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(54) STAMPING APPARATUS OF THE FLASH STAMPING TYPE FOR SOAP BARS, FOR THE PRODUCTION OF TOILETRY SOAPS, LAUNDRY SOAPS OR THE LIKE

(57) A stamping apparatus of the flash stamping type for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a first die part (3, 62), in which there is a plurality of first formation cavity parts (2, 64), each of which is extended around a corresponding axis (2a, 64a), and a second die part (4, 63), in which there is correspondingly a plurality of second formation cavity parts (8, 69), each extended around a corresponding axis (8a, 69a). The second die part (4, 63) is movable on command toward the first die part (3, 62), in order to close the formation cavity parts (2, 8; 64, 69) by means of the coaxial coupling of the first formation cavity parts (2, 64) with the corresponding second formation cavity parts (8, 69) and stamp a bar of soap interposed between the first die part (3, 62) and the second die part (4, 63), or away from the first die part (3, 62), in order to open the formation cavity parts (2, 8; 64, 69) and allow the extraction of the stamped pieces of soap (6, 72) from the formation cavity parts (2, 8; 64, 69) and the insertion, between the die parts (3, 4; 62, 63), of a new soap bar to be stamped. The coupling of each one of the first formation cavity parts (2, 64) with the corresponding second formation cavity part (8, 69) defines a corresponding formation cavity. The apparatus according to the invention comprises adjustment means (50, 73) for varying the volume of the formation cavities.

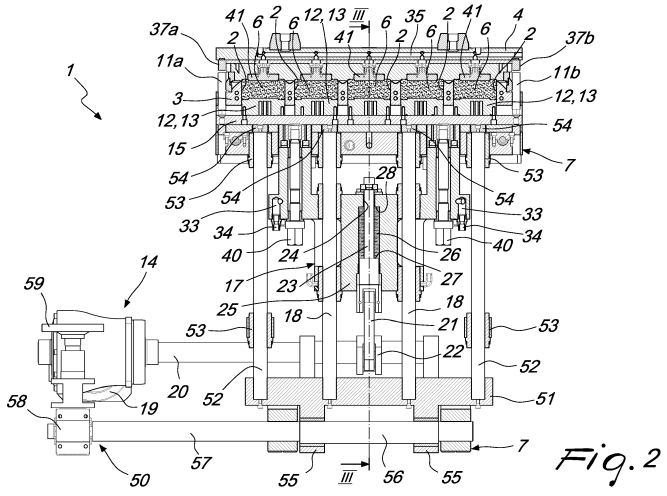

Fig. 2

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Description

[0001] The present invention relates to a stamping apparatus of the flash stamping type for soap bars, for the production of toiletry soaps, laundry soaps or the like.

[0002] Apparatuses for performing stamping, of the flash stamping type, of soap bars to produce toiletry soaps, laundry soaps or the like are known. These apparatuses are composed generally of a first die part and a second die part, which can be mutually coupled. In the first die part, which can be fixed or can rotate about a horizontal axis, there is a plurality of first formation cavity parts, each of which is extended around a corresponding axis. The first formation cavity parts are arranged in the first die part in mutual alignment, i.e., with their axes arranged on a same central plane. These first formation cavity parts are open at their axial end or mouth that can face the second die part and are delimited, a the opposite axial end, by a bottom that is occupied partially by an extraction plug.

[0003] In the second die part there is correspondingly a plurality of second formation cavity parts, each of which is extended around a corresponding axis. The second formation cavity parts also are arranged in the second die part in mutual alignment, i.e., with their axes arranged on a same central plane. The second formation cavity parts are open at their axial end or mouth that can face the first die part and are delimited, at the opposite axial end, by a bottom that is occupied partially by an extraction plug.

[0004] The second die part, in apparatuses of this kind, can move with an alternating movement for approach to the first die part, so as to close the first formation cavity parts by way of the coupling with the second formation cavity parts, stamping a soap bar interposed beforehand between the first die part and the second die part, or for spacing from the first die part, so as to allow the extraction and spacing of the stamped pieces of soap and the insertion, between the first die part and the second die part, of a new soap bar to be stamped.

[0005] The coupling of each one of the first formation cavity parts with a corresponding second formation cavity part defines a formation cavity for a piece of soap to be stamped.

[0006] Usually, this formation cavity is constituted substantially completely by the first formation cavity part and therefore is defined substantially completely in the first die part. For this reason, when the second die part is moved away from the first die part, the stamped pieces of soap remain in the first die part and are removed and moved away by way of sucker-fitted grip and removal means. The action of these grip and removal means is assisted by the actuation of the extraction plugs provided in the bottom of the first formation cavity parts, which, being moved toward the open axial end of the corresponding first formation cavity part, push the pieces of soap to exit from the first formation cavity part, overcoming the friction of the pieces of soap against the walls of the first formation cavity part, thus facilitating the action of the sucker-fitted grip and removal means.

[0007] The extraction plugs provided in the bottom of the second formation cavity parts have the function of facilitating separation, from the bottom of the second formation cavity parts, of the stamped pieces of soap when the second die part is moved away from the first die part.

[0008] Stamping apparatuses of the flash stamping type, with respect to other stamping apparatuses of the known type, such as for example "die box" stamping apparatuses, have the advantage of allowing high production rates and of not requiring precise sizing of the soap bar to be stamped, since in this type of apparatus the excess soap is evacuated automatically laterally to the formation cavities and is recovered to produce other soap bars to be stamped.

[0009] In stamping apparatuses of the flash stamping type, the need is felt to be able to vary the volume of the formation cavities in order to compensate for any variations in density of the soap or to obtain, with the same apparatus, the production of soaps having a different grammage.

[0010] The aim of the present invention is to meet this requirement, by providing a stamping apparatus of the flash stamping type for soap bars, for the production of toiletry soaps, laundry soaps or the like, in which it is possible to vary on command the volume of the formation cavities.

[0011] Within this aim, an object of the invention is to provide an apparatus that allows to vary the volume of the formation cavities with high precision and rapidly.

[0012] Another object of the invention is to provide an apparatus that can be derived from apparatuses of a known type with modifications that are simple to perform.

[0013] A further object of the invention is to provide an apparatus that offers the greatest assurances of safety and reliability in use.

[0014] This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a stamping apparatus of the flash stamping type for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a first die part, in which there is a plurality of first formation cavity parts, each of which is extended around a corresponding axis, and a second die part, in which there is correspondingly a plurality of second formation cavity parts, each extended around a corresponding axis, said second die part being movable on command toward said first die part, in order to close the formation cavity parts by means of the coaxial coupling of each one of said first formation cavity parts with the corresponding second formation cavity parts and stamp a bar of soap interposed between said first die part and said second die part, or away from said first die part, in order to open said formation cavity parts and allow the extraction of the stamped pieces of soap from said formation cavity parts and the insertion, between said die parts, of a new soap bar to be stamped, the coupling of each one of said first formation cavity parts with the cor-

responding second formation cavity part defining a corresponding formation cavity, characterized in that it comprises adjustment means for varying the volume of the formation cavities.

[0015] Further characteristics and advantages of the invention will become better apparent from the description of two preferred but not exclusive embodiments of the apparatus according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figures 1 to 9 are views of the apparatus according to the invention in the first embodiment, more particularly:

Figure 1 is a schematic top plan view of the apparatus according to the invention;
Figure 2 is a sectional view of Figure 1, taken along the line II-II, with the second die part coupled to the first die part during the stamping of the pieces of soap;
Figure 3 is an enlarged-scale sectional view of Figure 2, taken along the line III-III;
Figure 4 is a view of the apparatus according to the invention in cross-section as in Figure 2, during the extraction of the pieces of soap;
Figure 5 is an enlarged-scale sectional view of Figure 4, taken along the line V-V;
Figure 6 is a view of the apparatus according to the invention as in Figure 2, but with a different volume of the first formation cavity part;
Figure 7 is an enlarged-scale sectional view of Figure 6, taken along the line VII-VII;
Figure 8 is a view of the apparatus according to the invention in cross-section as in Figure 7, during the extraction of the pieces of soap;
Figure 9 is an enlarged-scale sectional view of Figure 8, taken along the line IX-IX;
Figures 10 to 16 are views of the apparatus in the second embodiment, more particularly:

Figure 10 is a top plan view of the apparatus according to the invention;
Figure 11 is a sectional view of Figure 1, taken along the line XI-XI;
Figure 12 is an enlarged-scale sectional view of Figure 11, taken along the line XII-XII;
Figure 13 is an enlarged-scale sectional view of the second die part, taken along the line XIII-XIII of Figure 11;
Figure 14 is a sectional view of the second die part, taken like Figure 13, but with a different volume of the second formation cavity part;
Figure 15 is an enlarged-scale sectional view of the second die part, taken along the line XV-XV of Figure 11;
Figure 16 is an enlarged-scale sectional view of the second die part, taken along the line XVI-XVI of Figure 11.

[0016] With reference to the figures, the apparatus according to the invention, designated generally in the two embodiments by the reference numerals 1, 61, comprises a first fixed or rotating die part 3, 62, of a known type and shown only partially for the sake of simplicity, and a second die part 4, 63 or alternated die part, which can be coupled to the first die part 3, 62.

[0017] In the first die part 3, 62 there is a plurality of first formation cavity parts 2, 64 which are each extended around a corresponding axis 2a, 64a and are preferably mutually aligned, i.e., their axes 2a, 64a are arranged on a same central plane. These first formation cavity parts 2, 64 are open at an axial end thereof or mouth 2b, 64b, which is intended to face the second die part 4, 63.

[0018] In the second die part 4, 63 there is a plurality of second formation cavity parts 8, 69, which are extended, so as to correspond to the first formation cavity parts 2, 64, each around a corresponding axis 8a, 69a and are preferably aligned with each other, i.e., their axes 8a, 69a are arranged on a same central plane. The second formation cavity parts 8, 69 are open at an axial end thereof or mouth 8b, 69b, which is intended to face the first die part 3, 62.

[0019] The second die part 4, 63 can move on command, in a per se known manner, toward the first die part 3, 62 in order to close the formation cavity parts 2, 8, 64, 69 by means of the coaxial coupling the first formation cavity parts 2, 64 with the corresponding second formation cavity parts 8, 69 and thus stamp a bar of soap interposed between the first die part 3, 62 and the second die part 4, 63, or away from the first die part 3, 62 in order to open the formation cavity parts 2, 8, 64, 69 and allow the extraction of the stamped pieces of soap 6, 72 from the formation cavity parts 2, 8, 64, 69 and the insertion, between the first die part 3, 62 and the second die part 4, 63, of a new bar of soap to be stamped.

[0020] The coupling of each one of the first formation cavity parts 2, 64 with the corresponding second formation cavity part 8, 69 defines a corresponding formation cavity, in each of which a piece of soap 6, 72 is stamped.

