, having a first end 57a articulated to the second support reinforcement 49 at a second axis 58 (Figure 6), and a second end 57b articulated to the table 54 in a third axis 59, parallel to the second axis 58 (figures 14,15), so as to provide a thrust crank gear.

[0136] Even more particularly, in the embodiment illustrated in the figures, which is of particular practical interest, the first axis 55 for articulating the table 54 to the second support reinforcement 49 is provided at the lateral sections 49b, 49c of the latter.

[0137] Furthermore, the rotary actuator means 56 comprise two linear actuators 57, the respective first ends 57a of which are articulated to the central portion 49a of the second support reinforcement 49.

[0138] The two linear actuators 57 are arranged along the lateral sections 49b, 49c of the second support reinforcement 49.

[0139] As shown in the details of figures 14, 15, the third axis 59 is provided in two respective appendages 60,61, which branch off from the two opposite sides of the table 54 at which the first axis 55 is also provided, so as to obtain the necessary center line to easily rotate the table 54 by means of the aforesaid thrust crank gear. The linear actuators 57 may be, for example, pneumatic, or electromechanical, or oleodynamic, without specific restrictions.

[0140] The operation of the forming group 1 according to the invention is, in the light of the foregoing, completely intuitive.

[0141] The following description of the operation of the group 1, assumes a configuration of use thereof as shown in the figures, i.e. with the portions 3, 4, associated with the horizontal structure 13 in the hung configuration: of course, other configurations of use may be possible with the portions 3, 4 differently oriented. Thus, assuming starting from the open configuration of the forming group 1 shown in Figure 1, the various portions 3, 4 mutually approach so as to close the forming cavity 7 in which the fluid mixture is cast.

[0142] The reciprocal approach of the first portion 3 and of the second portion 4 determines, more in detail, the engagement of the reliefs 29 of the second mold 6 inside the recesses 8 of the first mold 5, until the surfaces of mutual junction of the two molds 5, 6 match.

[0143] Once this closed configuration is obtained, the molds 5, 6 enclose the forming cavity 7 between them.

[0144] At this point the casting of the fluid mixture is carried out inside the forming cavity 7; simultaneously, at the start of the casting phase, or at a subsequent instant, the traction means 18 of the first portion 3 are activated.

[0145] In this way, the tightening element 12 encircles the perimeter of the pressing members 9, 10, 11 as a loop.

[0146] The pressing members 9, 10, 11, therefore - in cooperation with the plate 19c - exert a suitable pressure on all the faces of the perimeter surface 5b of the first mold 5.

[0147] This allows to effectively counteract the high pressure of the mixture inside the forming cavity 7, maintaining the first mold 5 (which is made, for example, of resin, and therefore could be deformed) in the optimal configuration and in the optimal position with respect to the second mold 6, to obtain the article of desired shape, without defects.

[0148] At the end of the casting and the subsequent solidification step of the sanitary article, the traction means 18 are released, and the forming group 1 is returned to the open configuration of Figure 1, at which the sanitary article can be extracted from the group 1.

[0149] At this point, if desired, the rotation means 53 - if present - may also be actuated in order to bring the table 54 in a horizontal or substantially horizontal position: in this position, the article realized within the forming group 1 can be more easily extracted, since it can be separated from the second mold 6 by simple fall.

[0150] In the case in which the rotation means 53 are not provided, the separation of the article formed by the molds 5, 6 can be carried out with other suitable means.

[0151] As previously mentioned, at the end of the solidification of the article inside the molds 5, 6, the release of the traction means 18 allows the pressing members 9, 10, 11 to return to their rest positions, thanks to the action of the elastic connection means 30, 31, 32.

[0152] The release of the traction means 18, and therefore the release of the pressure exerted by the pressing members 9, 10, 11 on the perimeter surface 5b of the first mold 5, allows to easily separate the molds 5, 6 from each other, and consequently to extract the article from the cavity 7 with reduced frictions.

[0153] It is to be understood that the object of the present invention is also a molding line comprising at least one forming group 1 as described above.

[0154] In more detail, said molding line comprises a plurality of forming groups 1 of the type described above, all connected in a hung configuration and side by side along the horizontal structure 13 of the frame 2.

[0155] The molding line comprises pressing means provided at the ends of the horizontal structure 13 and acting respectively on the plate-like support 48 and on the table 54 of the forming groups 1, which are positioned at the ends of said plurality. The action of such pressing means allows the forming groups 1 to be compacted side by side in order to compensate the pressure of the fluid mixture cast in the forming cavities 7 at least along the first approaching-removal direction A of the portions 3, 4 of the group 1; this action, combined with that of the pressing members 9, 10, 11, limits the possible deformations of the molds 5, 6 of the forming group 1 in correspondence with the respective junction areas, and therefore also the

possible consequences that may derive from this, such as fluid leaks, residual stresses, and more.

[0156] It has thus been seen how the invention achieves the intended purposes.

[0157] The deformations of the molds at the junction areas, and therefore the possible problems related to fluid leaks or defects in the sanitary articles, are limited or are entirely eliminated with a more effective technical solution than those currently present on the market.

[0158] In fact, all the disadvantages due, for example, to the use of inflatable elements to obtain the same effects are eliminated.

[0159] The adopted technical solution is constructively simpler and cheaper than those of the known type.

[0160] Even in the case of maintenance interventions, the forming group is easy to disassemble, since it is made up of a limited number of components.

[0161] Moreover, the technical solution according to the present invention is characterized by a greater durability over the known types of solutions, as the wear problems of the elastomeric parts composing said inflatable elements are completely eliminated.

[0162] The forming group for sanitary articles according to the present invention can also easily find use in pre-existing production plants for the integration or replacement of pre-existing production groups or lines.

[0163] Further, all the details can be replaced by other technically equivalent elements. In practice, the materials employed, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of protection of the following claims.

Claims

1. Forming group (1) for producing sanitary articles, comprising at least one support frame (2), at least one first portion (3) and one second portion (4), associated with said frame (2), respectively bearing at least one first mold (5) and one second mold (6) selectively connectable to each other, so as to define at least one forming cavity (7) adapted to receive the casting of at least one pressurized fluid mixture which, once solidified, forms at least one sanitary article,
said first portion (3) and second portion (4) being connected to said frame (2) in hung configuration and being selectively and mutually approachable in a closed configuration, so as to bring into mutual contact said molds (5,6) in order to define said at least one forming cavity (7), and mutually movable away in an open configuration in order to allow the extraction of the sanitary article once it is formed inside said cavity (7), at least said first portion (3) comprises a plurality of pressing members (9, 10, 11) which abut against the perimeter surface (5b) of said first mold (5) in said closed configuration, **characterized in that** at least said first portion (3) comprises at least one flexible and non-extensible tightening element (12) which encircles said pressing members (9, 10, 11), and traction means (18) associated with said tightening element (12), and **in that** said tightening element (12) comprises at least one cable, or at least one chain, or at least one belt, or at least one strip, or a combination of the aforesaid elements, or a combination of separate portions of the aforesaid elements.

2. Group according to claim 1, wherein said traction means (18) comprise at least one actuator (19) provided with a fixed element (19a) joined to said first portion (3), and with a movable element (19b) joined to the first end (12a) and to the second end (12b) of said tightening element (12), said tightening element (12) being closed substantially like a loop around said pressing members (9, 10, 11).

3. Group according to one of the preceding claims, wherein each of said pressing members (9, 10, 11) comprises an external portion (22) provided with means (23) for coupling with said tightening element (12), said coupling means (23) being adapted to allow the relative sliding of said tightening element (12) with respect to said external portion (22).

4. Group according to the preceding claim, wherein said coupling means (23) comprise a plurality of wheels (24) rotatably supported in said external portion (22), each of said wheels (24) comprising at least one peripheral portion (24a) in which said tightening element (12) is engaged.

5. Group according to claim 3 or 4, wherein each of said pressing members (9, 10, 11) comprises a respective operating portion (27) for abutting against the perimeter surface (5b) of said first mold (5), said external portion (22) comprising a substantially arc-shaped profile (28), said coupling means (23) being arranged along said profile (28).

6. Group according to one of the claims 2-5, wherein said traction means (18) comprise a first and a second transmission roller (25, 26) in which said tightening element (12) is engaged, interposed between said pressing members (9, 10, 11) and said actuator (19).

7. Group according to one of the preceding claims, wherein said first portion (3) comprises a first support reinforcement (14) and wherein said pressing members (9, 10, 11) comprise a first pressing member (9), a second pressing member (10) and a third pressing member (11) respectively associated with a first section (14a), second section (14b) and third section (14c) of said first support reinforcement (14),

and wherein at the fourth section (14d) of said first support reinforcement (14) said traction means (18) are provided, said pressing members (9, 10, 11) being respectively arranged according to the three consecutive sides of a rectangle or of a square.

8. Group according to one of the preceding claims, wherein said first mold (5) is a female mold and said second mold (6) is a male mold, said first mold (5) comprising at least one recess (8) for the insertion of at least one respective relief (29) provided in said second mold (6) so as to define said forming cavity (7).

9. Group according to claim 7 or 8, wherein said first pressing member (9), said second pressing member (10) and said third pressing member (11) comprise respective first elastic connection means (30), second elastic connection means (31) and third elastic connection means (32) for respectively connecting to a first section (14a), second section (14b) and third section (14c) of the first support reinforcement (14) of said first portion (14), said first, second, third elastic connection means (30, 31, 32) being adapted to bring said pressing members (9, 10, 11) back into the respective rest positions at the end of each forming cycle.

10. Group according to one of the claims 7-9, wherein said first portion (3) comprises first means (36) for adjusting the position of said first pressing member (9) with respect to said first section (14a) of said first support reinforcement (14), and second means (45) for adjusting the position of said third pressing member (11) with respect to said third section (14c) of said first support reinforcement (14).

11. Group according to one of the preceding claims, wherein said second portion (4) comprises rotation means (53) for rotating said second mold (6) from a substantially vertical forming position, in use, to a position that is substantially horizontal for unloading the formed object, in use.

12. Group according to the preceding claim, wherein said rotation means (53) comprise at least one table (54), associated with said second mold (6), hinged to the second support reinforcement (49) of said second portion (4) at a first axis (55), and rotary actuator means (56) adapted to rotate said table (54) from said substantially vertical position to said substantially horizontal position, and vice versa.

13. Group according to the preceding claim, wherein said rotary actuator means (56) comprise at least one linear actuator (57) having a first end (57a) articulated to the second support reinforcement (49) of said second portion (4) at a second axis (58), and a second end (57b) articulated to said table (54) at a third axis (59) parallel to said second axis (58), so as to make a thrust crank gear.

14. Line for forming sanitary articles, comprising a support frame (2) provided with at least one horizontal structure (13), a plurality of forming groups (1) according to one of the claims 1-13, connected to said horizontal structure (13) in hung configuration and side-by-side each other, and pressing means provided at the ends of said horizontal structure (13), which act on suitable surfaces of the forming groups (1) that are situated at the ends of said plurality, in a manner so as to retain said forming groups (1) in the respective closed configurations wherein they define the respective forming cavities (7).

Patentansprüche

1. Bildungsgruppe (1) zum Herstellen von Hygieneartikeln, umfassend mindestens einen Trägerrahmen (2), mindestens einen ersten Abschnitt (3) und einen zweiten Abschnitt (4), die mit dem Rahmen (2) assoziiert sind und jeweils mindestens eine erste Form (5) und eine zweite Form (6) tragen, die selektiv miteinander verbunden werden können, um mindestens einen Bildungshohlraum (7) zu definieren, der angepasst ist, um das Gießen mindestens eines unter Druck stehenden Fluidgemischs aufzunehmen, das nach Verfestigung mindestens einen Hygieneartikel bildet,

wobei der erste Abschnitt (3) und der zweite Abschnitt (4) in einer hängenden Konfiguration mit dem Rahmen (2) verbunden sind und sich in einer geschlossenen Konfiguration selektiv und gegenseitig annähern können, um die Formen (5, 6) in gegenseitigen Kontakt zu bringen, um den mindestens einen Bildungshohlraum (7) zu definieren, und in einer offenen Konfiguration gegenseitig wegbewegt werden können, um die Entnahme des Sanitärartikels zu ermöglichen, sobald er im Inneren des Hohlraums (7) gebildet ist,

wobei mindestens der erste Abschnitt (3) eine Vielzahl von Druckelementen (9, 10, 11) umfasst, die in der geschlossenen Konfiguration an der Umfangsfläche (5b) der ersten Form (5) anliegen, **dadurch gekennzeichnet, dass** mindestens der erste Abschnitt (3) mindestens ein flexibles und nicht dehnbares Spannelement (12), das die Druckelemente (9, 10, 11) umgibt, und Zugeinrichtungen (18), die mit dem Spannelement (12) assoziiert sind, umfasst, und dass das Spannelement (12) mindestens ein Kabel oder mindestens eine Kette oder mindestens einen Riemen oder mindestens einen Streifen

oder eine Kombination der vorgenannten Elemente oder eine Kombination separater Abschnitte der vorgenannten Elemente umfasst.

2. Gruppe nach Anspruch 1, wobei die Zugeinrichtungen (18) mindestens ein Betätigungselement (19) umfassen, das mit einem festen Element (19a), das mit dem ersten Abschnitt (3) verbunden ist, und mit einem beweglichen Element (19b), das mit dem ersten Ende (12a) und dem zweiten Ende (12b) des Spannelements (12) verbunden ist, versehen ist, wobei das Spannelement (12) im Wesentlichen wie eine Schleife um die Druckelemente (9, 10, 11) geschlossen ist.

3. Gruppe nach einem der vorherigen Ansprüche, wobei jedes der Druckelemente (9, 10, 11) einen äußeren Abschnitt (22) umfasst, der mit Einrichtungen (23) zum Koppeln mit dem Spannelement (12) versehen ist, wobei die Kopplungseinrichtungen (23) angepasst sind, um das relative Gleiten des Spannelements (12) in Bezug auf den äußeren Abschnitt (22) zu ermöglichen.

4. Gruppe nach dem vorherigen Anspruch, wobei die Kopplungseinrichtungen (23) eine Vielzahl von Rädern (24) umfassen, die drehbar in dem äußeren Abschnitt (22) gelagert sind, jedes der Räder (24) umfassend mindestens einen Umfangsabschnitt (24a), in den das Spannelement (12) eingreift.

5. Gruppe nach Anspruch 3 oder 4, wobei jedes der Druckelemente (9, 10, 11) einen jeweiligen Betätigungsabschnitt (27) zum Anliegen an der Umfangsfläche (5b) der ersten Form (5) umfasst, der äußere Abschnitt (22) umfassend ein im Wesentlichen bogenförmiges Profil (28), wobei die Kopplungseinrichtungen (23) entlang des Profils (28) angeordnet sind.

6. Gruppe nach einem der Ansprüche 2-5, wobei die Zugeinrichtungen (18) eine erste und eine zweite Übertragungsrolle (25, 26) umfassen, in die das Spannelement (12) eingreift, das zwischen den Druckelementen (9, 10, 11) und dem Betätigungselement (19) eingefügt ist.

7. Gruppe nach einem der vorherigen Ansprüche, wobei der erste Abschnitt (3) eine erste Trägerverstärkung (14) umfasst und wobei die Druckelemente (9, 10, 11) ein erstes Druckelement (9), ein zweites Druckelement (10) und ein drittes Druckelement (11) umfassen, die jeweils mit einem ersten Abschnitt (14a), einem zweiten Abschnitt (14b) und einem dritten Abschnitt (14c) der ersten Trägerverstärkung (14) assoziiert sind, und wobei an dem vierten Abschnitt (14d) der ersten Trägerverstärkung (14) die Zugeinrichtungen (18) bereitgestellt sind, wobei die Druckelemente (9, 10, 11) jeweils gemäß den drei aufeinanderfolgenden Seiten eines Rechtecks oder eines Quadrats angeordnet sind.

8. Gruppe nach einem der vorherigen Ansprüche, wobei die erste Form (5) eine Matrizenform und die zweite Form (6) eine Patrizenform ist, die erste Form (5) umfassend mindestens eine Aussparung (8) zum Einsetzen mindestens eines entsprechenden Reliefs (29), das in der zweiten Form (6) bereitgestellt ist, um den Bildungshohlraum (7) zu definieren.

9. Gruppe nach Anspruch 7 oder 8, wobei das erste Druckelement (9), das zweite Druckelement (10) und das dritte Druckelement (11) jeweils eine erste elastische Verbindungseinrichtung (30), eine zweite elastische Verbindungseinrichtung (31) und eine dritte elastische Verbindungseinrichtung (32) zum jeweiligen Verbinden mit einem ersten Abschnitt (14a), einem zweiten Abschnitt (14b) einem dritten Abschnitt (14c) der ersten Trägerverstärkung (14) des ersten Abschnitts (14) umfassen, wobei die erste, die zweite und die dritte elastische Verbindungseinrichtung (30, 31, 32) angepasst sind, um die Druckelemente (9, 10, 11) am Ende von jedem Bildungszyklus in die jeweiligen Ruhepositionen zurückzubringen.

10. Gruppe nach einem der Ansprüche 7-9, wobei der erste Abschnitt (3) eine erste Einrichtung (36) zum Einstellen der Position des ersten Druckelements (9) in Bezug auf den ersten Abschnitt (14a) der ersten Trägerverstärkung (14) und eine zweite Einrichtung (45) zum Einstellen der Position des dritten Druckelements (11) in Bezug auf den dritten Abschnitt (14c) der ersten Trägerverstärkung (14) umfasst.