[0021] It should be noted that the expression "formation cavity part" is not understood to reference a "formation cavity half" but is understood as a "part of a formation cavity", since, as in the illustrated case, each one of the first formation cavity parts 2, 64 and each one of the second formation cavity parts 8, 69 can correspond to more than half or less than half of a formation cavity.

[0022] According to the invention, the apparatus according to the invention comprises adjustment means 50, 73 for varying the volume of the formation cavities and consequently the volume of the stamped pieces of soap 6, 72.

[0023] Conveniently, each one of the first formation cavity parts 2, 64 and of the second formation cavity parts 8, 69 is delimited by a bottom on the opposite side with respect to its axial end or mouth 2b, 64b, 8b, 69b that

can face the corresponding formation cavity part defined in the other die part.

[0024] In the first embodiment, the adjustment means 50 comprise means for varying the distance of the bottom 12 of the first formation cavity parts 2 from the mouth 2b of the corresponding formation cavity part 2 in order to vary the volume of the first formation cavity parts 2.

[0025] In the second embodiment, the adjustment means 73 comprise means for varying the distance of the bottom 71 of the second formation cavity parts 69 from the mouth 69b of the corresponding formation cavity part 69 in order to vary the volume of the second formation cavity parts 69.

[0026] More particularly, in the first embodiment shown in Figures 1 to 9, the first die part 3 is fixed to a framework 7, which is preferably fixed and supports it, and the first formation cavity parts 2 are open upwardly.

[0027] Around the mouth 2b, which is directed upwardly, of the first formation cavity parts 2, the first die part 3 has adapted chutes and/or ducts 9 for removing the soap that is in excess when the second die part 4 is coupled to the first die part 3 so as to close the first formation cavity parts 2.

[0028] An extraction plug 13 is arranged on the bottom 12 of each first formation cavity part 2 and can move on command in the direction of the mouth 2b of the corresponding first formation cavity part 2, which is directed toward the second die part 4, in order to expel the stamped piece of soap 6.

[0029] The extraction plugs 13 are connected preferably to a mechanical actuator 14 that can be actuated in order to move the extraction plugs 13 from an inactive position, in which they are spaced from the mouth 2b of the corresponding first formation cavity part 2 within said first formation cavity part 2, to an extraction position, in which they are moved in the direction of the mouth 2b of the corresponding first formation cavity part 2 with respect to the inactive position, and vice versa.

[0030] Preferably, each extraction plug 13 occupies at least 50% of the surface of the bottom 12 of the corresponding first formation cavity part 2 and even more preferably, as shown, occupies substantially the entire surface of the bottom 12 of the corresponding first formation cavity part 2.

[0031] In this manner, the thrust applied by the extraction plug 13 on the stamped piece of soap 6 at the time of its extraction from the first formation cavity part 2 is distributed on a broad surface and therefore the danger of damage to the stamped piece of soap 6 is limited.

[0032] Preferably, the extraction plugs 13 are actuated by a single mechanical actuator 14.

[0033] More particularly, the extraction plugs 13 are fixed, with their opposite side with respect to the mouth 2b of the corresponding first formation cavity part 2, i.e., with their lower side, to a bottom supporting plate 15, which is arranged horizontally and is accommodated in a compartment 16 that is defined in the first die part 3 below the first formation cavity parts 2.

[0034] The bottom supporting plate 15 is fixed, by way of adapted fixing elements 40, to a slider 17 that can slide along vertical guiding shafts 18 that are fixed to the framework 7. The slider 17 is connected kinematically to the mechanical actuator 14.

[0035] In greater detail, the mechanical actuator 14 comprises a servomotor 19 with a gearmotor the output shaft 20 of which is connected to a transmission with a rod 21 and a crank 22. The rod 21 is fixed to a shaft 23, which acts on the slider 17.

[0036] Conveniently, safety means are interposed between the bottom supporting plate 15 and the mechanical actuator 14 and are adapted to avoid the transition of the extraction plugs 13 from the inactive position to the extraction position in the presence of hindrances to the extraction of the stamped pieces of soap 6, for example due to an accidental alteration of the operating cycle of the apparatus.

[0037] These safety means are constituted by elastic elements that are interposed between the slider 17 and the shaft 23. In greater detail, the shaft 23 passes through a hole 24 that has a vertical axis and is defined in a plate 25 of the slider 17 and these elastic elements are constituted by springs 26 that are interposed between a shoulder 27 of the shaft 23 and a shoulder 28 of the plate 25. If a hindrance prevents the lifting of the bottom supporting plate 15 and therefore of the plate 25, the shaft 23 can slide upwardly along the hole 24 without producing any lifting of the slider 17, since the springs 26 yield elastically.

[0038] Furthermore, it is possible to provide also additional safety refinements, such as for example an electronic device capable of detecting the increase in torque needed by the servomotor 19 and to stop immediately the operation of the apparatus if a preset torque value is exceeded.

[0039] The compartment 16 has, on its side walls, discharge openings 36 for any soap that might penetrate below the extraction plugs 13 and the bottom supporting plate 15.

[0040] In this manner, high operating reliability is achieved together with reduced maintenance interventions.

[0041] Conveniently, there are first means for cooling the first die part 3. These first cooling means comprise ducts 29 that are defined in the walls of the first die part 3 and delimit laterally the first formation cavity parts 2. The ducts 29 are connected to intake-discharge connectors 30 which can be connected, in a per se known manner, to a circuit for supplying a cooling liquid.

[0042] Advantageously, second means for cooling the extraction plugs 13 are provided.

[0043] These second cooling means comprise ducts 31 that are defined in the extraction plugs 13 and are connected to ducts 32 defined in the bottom supporting plate 15, which in turn are connected to ducts 33 defined in the slider 17 and provided with intake-discharge connectors 34 that can be connected to a circuit for supplying

a cooling liquid.

[0044] Conveniently, the second cooling means are independent of the first cooling means so as to allow to manage the cooling of the extraction plugs 13 independently of the cooling of the first die part 3. Thanks to this solution, it is possible to raise the temperature of the first die part 3 to an optimum level for the separation of the stamped pieces of soap 6 and achieve a hardening of the surface of the stamped pieces of soap 6 in contact with the extraction plugs 13 that is sufficient to exclude damage of the stamped pieces of soap during their extraction from the first formation cavity parts 2.

[0045] The second die part 4 also can be provided with corresponding cooling means, constituted likewise by ducts 35 that are extended in the body of the second die part 4 and can be connected to a circuit for supplying a cooling liquid.

[0046] The servomotor 19 can be connected to an actuation and control element that supervises the operation of the soap stamping apparatus. This control and actuation element is programmable so as to actuate the servomotor 19 with a rule of motion that is correlated to the various steps of stamping, with parameters that can be changed according to the type of pieces of soap to be stamped. In particular, the actuation and control element, by means of a variation of the actuation of the mechanical actuator 14, can vary the stroke of the extraction plugs 13 in relation to the height of the lateral band 6a of the pieces of soap to be stamped and therefore of their final weight. Furthermore, again by varying the actuation of the mechanical actuator 14 by means of the actuation and control element it is possible to vary the actuation step of the extraction plugs 13 with respect to preceding and/or subsequent steps of the entire stamping cycle.

[0047] Conveniently, the adjustment means 50 for varying the useful volume of the first formation cavity parts 2 comprise means for varying the distance of the bottoms 12 or of the extraction plugs 13 from the mouth 2b of the corresponding first formation cavity 2 when they are in the inactive position, i.e., before stamping the bar of soap that is interposed between the first die part 3 and the second die part 4.

[0048] The vertical guiding shafts 18, along which the slider 17 slides, are fixed, by way of their lower end, to a lower beam 51 and define, by means of their upper end, a resting element for the bottom supporting plate 15. Additional guiding shafts 52, parallel to the guiding shafts 18, are provided and again define, by means of their upper end, a resting element for the bottom supporting plate 15 and are again fixed to the lower beam 51 but do not support the slider 17. The guiding shafts 18, 52 are supported, so that they can slide along their axes, by guiding bushes 53, which are integral with the framework 7. The upper end of the guiding shafts 18, 52 is provided with a contrast block 54 against which the bottom supporting plate 15 rests.

[0049] The mechanical actuator 14 or the servomotor 19 with gearmotor and corresponding output shaft 20 are mounted on the lower beam 51.

[0050] The lower beam 51 is provided with bushings 55 within which an eccentric portion 56 of an actuation shaft 57, supported so that it can rotate about its own axis by the framework 7, engages. The actuation shaft 57 is connected, by means of a transmission 58 of a known type, for example a worm screw-helical gear transmission, to an actuation handwheel 59, by means of which it is possible to produce the rotation of the actuation shaft 57 and therefore the axial movement of the guiding shafts 18, 52 along the guiding bushes 53 with respect to the framework 7.

[0051] The axial movement of the guiding shafts 18, 52 causes the movement of the bottom supporting plate 15 and therefore varies the distance of the extraction plugs 13 from the mouth 2b of the corresponding first formation cavity part 2 when the extraction plugs 13 are in their inactive position.

[0052] In this manner, by means of the actuation handwheel 59, it is possible to vary the volume of the first formation cavity parts 2 when the extraction plugs 13 are in the inactive position and it is therefore possible to vary the volume and consequently, for an equal density, the weight of the pieces of soap 6 to be produced.

[0053] It should be noted that since the servomotor 19 with gearmotor and corresponding output shaft 20 are mounted on the lower beam 51, the variation of the position of the bottom supporting plate 15 produced by acting on the actuation handwheel 59, i.e., by moving the guiding shafts 18, 52, does not modify the methods of actuation of the extraction plugs 13.

[0054] Thanks to this fact it is possible to vary the volume of the pieces of soap 6 to be stamped without having to modify the rule of motion according to which the extraction plugs 13 are actuated.

[0055] The second die part 4, in the first embodiment, is provided in a per se known manner, with the bottom of the second formation cavity parts 8 occupied almost entirely by an extraction plug 41 that can also move from an inactive position, in which it is spaced from the mouth 8b of the corresponding second formation cavity part 8 within said second formation cavity part 8, to an extraction position, in which it is displaced in the direction of the mouth 8b of the corresponding first formation cavity part 8 with respect to the inactive position, and vice versa. In this case, the actuation of the extraction plugs 41 is of the pneumatic type.

[0056] Operation of the apparatus according to the invention in the first embodiment is as follows.

[0057] With the second die part 4 spaced from the first die part 3 and with the extraction plugs 13 in the inactive position, a bar of soap is arranged so as to face the mouth 2b of the first formation cavity parts 2.

[0058] The second die part 4 is then moved toward the first die part 3 until it couples with it, closing the first formation cavity parts 2. The closure of the first formation cavity parts 2 causes the evacuation of the excess soap, which is moved away along the ducts and/or chutes 9

arranged laterally to the mouths 2b of the first formation cavity parts 2.