11. Gruppe nach einem der vorherigen Ansprüche, wobei der zweite Abschnitt (4) Dreheinrichtungen (53) zum Drehen der zweiten Form (6) aus einer im Wesentlichen vertikalen Bildungsposition in Verwendung in eine im Wesentlichen horizontale Position zum Entladen des gebildeten Objekts in Verwendung umfasst.

12. Gruppe nach dem vorherigen Anspruch, wobei die Dreheinrichtungen (53) mindestens einen Tisch (54), der mit der zweiten Form (6) assoziiert ist und an der zweiten Trägerverstärkung (49) des zweiten Abschnitts (4) an einer ersten Achse (55) angelenkt ist, und Drehbetätigungseinrichtungen (56) umfassen, die angepasst sind, um den Tisch (54) aus der im Wesentlichen vertikalen Position in die im Wesentlichen horizontale Position zu drehen, und umgekehrt.

13. Gruppe nach dem vorherigen Anspruch, wobei die Drehbetätigungseinrichtungen (56) mindestens ein lineares Betätigungselement (57), das ein erstes En-

de (57a) aufweist, das an der zweiten Trägerverstärkung (49) des zweiten Abschnitts (4) an einer zweiten Achse (58) gelenkig angebracht ist, und ein zweites Ende (57b), das an dem Tisch (54) an einer dritten Achse (59) parallel zu der zweiten Achse (58) gelenkig angebracht ist, umfassen, um ein Schubkurbelgetriebe zu bilden.

14. Linie zum Bilden von Hygieneartikeln, umfassend einen Trägerrahmen (2), der mit mindestens einer horizontalen Struktur (13) versehen ist, eine Vielzahl von Bildungsgruppen (1) nach einem der Ansprüche 1-13, die mit der horizontalen Struktur (13) in hängender Konfiguration und Seite an Seite miteinander verbunden sind, und Druckeinrichtungen, die an den Enden der horizontalen Struktur (13) bereitgestellt sind, die auf geeignete Oberflächen der Bildungsgruppen (1), die sich an den Enden der Vielzahl befinden, auf eine Weise einwirken, um die Bildungsgruppen (1) in den jeweiligen geschlossenen Konfigurationen zu halten, wobei sie die jeweiligen Bildungshohlräume (7) definieren.

Revendications

1. Groupe de formage (1) pour la fabrication d'articles sanitaires, comprenant au moins un cadre de support (2), au moins une première partie (3) et une deuxième partie (4), associées audit cadre (2), portant respectivement au moins un premier moule (5) et un deuxième moule (6) sélectivement connectables l'un à l'autre, de manière à définir au moins une cavité de formage (7) adaptée pour recevoir la coulée d'au moins un mélange fluide sous pression qui, une fois solidifié, forme au moins un article sanitaire,

lesdites première partie (3) et deuxième partie (4) étant reliées audit cadre (2) en configuration suspendue et pouvant être approchées sélectivement et mutuellement dans une configuration fermée, de manière à amener en contact mutuel lesdits moules (5, 6) afin de définir ladite au moins une cavité de formage (7), et pouvant s'écarter mutuellement dans une configuration ouverte afin de permettre l'extraction de l'article sanitaire une fois qu'il est formé à l'intérieur de ladite cavité (7),
au moins ladite première partie (3) comprend une pluralité d'éléments de pression (9, 10, 11) qui butent contre la surface périphérique (5b) dudit premier moule (5) dans ladite configuration fermée, **caractérisé en ce qu'**au moins ladite première partie (3) comprend au moins un élément de serrage flexible et non extensible (12) qui encercle lesdits éléments de pression (9, 10, 11), et des moyens de traction (18) associés audit élément de serrage (12), et **en ce que** ledit élément de serrage (12) comprend au moins un câble, ou au moins une chaîne, ou au moins une courroie, ou au moins une bande, ou une combinaison des éléments précités, ou une combinaison de parties distinctes des éléments précités.

2. Groupe selon la revendication 1, dans lequel lesdits moyens de traction (18) comprennent au moins un actionneur (19) pourvu d'un élément fixe (19a) relié à ladite première partie (3), et d'un élément mobile (19b) relié à la première extrémité (12a) et à la seconde extrémité (12b) dudit élément de serrage (12), ledit élément de serrage (12) étant fermé sensiblement comme une boucle autour desdits éléments de pression (9, 10, 11).

3. Groupe selon l'une des revendications précédentes, dans lequel chacun desdits éléments de pression (9, 10, 11) comprend une partie externe (22) munie de moyens (23) de couplage avec ledit élément de serrage (12), lesdits moyens de couplage (23) étant adaptés pour permettre le coulissement relatif dudit élément de serrage (12) par rapport à ladite partie externe (22).

4. Groupe selon la revendication précédente, dans lequel lesdits moyens de couplage (23) comprennent une pluralité de roues (24) supportées de manière rotative dans ladite partie externe (22), chacune desdites roues (24) comprenant au moins une partie périphérique (24a) dans laquelle ledit élément de serrage (12) est engagé.

5. Groupe selon la revendication 3 ou 4, dans lequel chacun desdits éléments de pression (9, 10, 11) comprend une partie opérationnelle respective (27) pour venir en butée contre la surface périphérique (5b) dudit premier moule (5), ladite partie externe (22) comprenant un profil sensiblement en forme d'arc (28), lesdits moyens de couplage (23) étant agencés le long dudit profil (28).

6. Groupe selon l'une des revendications 2 à 5, dans lequel lesdits moyens de traction (18) comprennent un premier et un second galets de transmission (25, 26) dans lesquels ledit élément de serrage (12) est engagé, interposés entre lesdits éléments de pression (9, 10, 11) et ledit actionneur (19).

7. Groupe selon l'une des revendications précédentes, dans lequel ladite première partie (3) comprend une première armature de support (14) et dans lequel lesdits éléments de pression (9, 10, 11) comprennent un premier élément de pression (9), un deuxième élément de pression (10) et un troisième élément de pression (11) associés respectivement à une première section (14a), une deuxième section (14b) et

une troisième section (14c) de ladite première armature de support (14), et dans lequel au niveau de la quatrième section (14d) de ladite première armature de support (14) lesdits moyens de traction (18) sont prévus, lesdits éléments de pression (9, 10, 11) étant respectivement agencés selon les trois côtés consécutifs d'un rectangle ou d'un carré.

8. Groupe selon l'une des revendications précédentes, dans lequel ledit premier moule (5) est un moule femelle et ledit deuxième moule (6) est un moule mâle, ledit premier moule (5) comprenant au moins un évidement (8) pour l'insertion d'au moins un relief respectif (29) prévu dans ledit deuxième moule (6) de manière à définir ladite cavité de formage (7).

9. Groupe selon la revendication 7 ou 8, dans lequel ledit premier élément de pression (9), ledit deuxième élément de pression (10) et ledit troisième élément de pression (11) comprennent respectivement des premiers moyens de liaison élastiques (30), des deuxièmes moyens de liaison élastiques (31) et des troisièmes moyens de liaison élastiques (32) pour lier respectivement une première section (14a), une deuxième section (14b) et une troisième section (14c) de la première armature de support (14) de ladite première partie (14), lesdits premiers, deuxièmes, troisièmes moyens de liaison élastiques (30, 31, 32) étant adaptés pour ramener lesdits éléments de pression (9, 10, 11) dans les positions de repos respectives à la fin de chaque cycle de formage.

10. Groupe selon l'une des revendications 7 à 9, dans lequel ladite première partie (3) comprend des premiers moyens (36) pour ajuster la position dudit premier élément de pression (9) par rapport à ladite première section (14a) de ladite première armature de support (14), et des deuxièmes moyens (45) pour ajuster la position dudit troisième élément de pression (11) par rapport à ladite troisième section (14c) de ladite première armature de support (14).

11. Groupe selon l'une des revendications précédentes, dans lequel ladite deuxième partie (4) comprend des moyens de rotation (53) pour faire tourner ledit deuxième moule (6) d'une position de formage sensiblement verticale, en cours d'utilisation, vers une position qui est sensiblement horizontale pour décharger l'objet formé, en cours d'utilisation.

12. Groupe selon la revendication précédente, dans lequel lesdits moyens de rotation (53) comprennent au moins une table (54), associée audit deuxième moule (6), articulée à la deuxième armature de support (49) de ladite deuxième partie (4) selon un premier axe (55), et des moyens d'actionnement rotatif (56) adaptés pour faire tourner ladite table (54) depuis ladite position sensiblement verticale vers ladite position sensiblement horizontale, et vice versa.

13. Groupe selon la revendication précédente, dans lequel lesdits moyens d'actionnement rotatif (56) comprennent au moins un actionneur linéaire (57) ayant une première extrémité (57a) articulée à la deuxième armature de support (49) de ladite deuxième partie (4) selon un deuxième axe (58), et une deuxième extrémité (57b) articulée à ladite table (54) selon un troisième axe (59) parallèle audit deuxième axe (58), de manière à constituer un pignon de vilebrequin de poussée.