[0059] The closure of the first formation cavity parts 2 achieves the stamping of the pieces of soap, as shown in Figures 2, 3, 6 and 7.

[0060] The second die part 4 is then disengaged and moved away from the first die part 3, and pickup elements, of a known type and not shown for the sake of simplicity, for example provided with suckers that can engage the side of the stamped pieces of soap 6 that is opposite with respect to the side that rests against the extraction plugs 13, are arranged so as to face the mouth 2b of the first formation cavity parts 2.

[0061] By means of the actuation of the mechanical actuator 14, the extraction plugs 13 are moved to the extraction position, causing the at least partial extraction of the stamped pieces of soap 6 through the mouths 2b of the first formation cavity parts 2 in the direction of the pickup elements, as shown in Figures 4, 5, 8 and 9.

[0062] The pieces of soap are then picked up by the pickup elements and are moved away from the apparatus.

[0063] By means of the actuation of the servomotor 19, the extraction plugs 13 are returned to the inactive position and another bar of soap to be stamped is arranged so as to face the mouths 2b of the first formation cavity parts 2.

[0064] It should be noted that if needed, the stroke of the extraction plugs 13 can be such as to extract almost entirely the stamped pieces of soap 6 from the first formation cavity parts 2 so as to minimize the force that the pickup elements have to apply in order to remove the stamped pieces of soap 6 from the first die part 3 and the stroke required by the pickup elements in order to extract the stamped pieces of soap 6.

[0065] Thanks to this fact, the apparatus according to the invention allows to perform stamping with the flash stamping method of pieces of soap that have a very high lateral band 6a and/or are particularly sticky, with fully satisfactory results in terms of quality.

[0066] Furthermore, thanks to the fact that the transition of the extraction plugs 13 from the extraction position to the inactive position also is caused by the mechanical actuator 14, it is possible to have a force that acts on the extraction plugs 13 in this step that is sufficient to exclude the possibility of imprecise placements of the extraction plugs 13.

[0067] If one wishes to vary the size, i.e., the volume of the pieces of soap to be stamped, one acts on the actuation handwheel 59, while the extraction plugs 13 are in the inactive position, so as to cause the movement of the bottom supporting plate 15 and therefore of the extraction plugs 13 within the corresponding first formation cavity part 2, as explained above, reducing the volume of the first formation cavity parts 2, as is evident from the comparison between Figures 2 to 5, which refer to the stamping of thicker pieces of soap 6, and Figures 6 to 9, which refer to the stamping of thinner pieces of soap 6, or vice versa.

[0068] In the second embodiment, shown in Figures 10 to 16, the first formation cavity parts 64 are defined in a box 65 of the first die part 62 and are delimited, on the opposite side with respect to their mouth 64b, by a bottom 66.

[0069] The bottom 66 of the first formation cavity parts 64 can be occupied at least partially by an extraction plug that can move on command along the axis 64a of the corresponding first formation cavity part 64 from an inactive position, in which it is spaced from the mouth 64b of the corresponding first formation cavity part 64, to an extraction position, in which it is moved toward the mouth 64b of the corresponding first formation cavity part 64 with respect to the inactive position. In the illustrated embodiment, the extraction plug occupies completely the bottom 66 of the corresponding first formation cavity 64, constituting itself said bottom 66. The extraction plugs or the bottoms 66 of the various first formation cavity parts 64 are fixed to a single bottom supporting plate 67, which can move with respect to the box 65 of the first die part 62 parallel to the axes 64a of the first formation cavity parts 64, so as to actuate simultaneously the various extraction plugs or the various bottoms 66.

[0070] The extraction plugs or the bottoms 66 of the various first formation cavity parts 64 are provided with corresponding cooling means constituted by ducts 68 that are extended inside the extraction plugs 66 and the bottom supporting plate 67 and can be connected to means for supplying a cooling fluid, which are of a known type and are not shown for the sake of simplicity.

[0071] The second formation cavity parts 69 are defined in a box 70 of the second die part 63 and are delimited, on the opposite side with respect to their mouth 69b, by a corresponding bottom 71.

[0072] The adjustment means 73 comprise means for varying the distance of the bottom 71 of each one of the second formation cavity parts 69 from the mouth 69b of the corresponding second formation cavity part 69.

[0073] Preferably, each bottom 71 of the second formation cavity parts 69 is occupied at least partially by an extraction plug 74 that is directed toward the mouth 69b of the second formation cavity part 69 and can move on command from an inactive position, in which it is spaced from the mouth 69b of the corresponding second formation cavity part 69, to an extraction position, in which it is moved toward the mouth 69b of the corresponding second formation cavity part 69 with respect to the inactive position.

[0074] Preferably, the box 70 of the second die part 63, in which the second formation cavity parts 69 are defined, is fixed to a support 75, which in turn is fixed to a supporting beam 76. The supporting beam 76 is provided, in a per se known manner, with engagement means for the means for moving the second die part 63 with respect to the first die part 62.

[0075] The engagement means for the movement means are constituted by brackets 77a, 77b that are fixed

to the supporting beam 76 and are shown only in Figure 11 for the sake of simplicity. The movement means, of a known type and not shown for the sake of simplicity, actuate the alternating movement of the second die part 63 toward or away from the first die part 62 so as to open and close the formation cavity parts 64, 69.

[0076] The bottoms 71 of the second formation cavity parts 69 are fixed to a bottom supporting plate 78 that is accommodated, so that it can slide along a direction that is parallel to the axes 69a of the second formation cavity parts 69, within the support 75.

[0077] The means for varying the distance of the bottoms 71 from the mouth 69b of the corresponding second formation cavity part 69 comprise at least one actuation shaft 79a, 79b, which is supported, so that it can rotate about its own axis, which is oriented at right angles to the central plane cited above, by the supporting beam 76. The actuation shaft 79a, 79b has an eccentric portion 80 that is connected to the bottom supporting plate 78.

[0078] Preferably, instead of a single actuation shaft 79a, 79b, there is a pair of actuation shafts 79a, 79b which have mutually parallel axes and are connected to corresponding actuation means 81 mounted on the supporting beam 76.

[0079] The actuation means 81 can comprise a handwheel 82, which is connected, by means of a pair of reduction units 83a, 83b, to the pair of actuation shafts 79a, 79b.

[0080] As an alternative, the actuation means 81 can comprise a servomotor that is connected to the pair of actuation shafts 79a, 79b and is connected functionally to an actuation and control element of the electronic type that supervises the operation of the entire apparatus and, in particular, is capable of performing the rotation, through angles of preset breadth, of the pair of actuation shafts 79a, 79b so as to perform the controlled movement of the bottoms 71 of the second formation cavity parts 69 parallel to the axis 69a of the corresponding second formation cavity part 69.

[0081] The supporting beam 76 is provided with two shoulders 84a, 84b that define between them a seat 103 which accommodates an actuation beam 85 that connects the eccentric portions 80 of the actuation shafts 79a, 79b to the bottom supporting plate 78.

[0082] The reduction units 83a, 83 be with the actuation handwheel 82 or, as an alternative, the servomotor, are mounted on the supporting beam 76 and the actuation shafts 79a, 79b are supported, so that they can rotate about their corresponding axes, by the supporting beam 76 by means of bearings 104. The eccentric portion 80 of each one of the actuation shafts 79a, 79b mates with a hole 86 that is defined in a bushing 87 that is accommodated in the actuation beam 85.

[0083] Each extraction plug 74 is connected to the stem of the piston 88 of a pneumatic cylinder that is arranged in the bottom 71 of the corresponding second formation cavity part 69.

[0084] More particularly, each bottom 71 of the second formation cavity parts 69 constitutes the body of a pneumatic cylinder in which there is a cylindrical chamber that accommodates a piston 88, the stem of which is connected to a corresponding extraction plug 74. The various cylindrical chambers are connected to a duct 89 that is extended inside the bottom supporting plate 78 and the actuation beam 85 and can be connected to means for supplying a pressurized fluid in order to move the extraction plugs 74 in the direction of the mouth 69b of the corresponding second formation cavity part 69. The return motion of the extraction plugs 74 can be achieved in a per se known manner by means of springs.

[0085] The actuation beam 85 is connected to the bottom supporting plates 78 by means of mutually spaced blocks 90. The two end blocks 90 are fixed to the actuation plate by means of screws 91 a, 91 b.

[0086] The supporting beam 76 is fixed to the support 75 by means of pins 92 and engagement blocks 93, as shown in particular in Figure 15.

[0087] Advantageously, means for cooling the bottoms 71 of the second formation cavities 69 are provided.

[0088] Such cooling means comprise a plurality of ducts 94 that are extended inside the various bottoms 71 and are connected to manifold ducts 95 that are defined inside the bottom supporting plate 78 and in turn are connected to an intake duct 96 and to a discharge duct 97, which are defined in the actuation beam 85 and can be connected to a circuit for supplying a cooling fluid, in a per se known manner.

[0089] Conveniently, there are also means for cooling the box 70 of the second die part 63, which in this case are constituted by ducts 98 that are extended within the body of the box 70 and can be connected to a circuit for supplying a cooling fluid, in a per se known manner.

[0090] In a similar manner, it is possible to provide also cooling ducts 99 within the box 65 of the first die part 62.

[0091] For the sake of completeness in description, it should be noted that laterally to the mouths 64b of the first formation cavity parts 64 there are chutes 102 for removing the excess soap. The chutes 102 are fixed to the box 65 of the first die part 62, as shown in Figures 11 and 12.

[0092] Furthermore, in both embodiments the first die part 3, 62 can be provided with spacing pins 11a, 11b, 100a, 100b, which by mating with respective blocks 37a, 37b, 101a, 101b provided appropriately on the side of the second die part 4, 63 that faces the first die part 3, 62 ensure the placement of the bottom supporting plate 15, 67 during the step for forming the soap between the first formation cavity parts 2, 64 and the second formation cavity parts 8, 69.

[0093] Operation of the apparatus according to the invention in the second embodiment is as follows.

[0094] With the second die part 63 spaced from the first die part 62 and with the extraction plugs 74 and 76 in the inactive position, a bar of soap is arranged between the first die part 62 and the second die part 63. The second die part 63 is then moved toward the first die part 62

so as to produce the mating of the first formation cavity parts 64 with the second formation cavity parts 69, stamping the interposed bar of soap that is pushed so as to occupy the formation cavities, each of which is composed of a first formation cavity part 64 and a corresponding second formation cavity part 69 that are mutually coaxially coupled.

[0095] The soap that is in excess with respect to what is needed to fill the formation cavities is moved away laterally through the chutes 102.