14. Ligne de formage d'articles sanitaires, comprenant un cadre de support (2) muni d'au moins une structure horizontale (13), une pluralité de groupes de formage (1) selon l'une des revendications 1 à 13, reliés à ladite structure horizontale (13) en configuration suspendue et côte à côte, et des moyens de pression prévus aux extrémités de ladite structure horizontale (13), qui agissent sur des surfaces appropriées des groupes de formage (1) qui sont situées aux extrémités de ladite pluralité, de manière à retenir lesdits groupes de formage (1) dans les configurations fermées respectives dans lesquelles ils définissent les cavités de formage respectives (7).

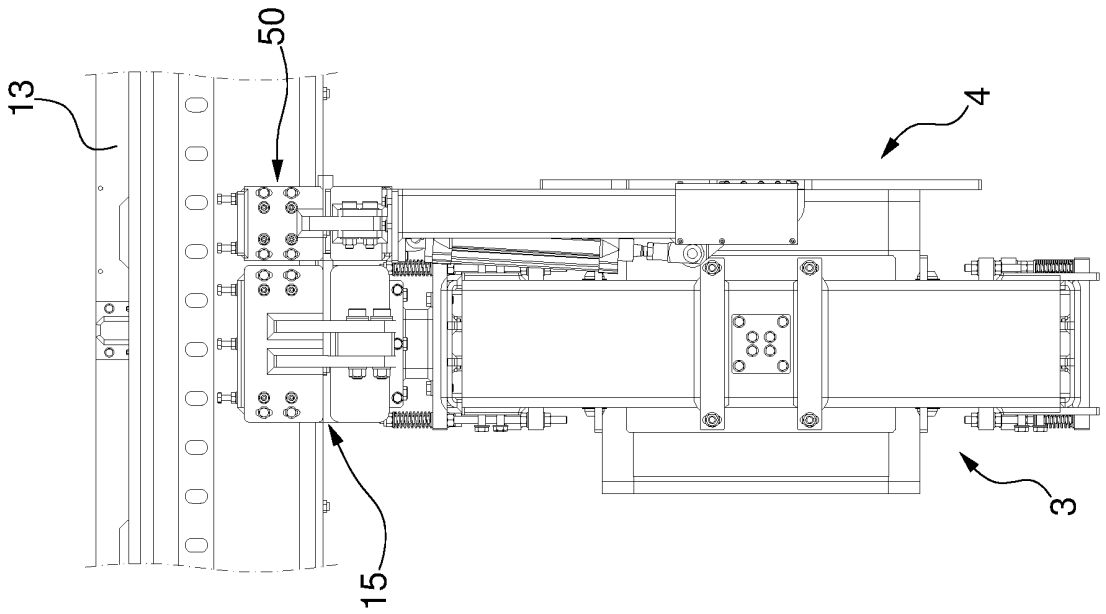


FIG. 2

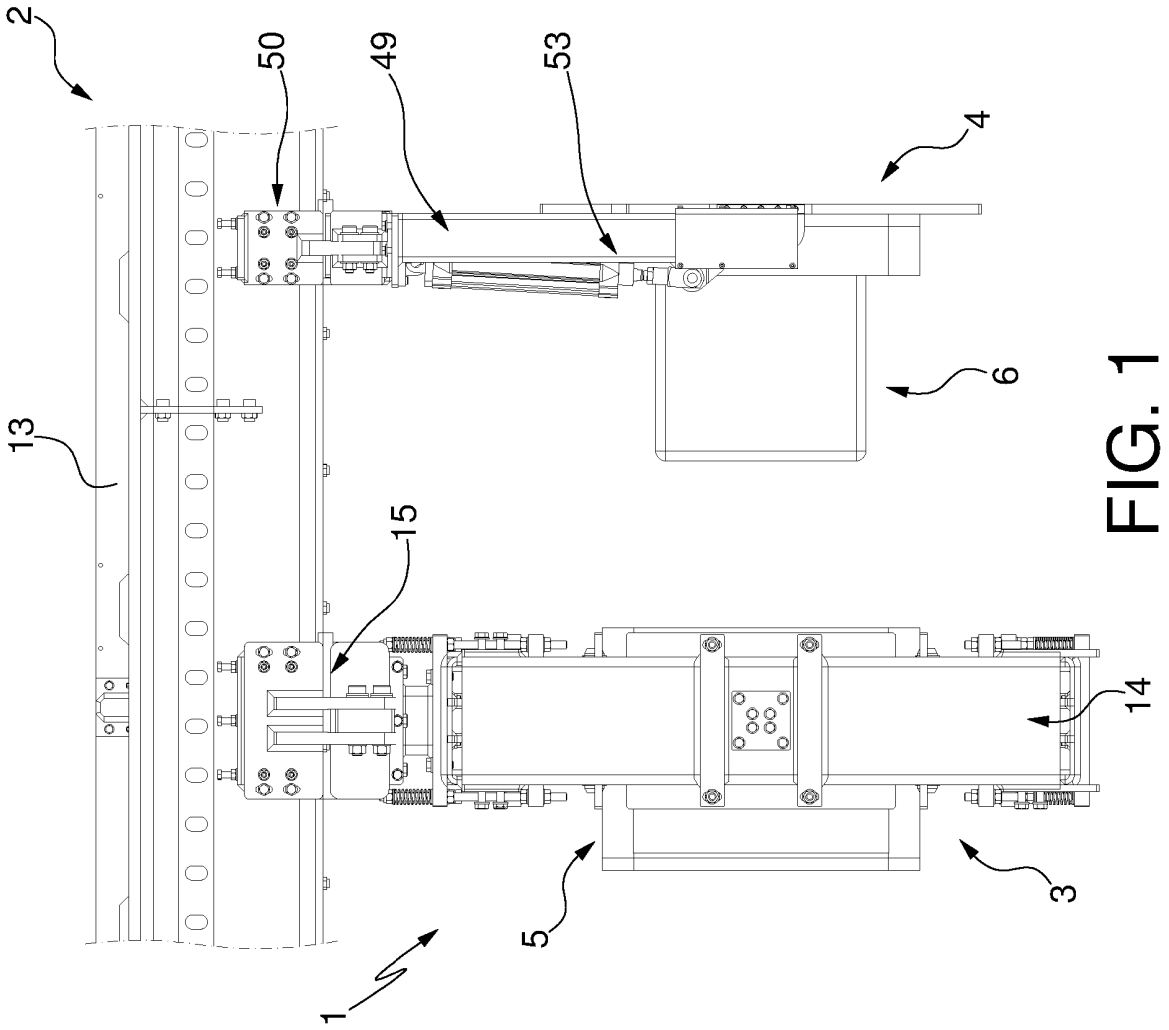


FIG. 1

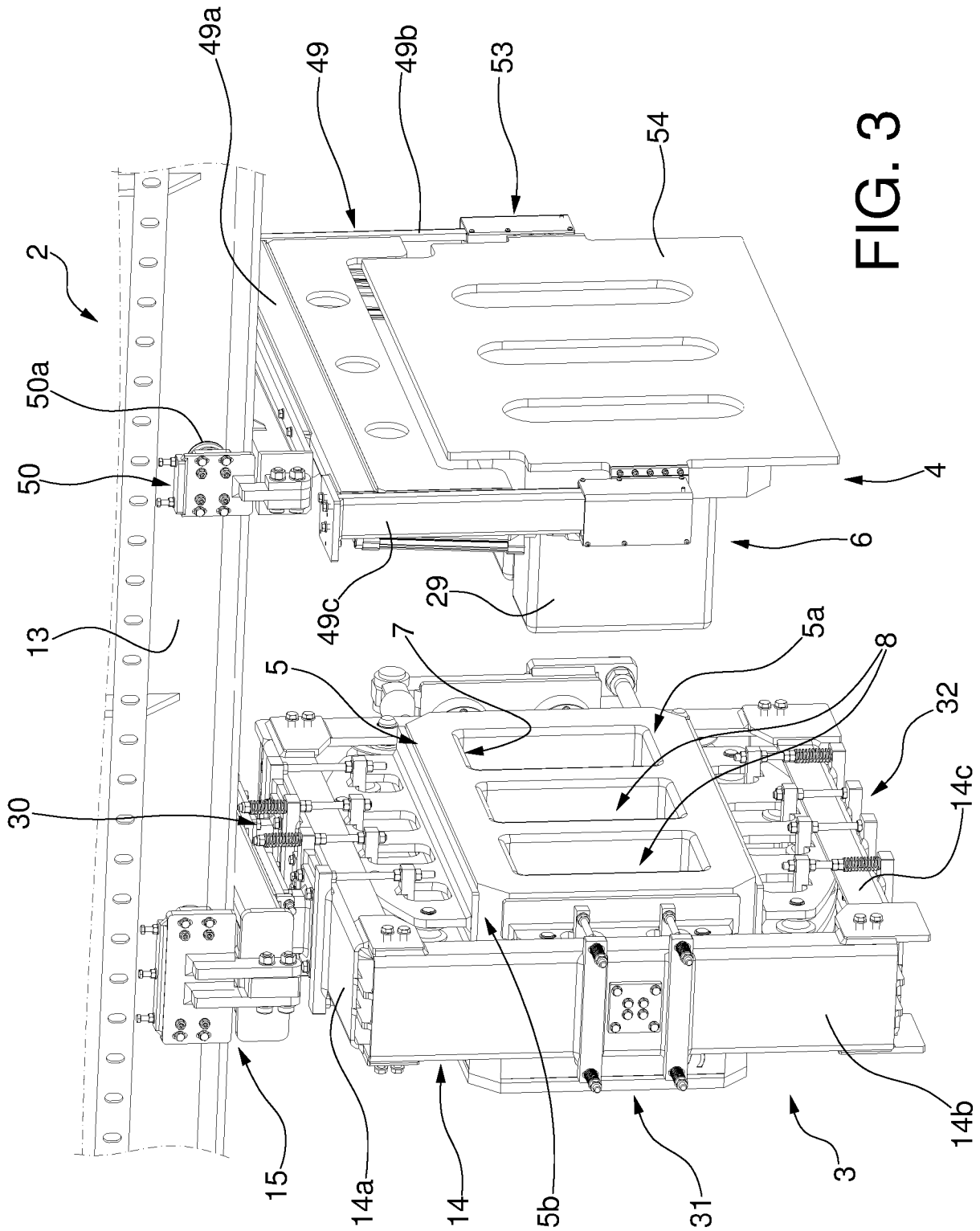

49a
49
49b
53
54
2
50a
50
4
6
49c
29
13
7
5a
8
5
32
30
14c
15
14a
14
5b
31
3
14b

FIG. 3

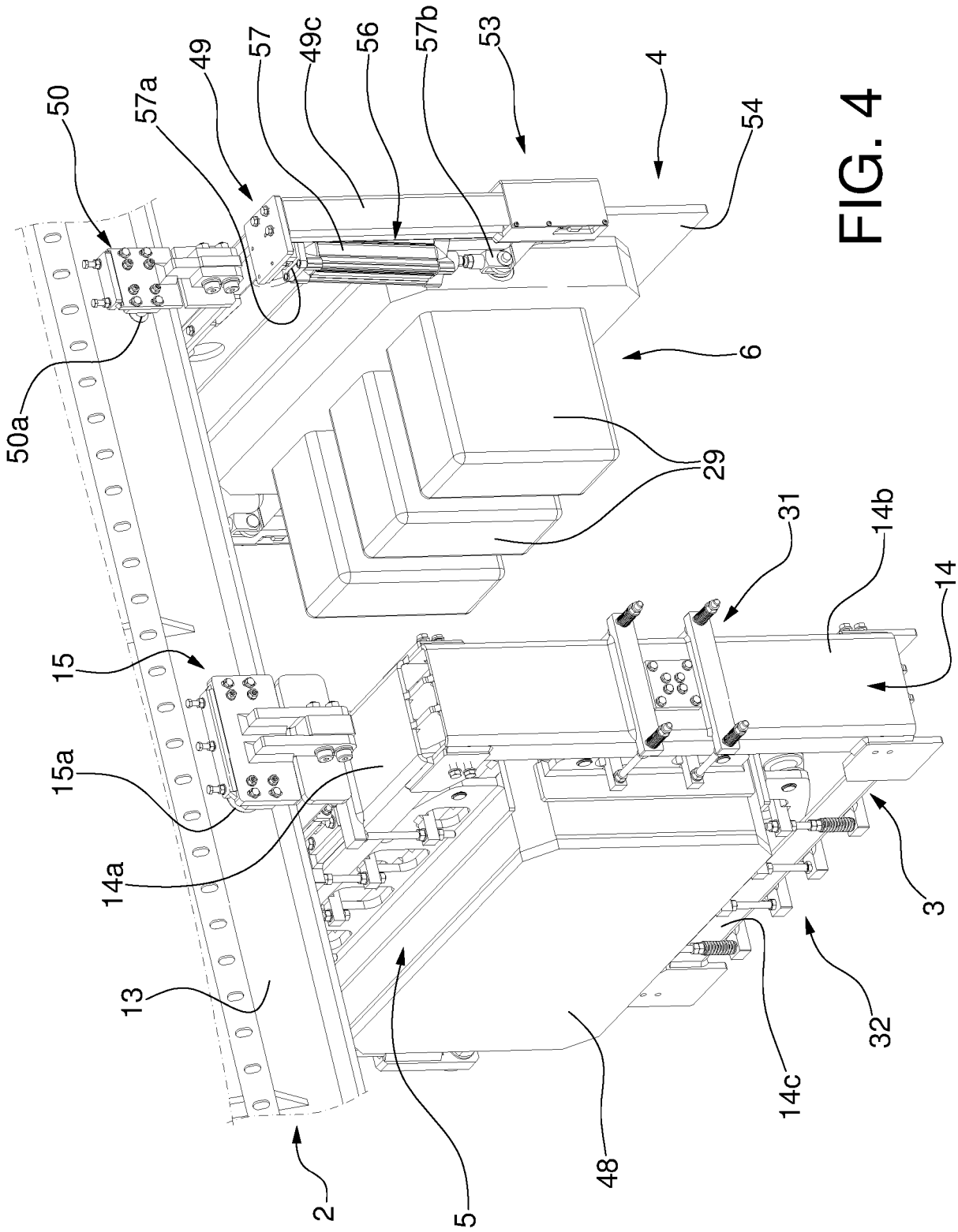

50
57a
49
57
49c
56
57b
53
4
54
50a
6
29
31
14b
14
15
15a
14a
13
3
32
14c
48
5
2

FIG. 4

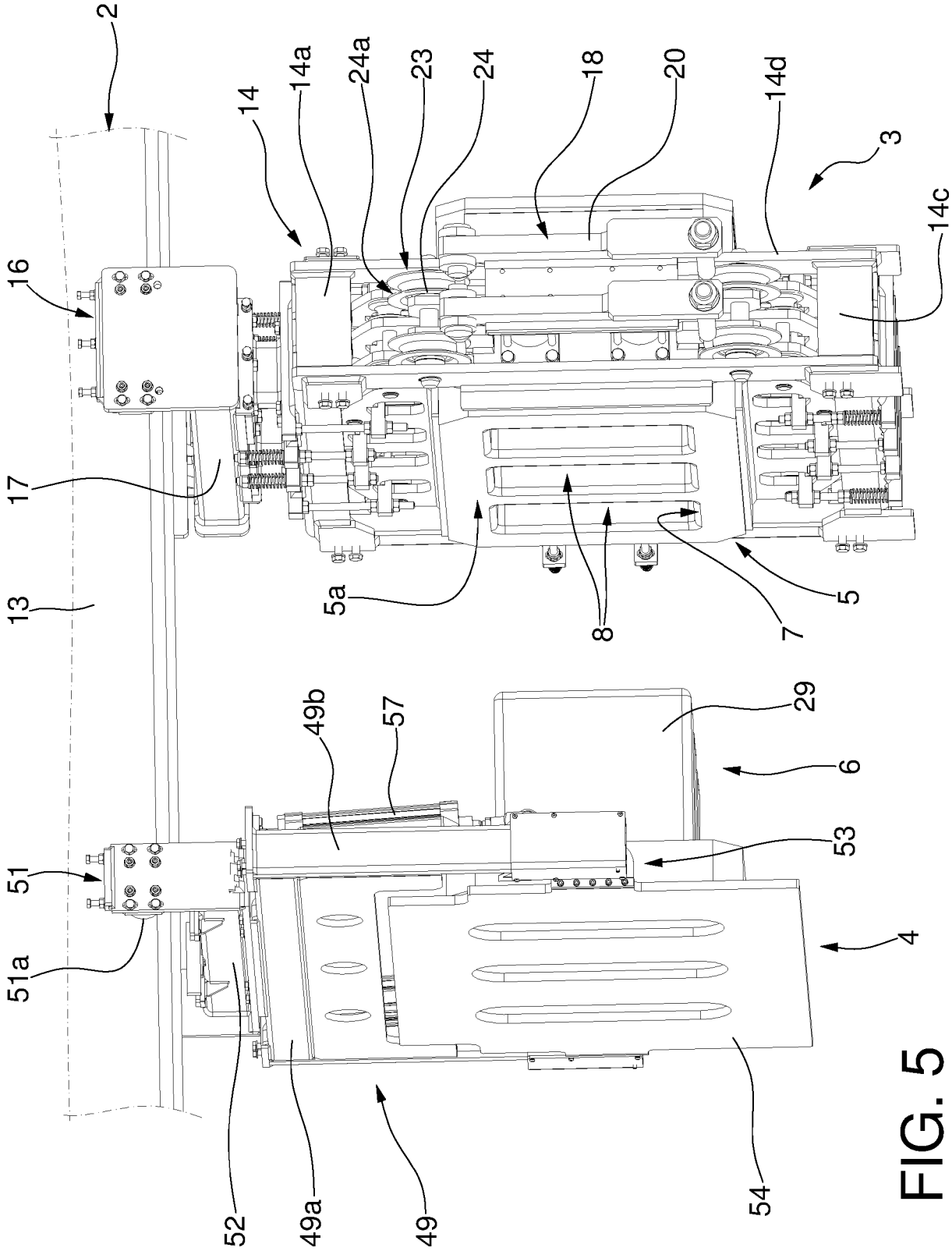

2
14
14a
24a
23
24
18
20
14d
3
14c
16
17
13
5a
8
7
5
49b
57
29
6
53
51
51a
4
52
49a
49
54