[0096] The second die part 63 is then moved away from the first die part 62, thus opening the formation cavity parts 64, 69. In this step of spacing of the second die part 63, the extraction plugs 74 placed in the second formation cavity parts 69 are actuated in order to perform their transition from the inactive position to the extraction position, so as to facilitate the separation of the stamped pieces of soap 72 from the second formation cavity parts 69. In this manner, the stamped pieces of soap 72 remain in the first formation cavity parts 64.

[0097] At this point, the grip and removal means, usually provided with suckers, intervene and engage the side of the pieces of soap 72 that protrudes from the mouth 64b of the first formation cavity parts 64. Such grip and removal means extract the pieces of stamped soap 72 from the first formation cavity parts 64 and move them away from the first die part 62. In this step, the extraction plugs or the bottom 66 of the first formation cavity parts 64 are actuated in order to perform their transition from the inactive position to the extraction position, i.e., moving them toward the mouth 64b of the first formation cavity parts 64 so as to assist the action of the grip and removal means. The pushing action of the extraction plugs or of the bottoms 66 of the first formation cavity parts 64 is particularly useful if the soap is sticky or if the pieces of soap 72 have a large surface in contact with the side walls of the first formation cavity parts 64, as occurs in the case of pieces of soap 72 that have a lateral surface that is cylindrical or has flat faces.

[0098] If a variation of the volume of the formation cavities is required, i.e., a variation of the volume of pieces of soap 72 to be stamped is required, it is sufficient to act on the handwheel 82 or actuate the servomotor, which by turning the actuation shafts 79a, 79b, by means of the coupling that exists between the eccentric portion 80 of the actuation shafts 79a, 79b and the actuation beam 85 that is connected to the bottom supporting plate 78 causes the simultaneous movement of the various bottoms 71 of the second formation cavity parts 69 parallel to the axis 69a of each second formation cavity part 69, varying the volume of the second formation cavity parts 69, as shown in particular in Figures 13 and 14 and consequently the total volume of the formation cavities, each constituted by the mating of a first formation cavity part 64 with a corresponding second formation cavity part 69.

[0099] In practice it has been found that the apparatus according to the invention achieves fully the intended aim, since it allows to vary the volume of the formation cavities and consequently the volume of the stamped pieces of soap according to requirements.

[0100] The apparatus thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0101] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0102] The disclosures in Italian Patent Application no. MI2014A000115 and MI2014A001916, from which this application claims priority, are incorporated herein by reference.

[0103] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A stamping apparatus of the flash stamping type for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a first die part (3, 62), in which there is a plurality of first formation cavity parts (2, 64), each of which is extended around a corresponding axis (2a, 64a), and a second die part (4, 63), in which there is correspondingly a plurality of second formation cavity parts (8, 69), each extended around a corresponding axis (8a, 69a), said second die part (4, 63) being movable on command toward said first die part (3, 62), in order to close the formation cavity parts (2, 8; 64, 69) by means of the coaxial coupling of each one of said first formation cavity parts (2, 64) with the corresponding second formation cavity parts (8, 69) and stamp a bar of soap interposed between said first die part (3, 62) and said second die part (4, 63), or away from said first die part (3, 62), in order to open said formation cavity parts (2, 8; 64, 69) and allow the extraction of the stamped pieces of soap (6, 72) from said formation cavity parts (2, 8; 64, 69) and the insertion, between said die parts (3, 4; 62, 63), of a new soap bar to be stamped, the coupling of each one of said first formation cavity parts (2, 64) with the corresponding second formation cavity part (8, 69) defining a corresponding formation cavity, **characterized in that** it comprises adjustment means (50, 73) for varying the volume of the formation cavities.

2. The apparatus according to claim 1, **characterized in that** each one of said first formation cavity parts (2) and/or of said second formation cavity parts (69) is delimited, on the opposite side with respect to its

axial end or mouth (2b, 69b) that can face the corresponding formation cavity part (8, 64) defined in the other die part (4, 62), by a bottom (12, 71); said adjustment means (50, 73) comprising means for varying the distance of said bottom (12, 71) from the mouth (2b, 69b) of the corresponding formation cavity part (2, 69).

3. The apparatus according to claims 1 and 2, **characterized in that** said bottom (12, 71) is occupied at least partially by an extraction plug (13, 74) that is directed toward the mouth (2b, 69b) of the corresponding formation cavity part (2, 69) and can move on command from an inactive position, in which it is spaced from the mouth (2b, 69b) of the corresponding formation cavity part (2, 69), to an extraction position, in which it is moved toward the mouth (2b, 69b) of the corresponding formation cavity part (2, 69) with respect to said inactive position.

4. The apparatus according to one or more of the preceding claims, **characterized in that** said adjustment means (50) are adapted to vary the volume of said first formation cavity parts (2).

5. The apparatus according to one or more of the preceding claims, **characterized in that** first die part (3) is fixed to a fixed framework (7) that supports it, said first formation cavity parts (2) being open upwardly, the bottom (12) of said first formation cavity parts (2) being fixed to a bottom supporting plate (15) accommodated in said first die part (3) below said first formation cavity parts (2); said bottom supporting plate (15) resting on the upper end of vertical guiding shafts (18, 52) that are fixed, by means of their lower end, to a lower beam (51) that can move vertically on command in order to vary the distance of the bottom (12) of said first formation cavity parts (2) from the mouth (2b) of said first formation cavity parts (2).

6. The apparatus according to one or more of the preceding claims, **characterized in that** said lower beam (51) engages eccentric portions (56) of a rotatable actuation shaft (57) in order to actuate the movement, along a vertical direction, of said lower beam (51) with respect to said first die part (3).

7. The apparatus according to one or more of the preceding claims, **characterized in that** the extraction plugs (13) of said first formation cavity parts (2) are connected to a mechanical actuator (14) that can be actuated to cause the movement of said extraction plugs (13) of the first formation cavity parts (2) from an inactive position, in which they are spaced from the mouth (2b) of the corresponding formation cavity part (2) inside the corresponding first formation cavity part (2), to an extraction position, in which they are shifted in the direction of the mouth (2b) of the corresponding first formation cavity part (2) with respect to said inactive position, and vice versa.

8. The apparatus according to one or more of the preceding claims, **characterized in that** in said first formation cavity parts (2) each extraction plug (13) occupies substantially the entire surface of the bottom (12) of the corresponding first formation cavity part (2).

9. The apparatus according to one or more of the preceding claims, **characterized in that** each extraction plug (13) of said first formation cavity parts (2) is constituted by the bottom (12) of said first formation cavity parts (2).

10. The apparatus according to one or more of the preceding claims, **characterized in that** said bottom supporting plate (15) is connected kinematically to said mechanical actuator (14) mounted on said lower beam (51) and can be actuated for the vertical movement of said bottom supporting plate (15) with respect to said lower beam (51).

11. The apparatus according to one or more of claims 1 to 3, **characterized in that** said adjustment means (73) are adapted to vary the volume of said second formation cavity parts (69).

12. The apparatus according to one or more of claims 1 to 3, **characterized in that** said first die part (62) comprises: a box (70), in which said second formation cavity parts (69) are defined with their axes (69a) arranged on a same central plane, a support (75), to which said box (70) is fixed, and a supporting beam (76), to which said support (75) is fixed; said supporting beam (76) being provided with engagement means (77a, 77b) for means for moving said second die part (63) with respect to said first die part (62); said bottoms (71) of the second formation cavity parts (69) being fixed to a bottom supporting plate (78) that is accommodated slidingly within said support (75) along a direction that is parallel to the axes (69a) of said second formation cavity parts (69); said means for varying the distance of said bottoms (11) from the mouth (69b) of the corresponding second formation cavity part (69) comprising at least one actuation shaft (79a, 79b), which is supported so that it can rotate about its own axis, oriented at right angles to said central plane, by said supporting beam (76) and is provided with an eccentric portion (80) that is connected to said bottom supporting plate (78).

13. The apparatus according to one or more of the preceding claims, **characterized in that** said at least one actuation shaft (79a, 79b) comprises a pair of

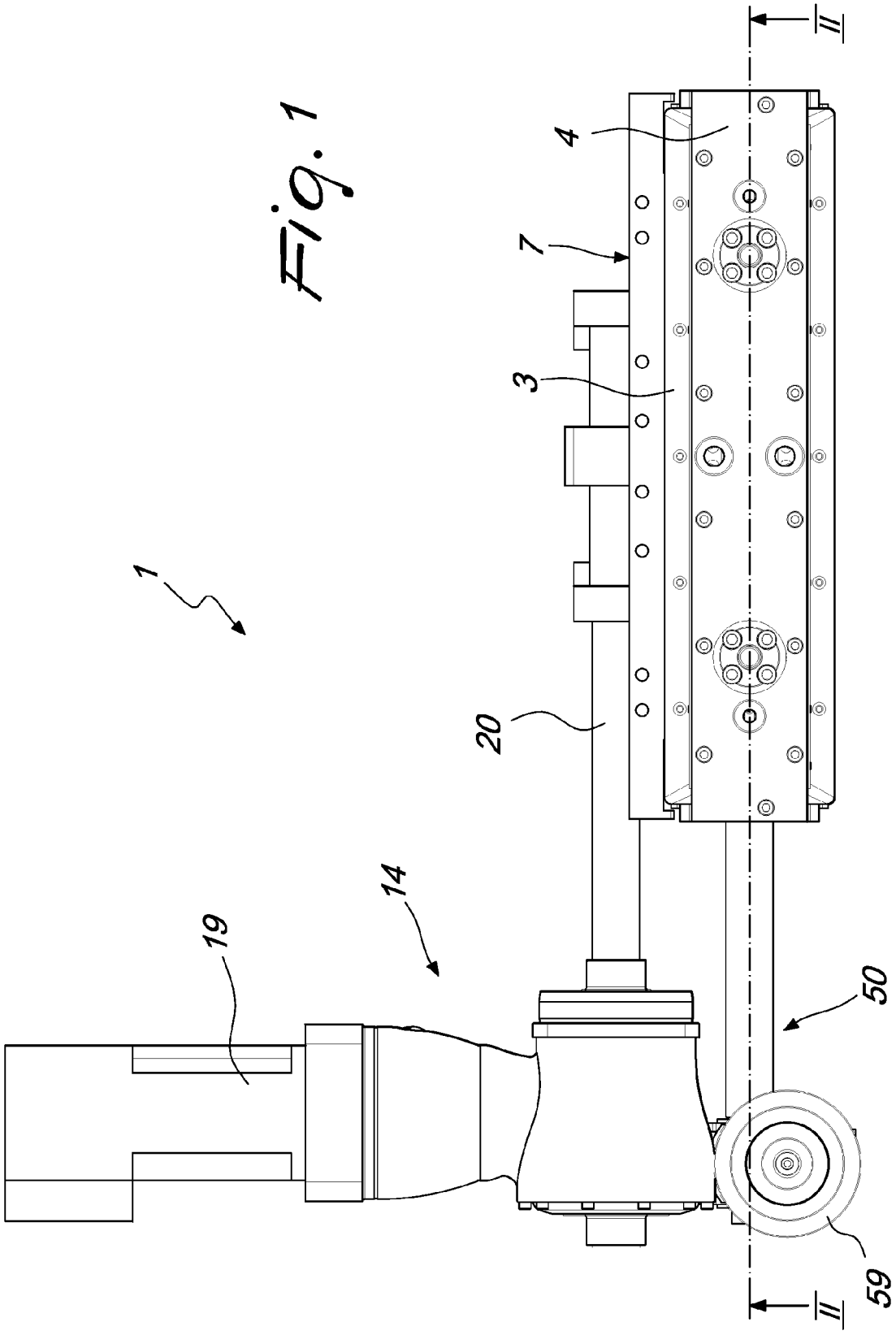
actuation shafts (79a, 79b) that have mutually parallel axes and are connected to corresponding actuation means (81) that are mounted on said supporting beam (76).