FIG. 5

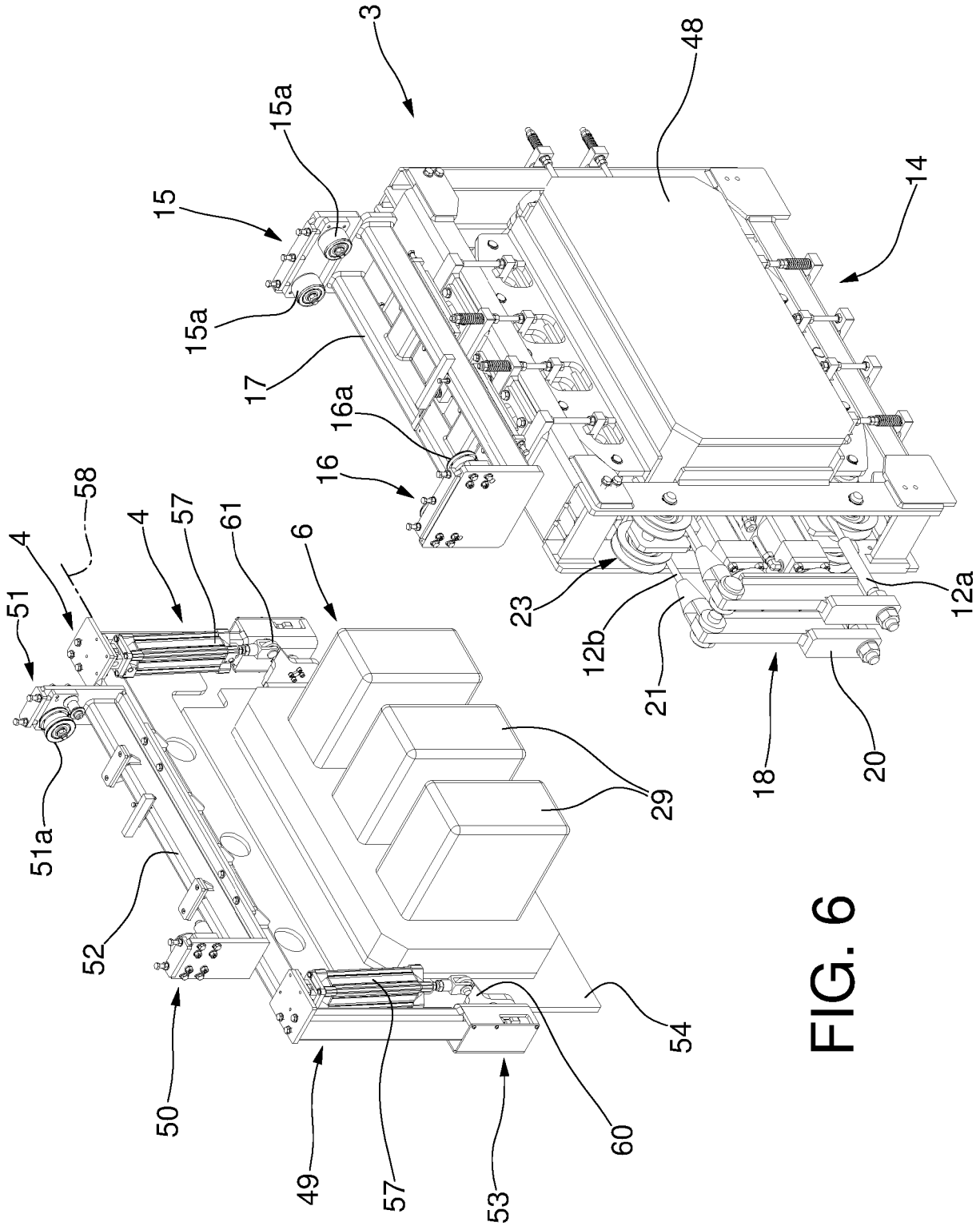
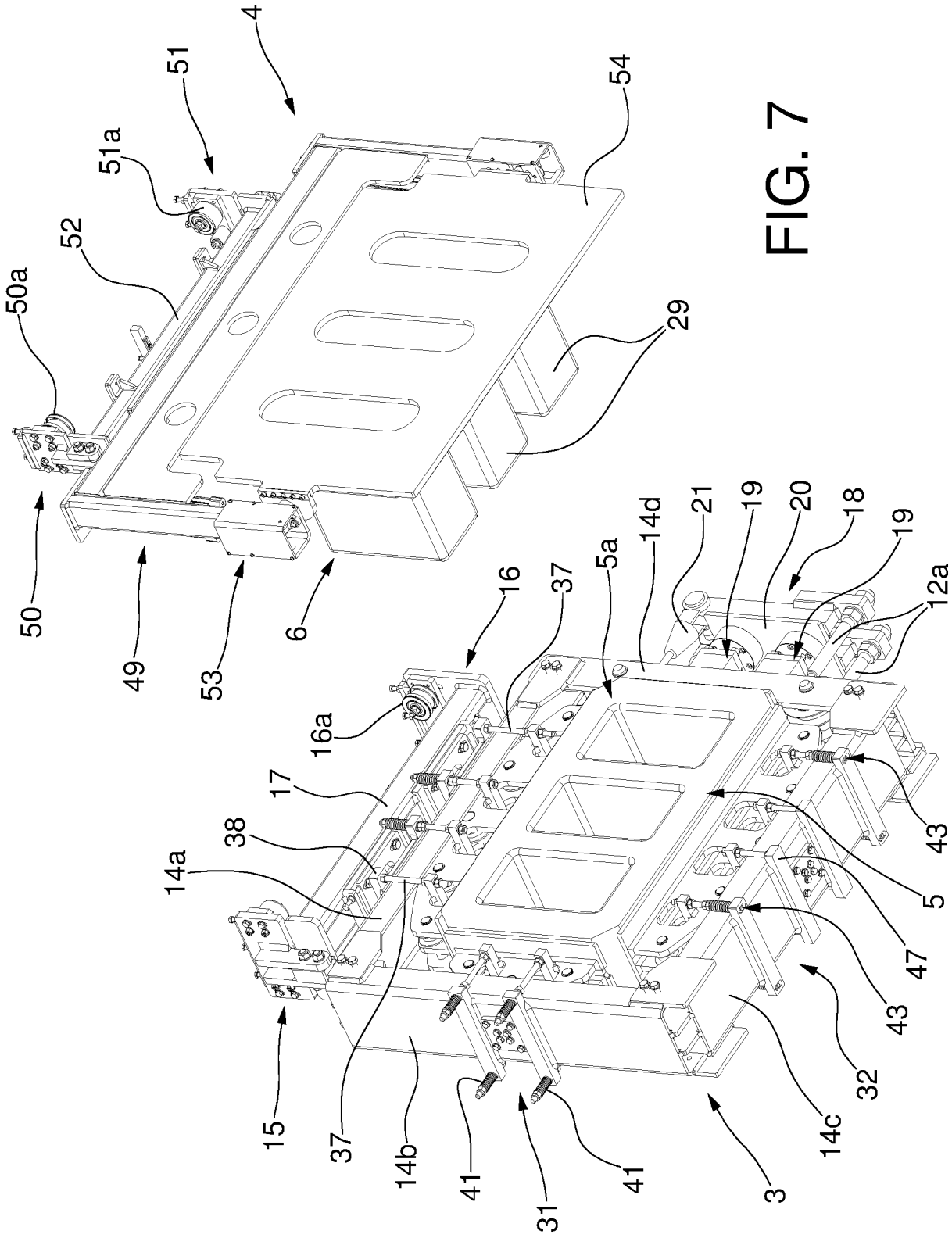

3
48
15a
15
14
15a
17
16a
16
58
4
57
61
6
4
51
23
12b
12a
21
18
20
29
51a
52
50
49
57
53
60
54

FIG. 6


4
51
51a
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50a
54
29
50
49
53
6
16
37
5a
14d
21
19
20
18
19
12a
16a
17
38
14a
43
5
47
43
32
14c
3
41
31
41
14b
37
15

FIG. 7

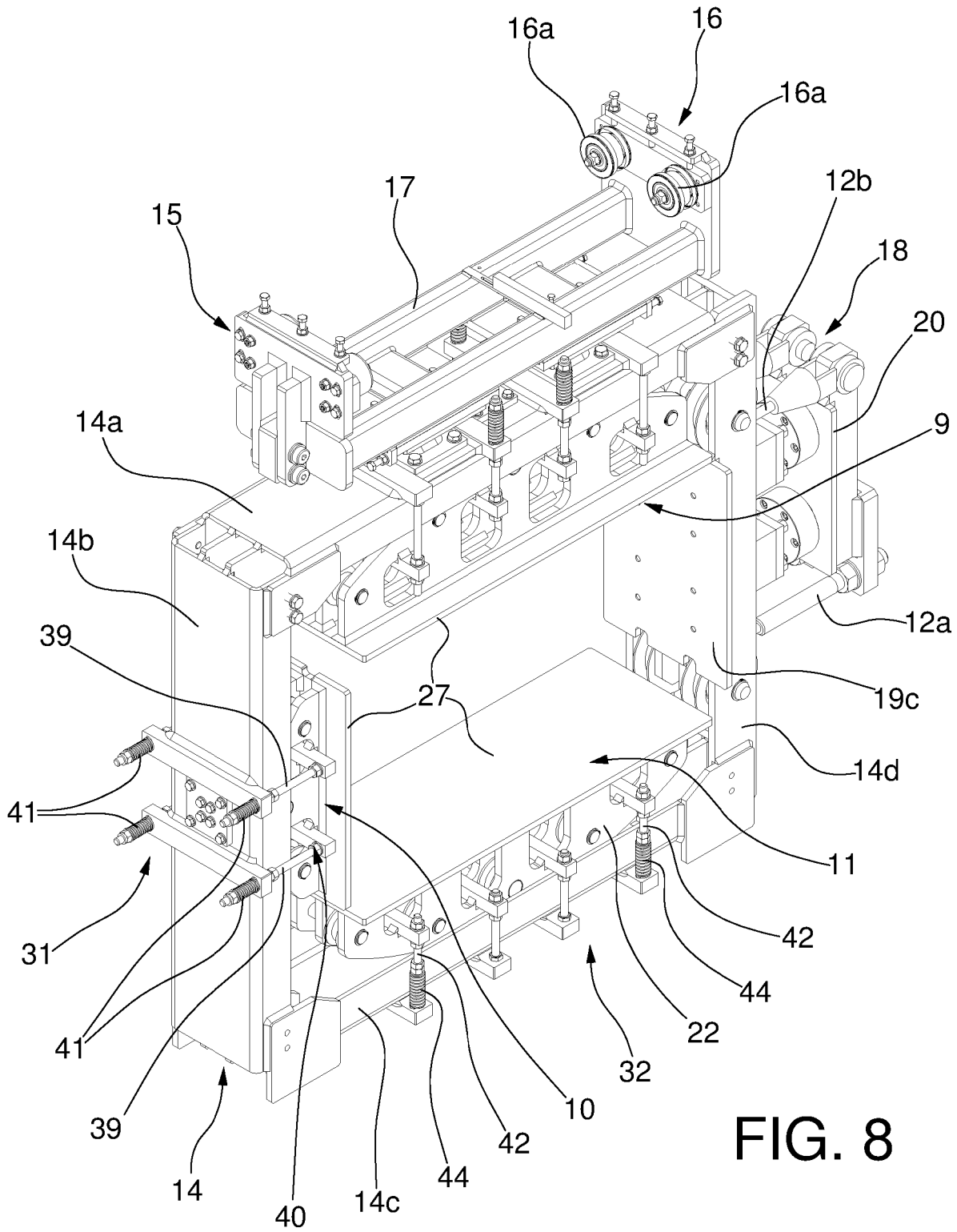
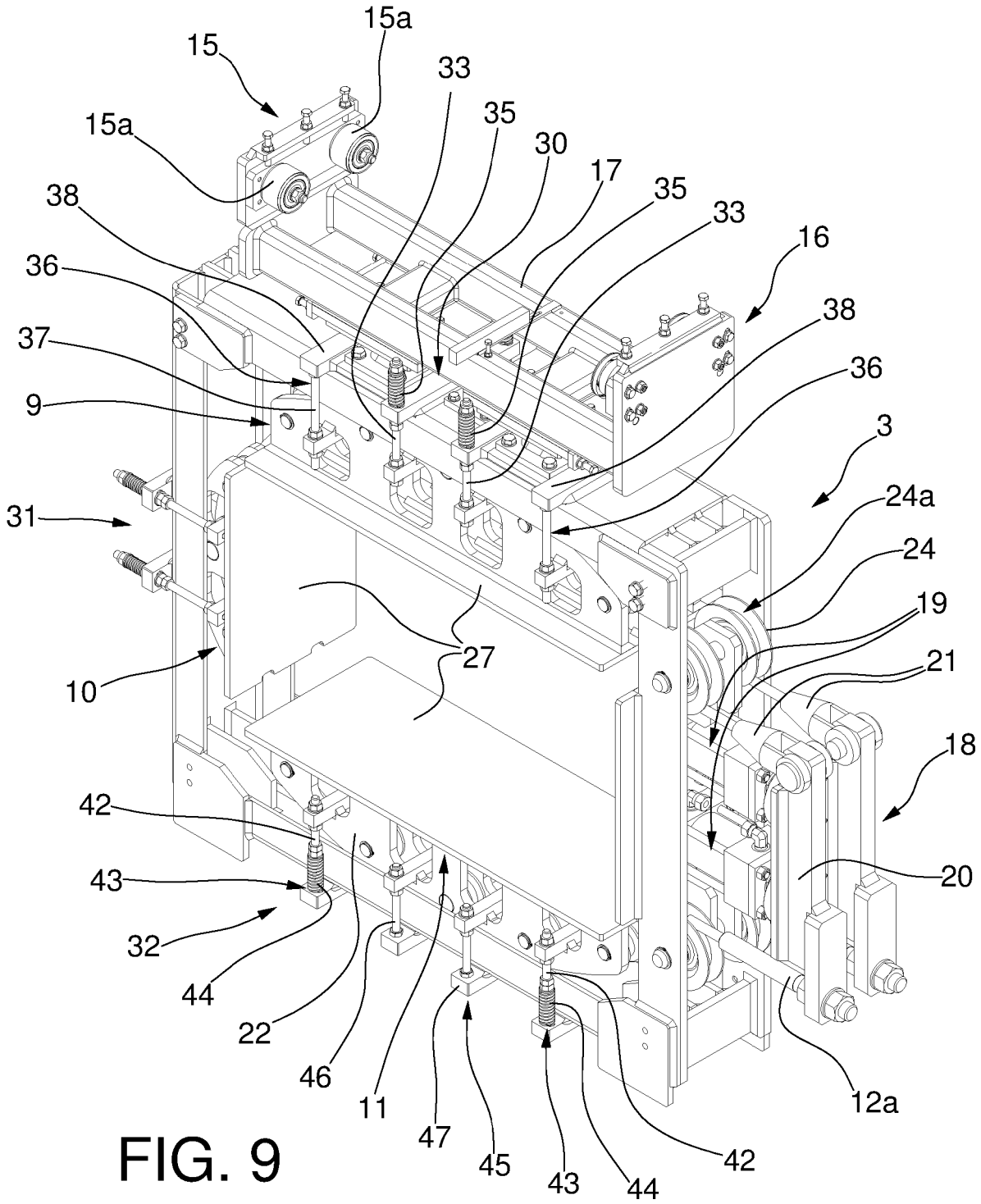

16a
16
16a
17
15
12b
18
20
14a
9
14b
12a
39
27
19c
14d
41
11
42
31
44
22
41
32
39
10
42
14
44
14c
40

FIG. 8


15a
15
33
35
15a
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17
35
38
33
16
36
38
37
36
9
3
31
24a
24
19
27
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43
32
44
22
46
11
47
45
43
44
42
12a