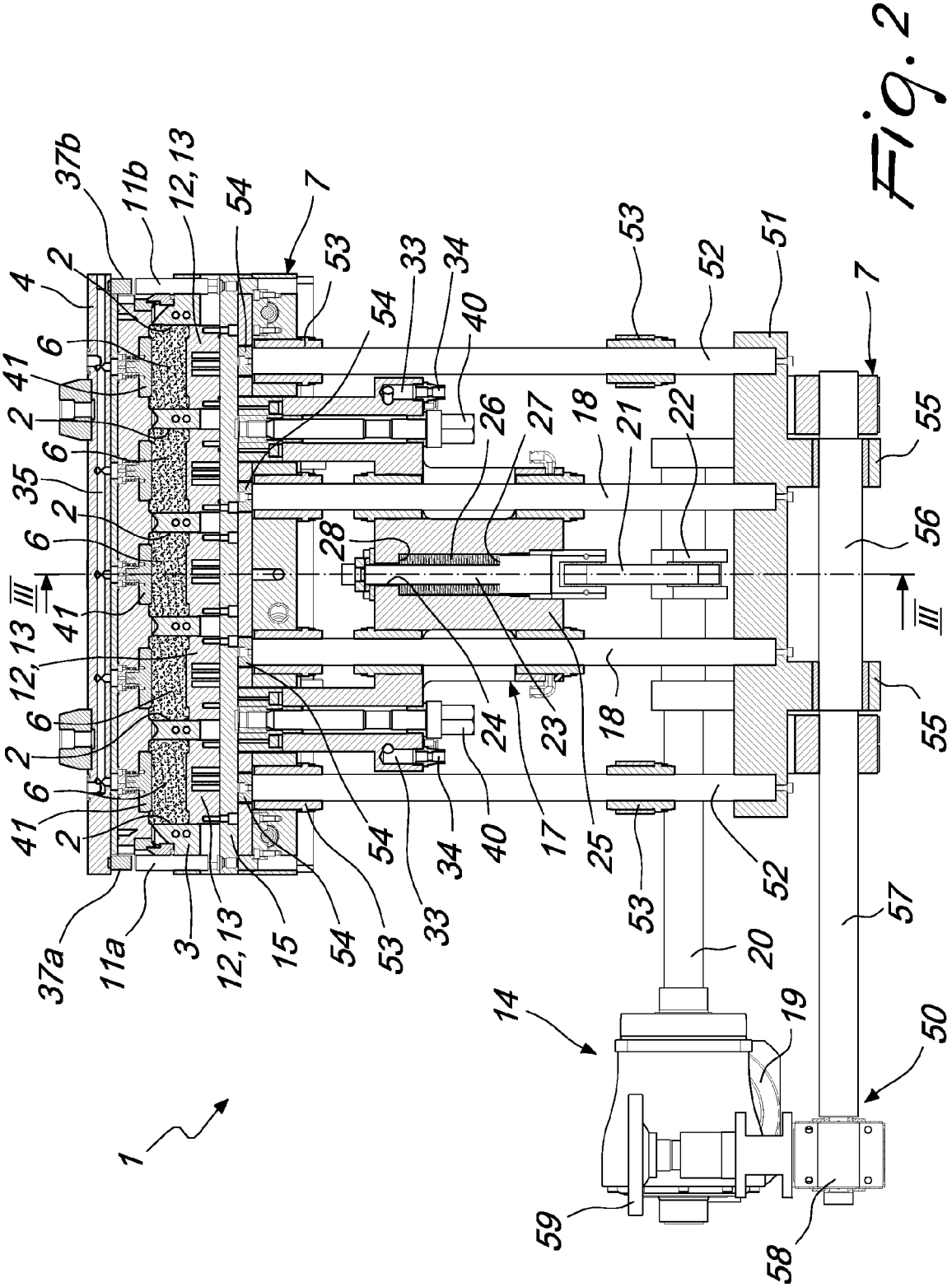
14. The apparatus according to one or more of the preceding claims, **characterized in that** said actuation means (81) comprise a handwheel (82) that is connected, by means of a pair of reduction units (83a, 83b), to said pair of actuation shafts (79a, 79b).

15. The apparatus according to one or more of the preceding claims, **characterized in that** said actuation means (81) comprise a servomotor that is connected to said pair of actuation shafts (79a, 79b) and is connected functionally to an actuation and control element of the electronic type.

16. The apparatus according to one or more of the preceding claims, **characterized in that** said supporting beam (76) is provided with two shoulders (84a, 84b) that define between them a seat (103) that accommodates an actuation beam (85) that connects the eccentric portions (80) of said actuation shafts (79a, 79b) to said bottom supporting plate (78).

Fig. 1

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III
III
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14
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Fig. 2

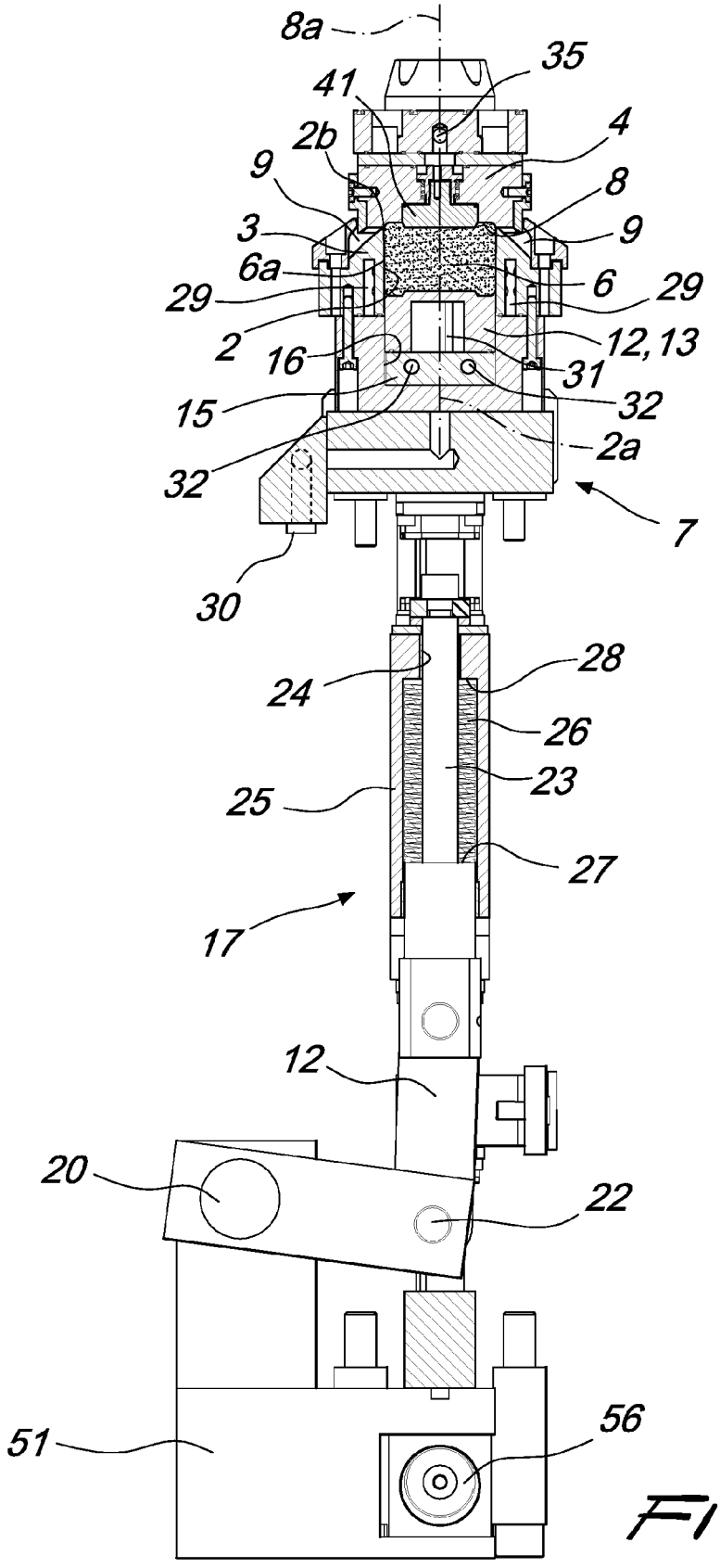
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Fig. 3