FIG. 9

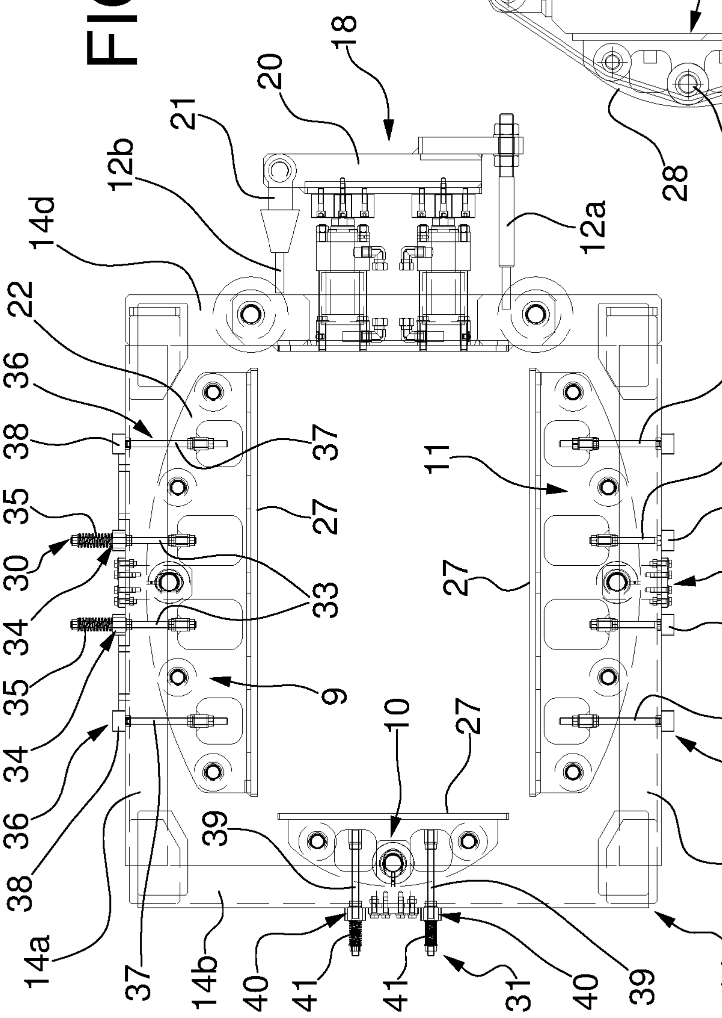

FIG. 10

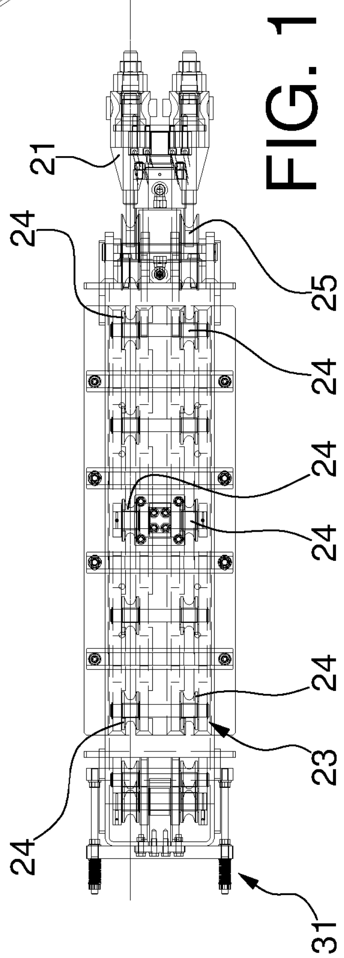

FIG. 11

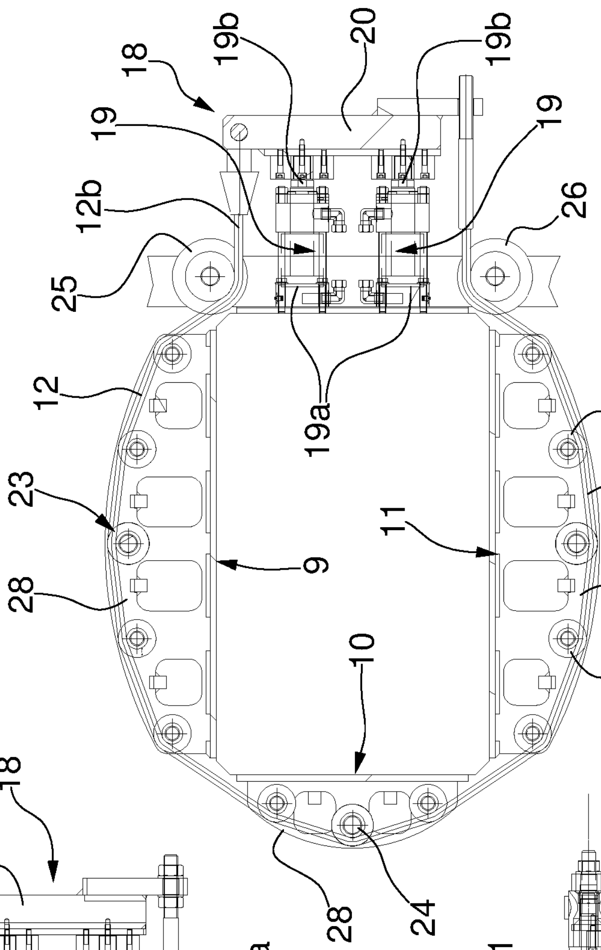

FIG. 12

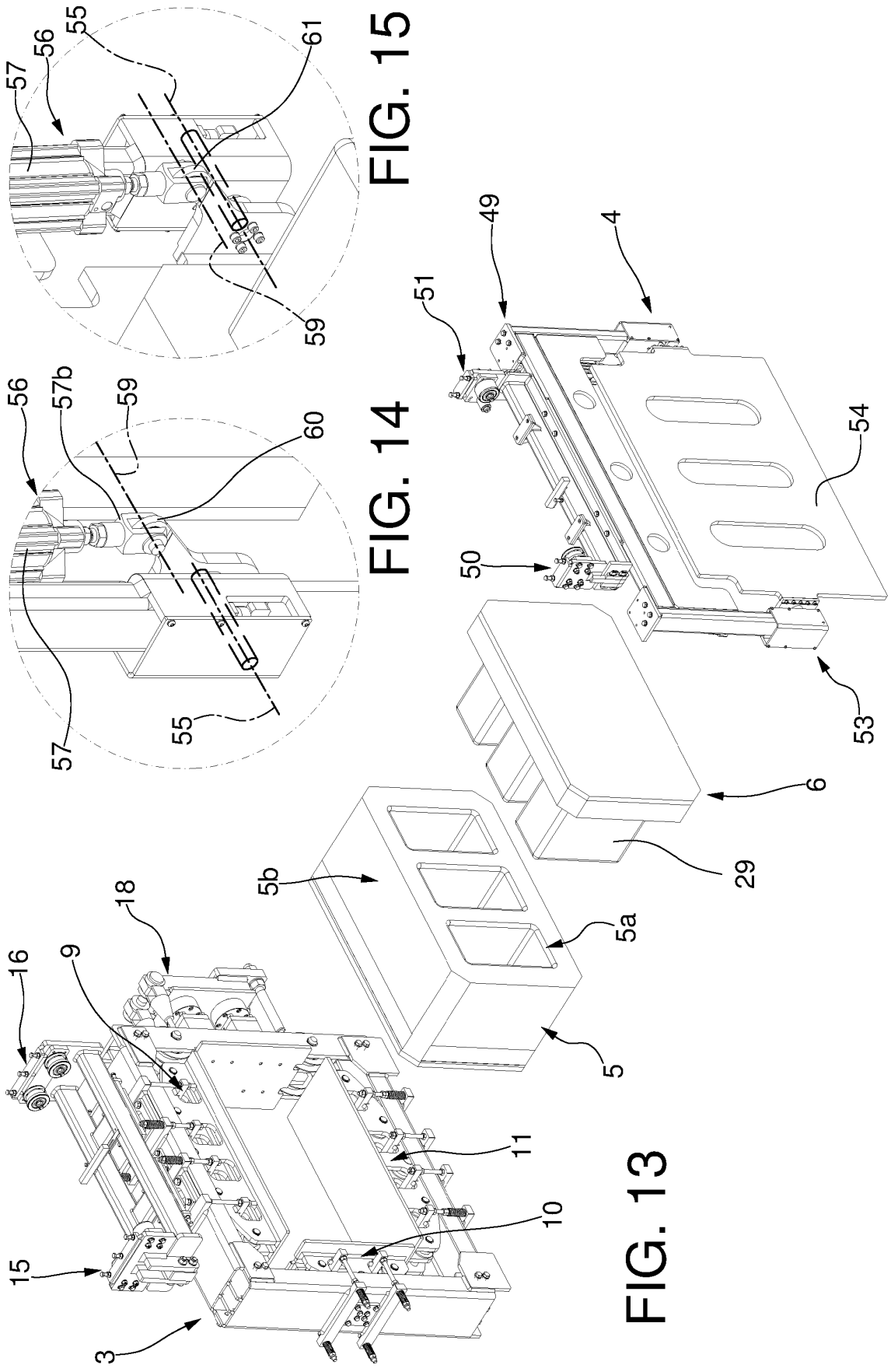

FIG. 13

FIG. 14

FIG. 15

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1905561 A2 **[0010]**
- WO 2011095862 A1 **[0010]**