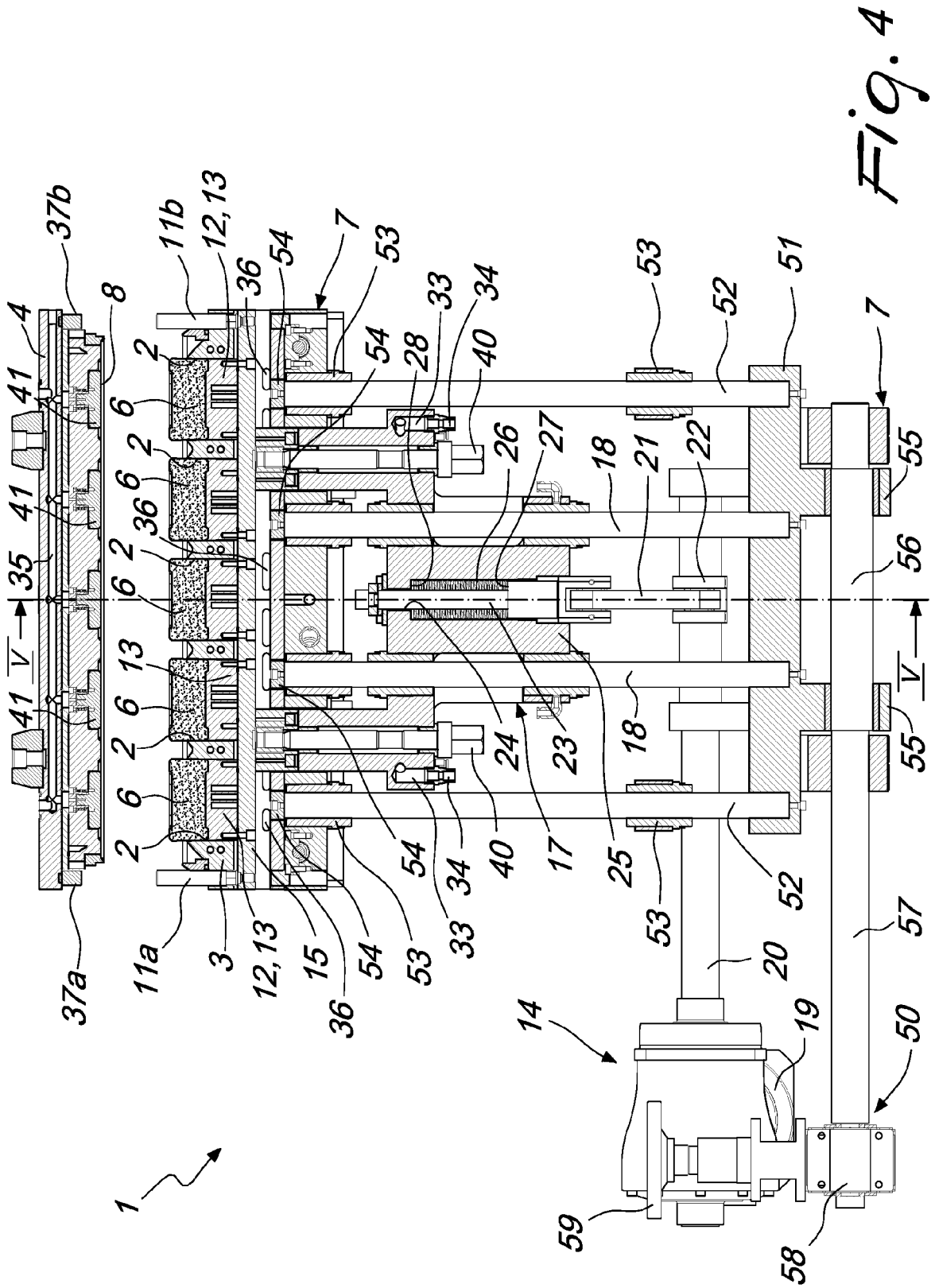
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Fig. 4

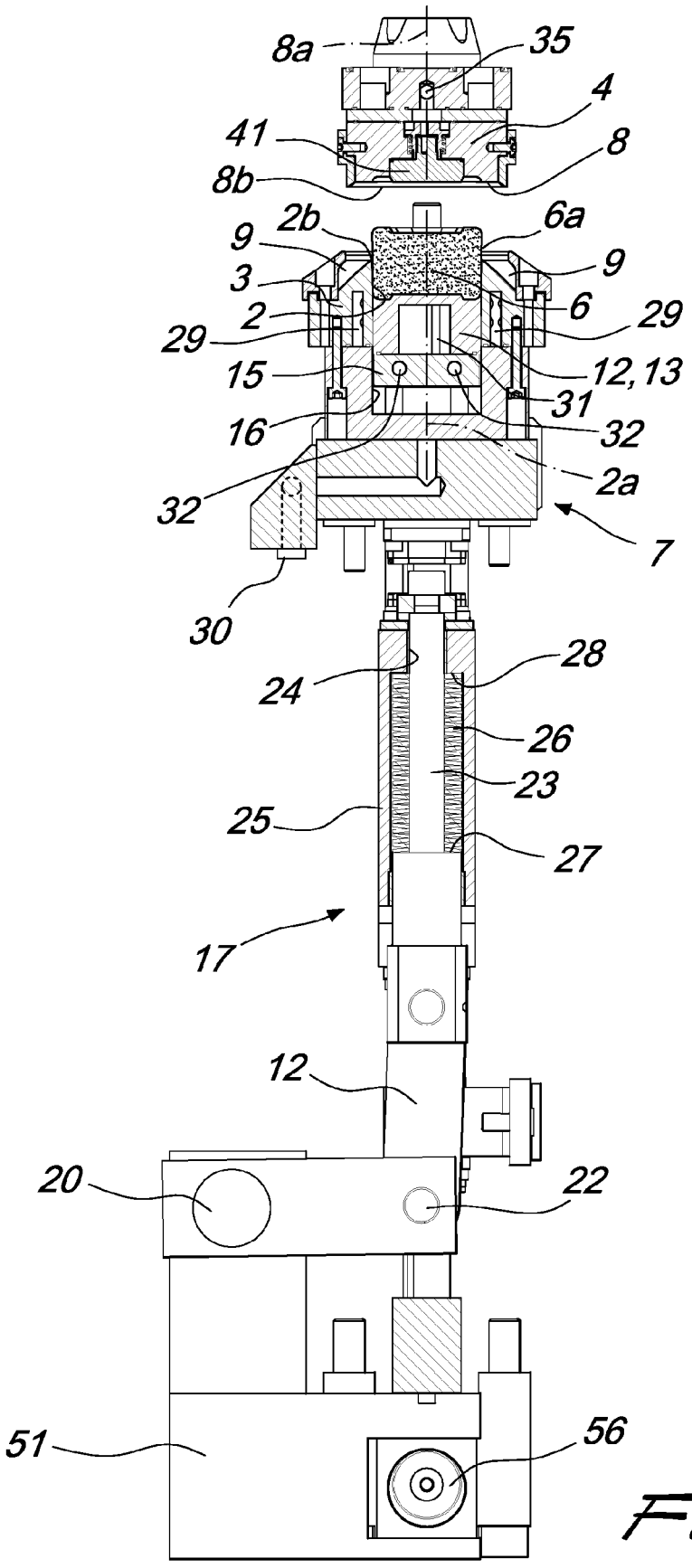
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Fig. 5

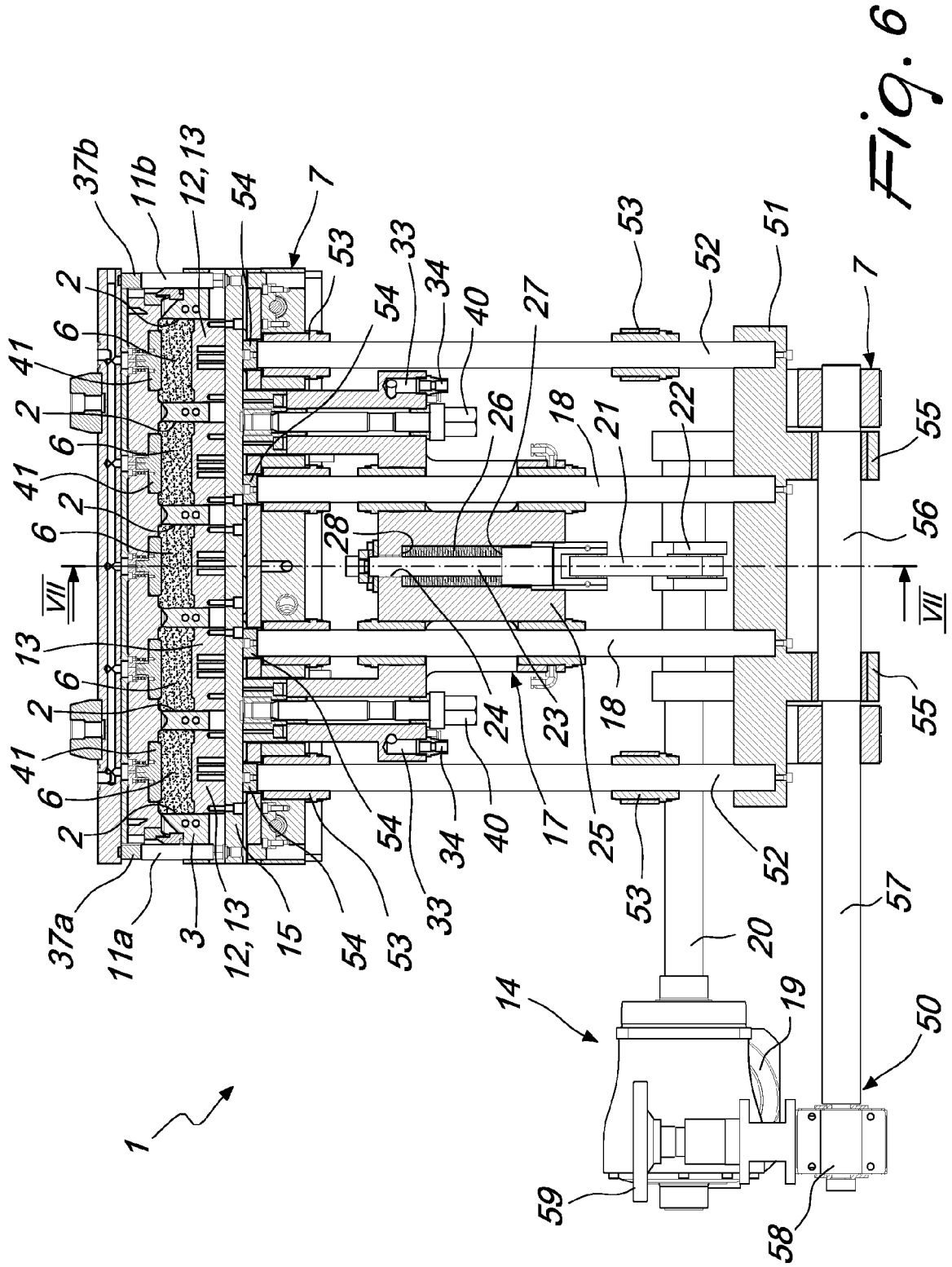
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Fig. 6

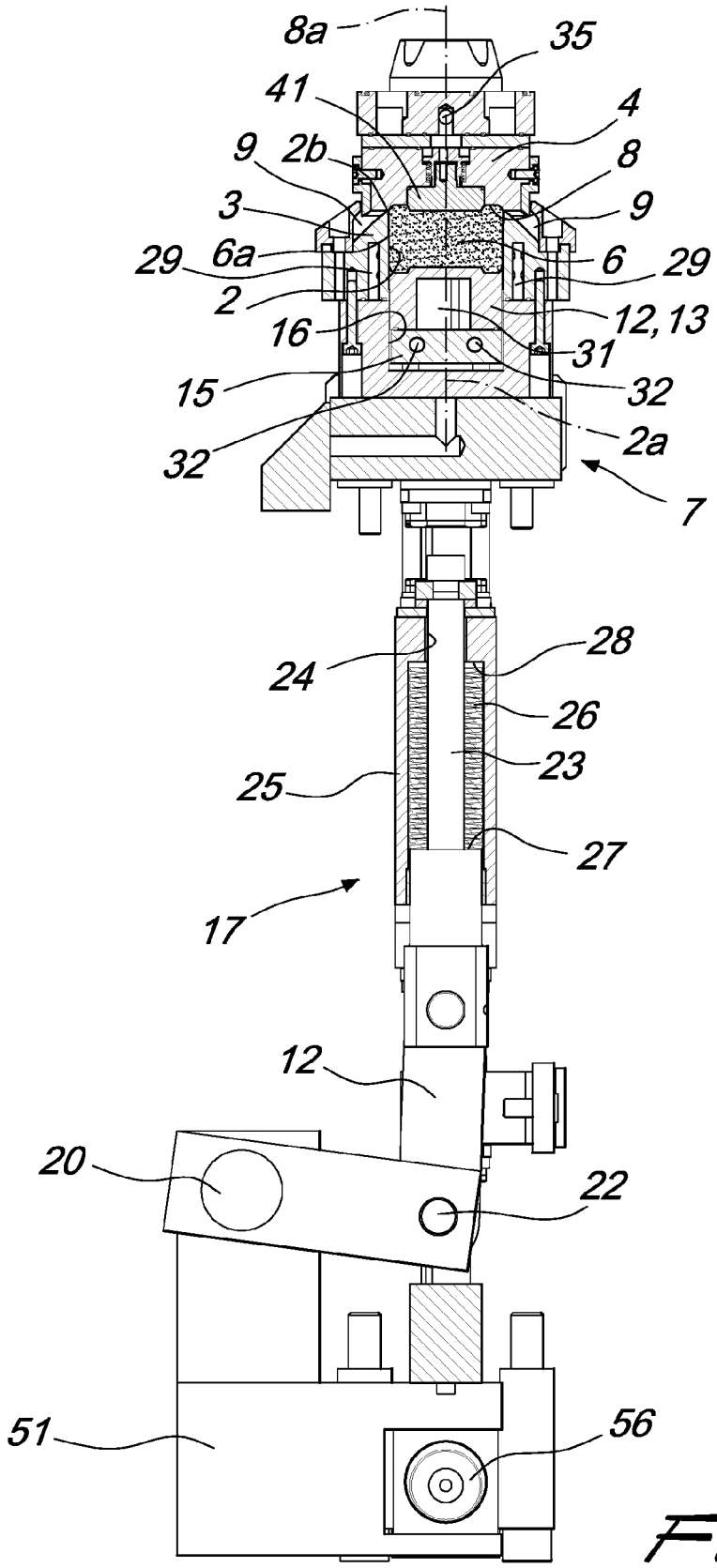
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Fig. 7

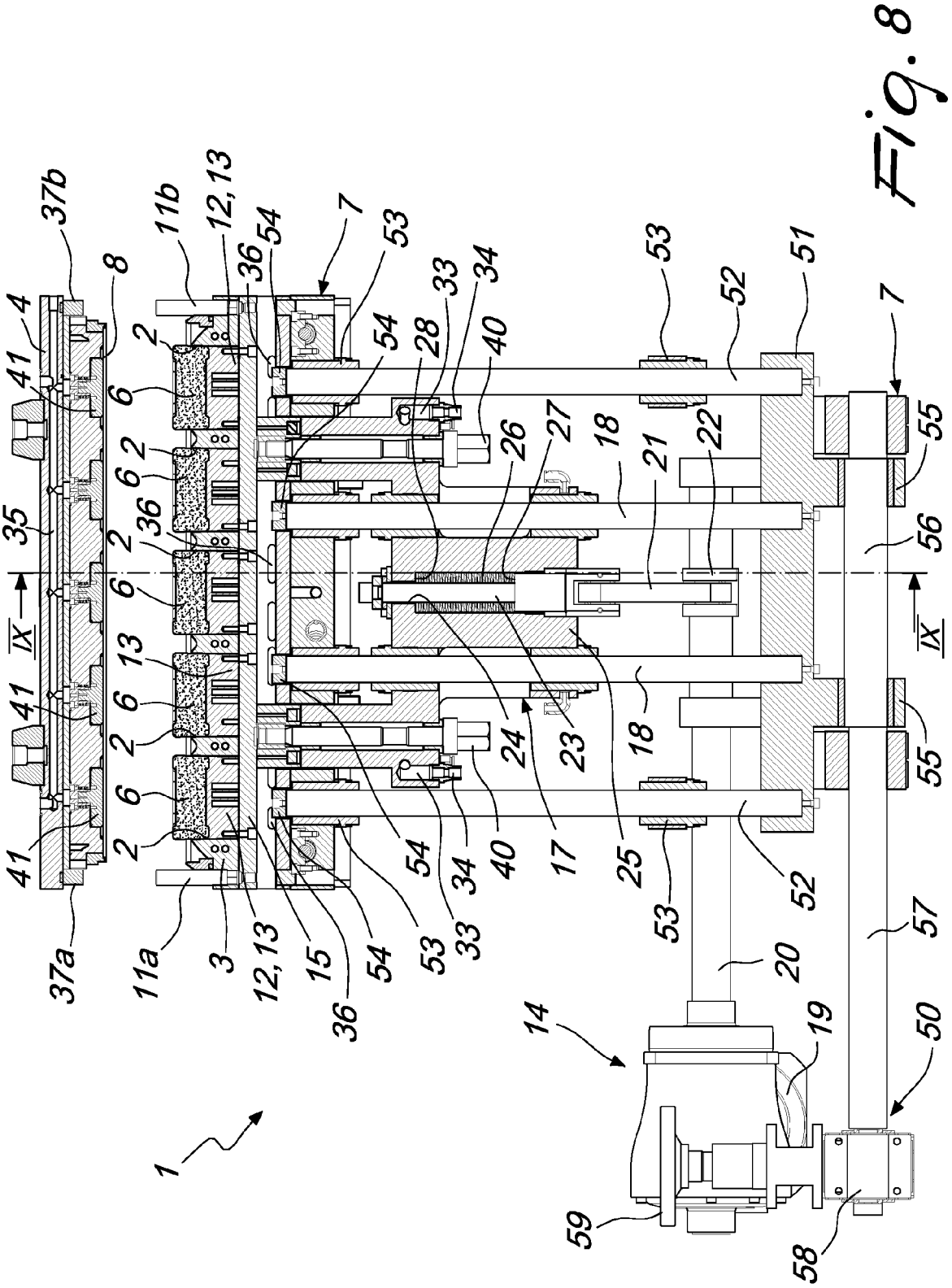
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Fig. 8

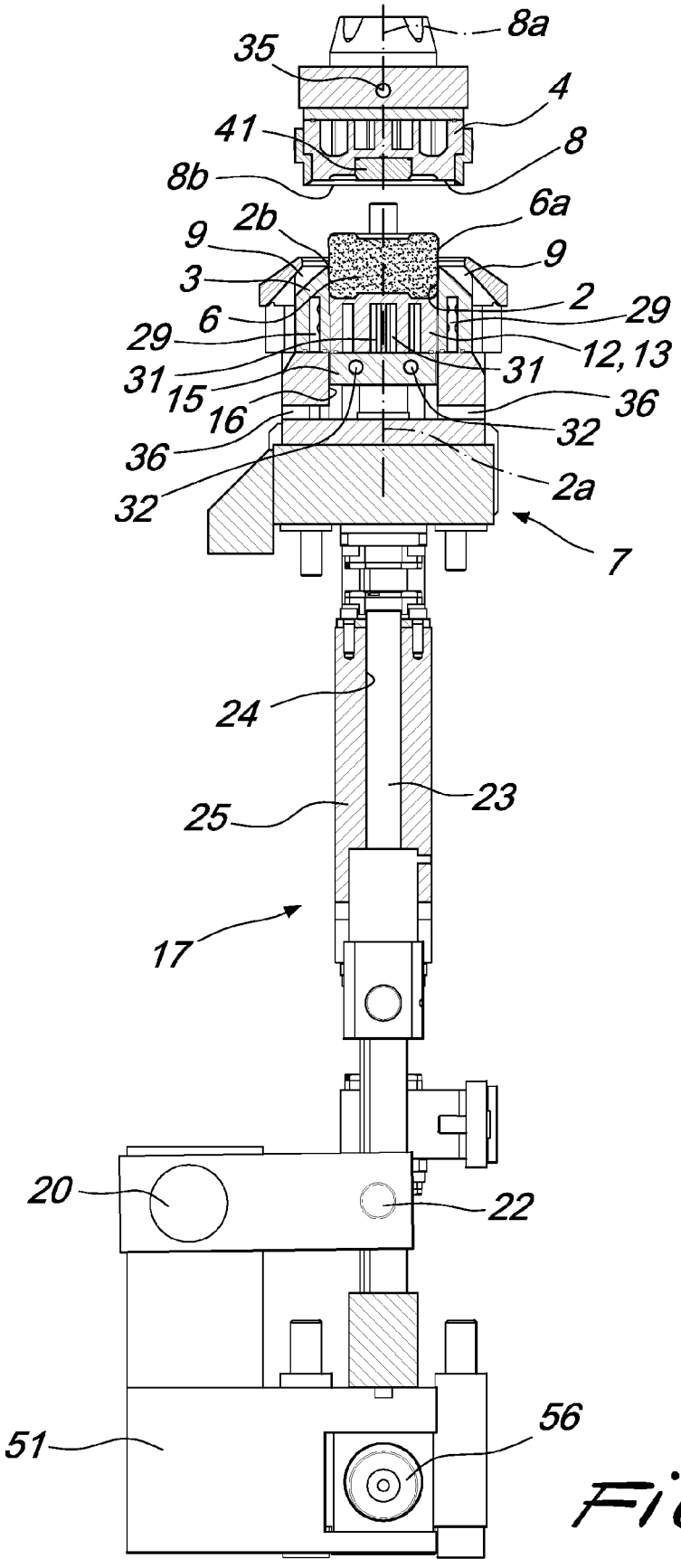
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Fig. 9

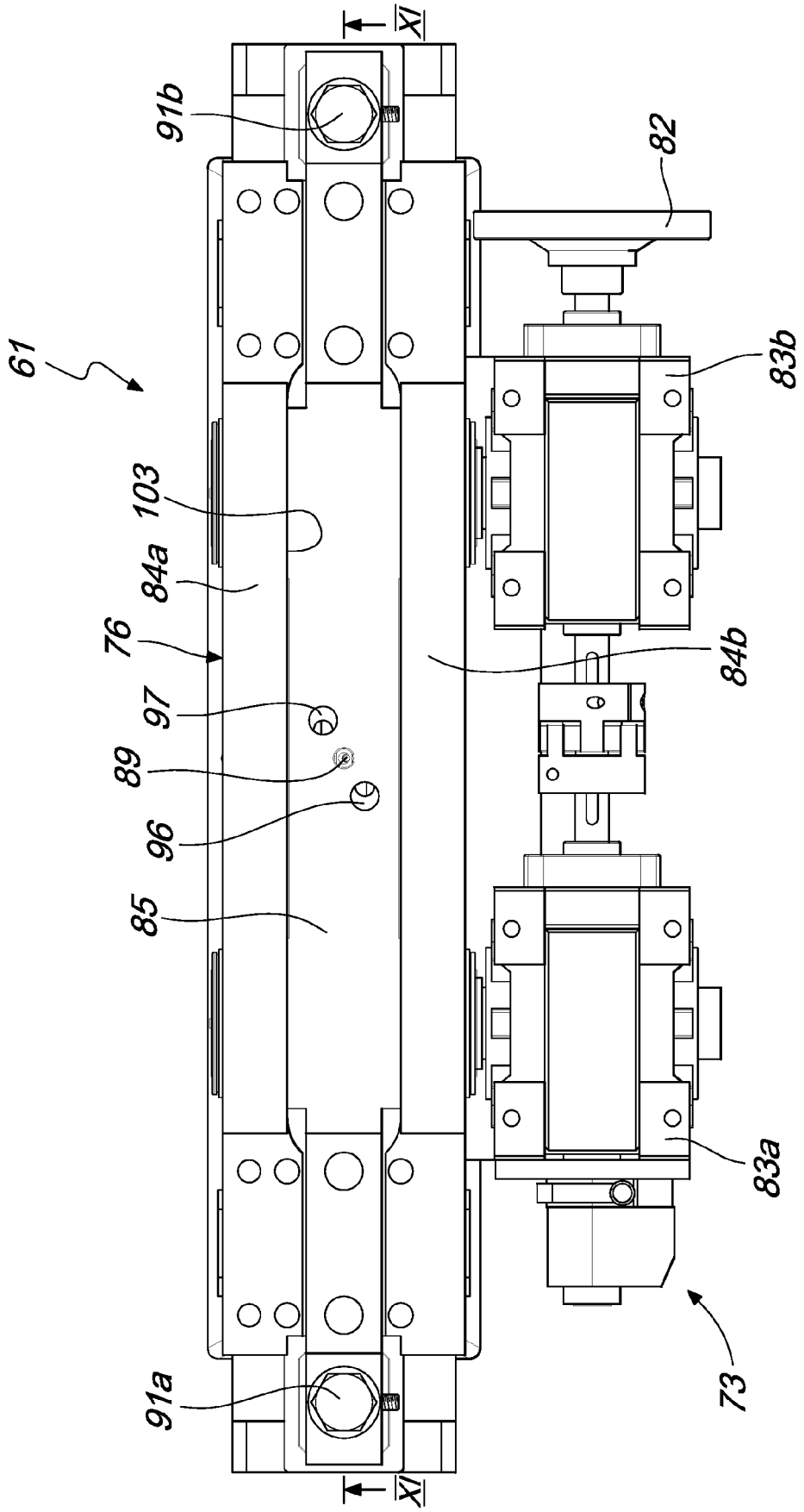
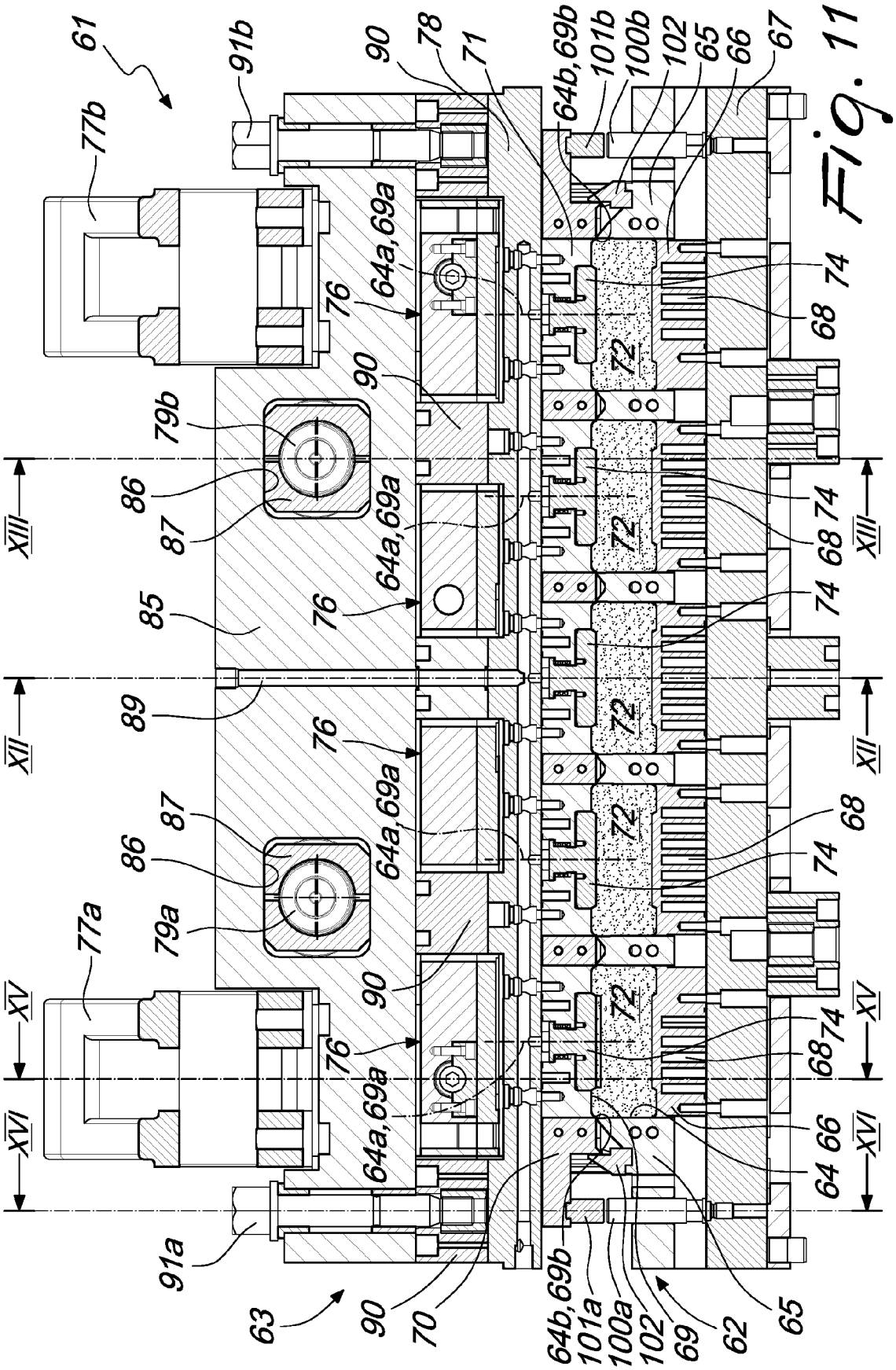


Fig. 10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64

Fig. 11

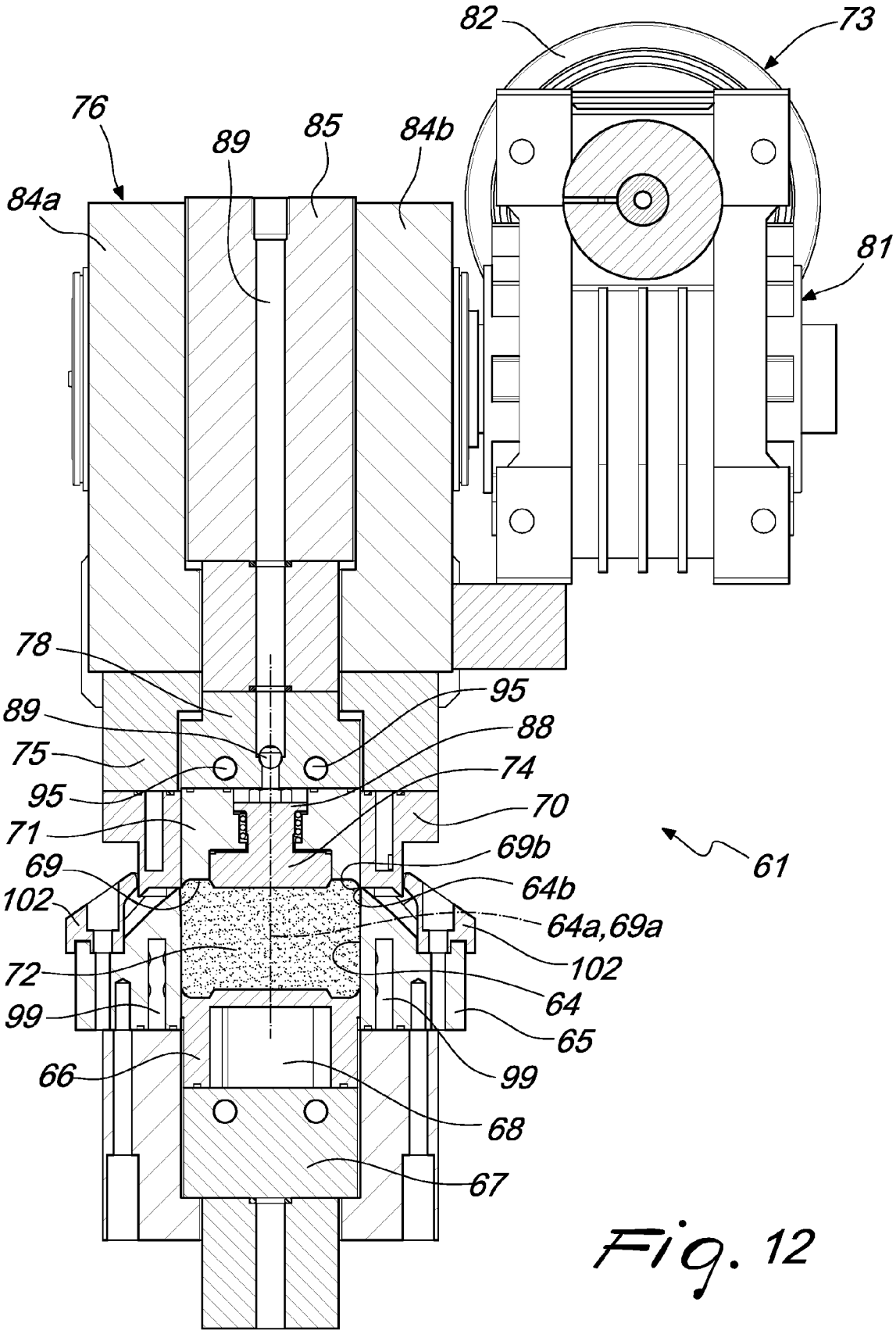
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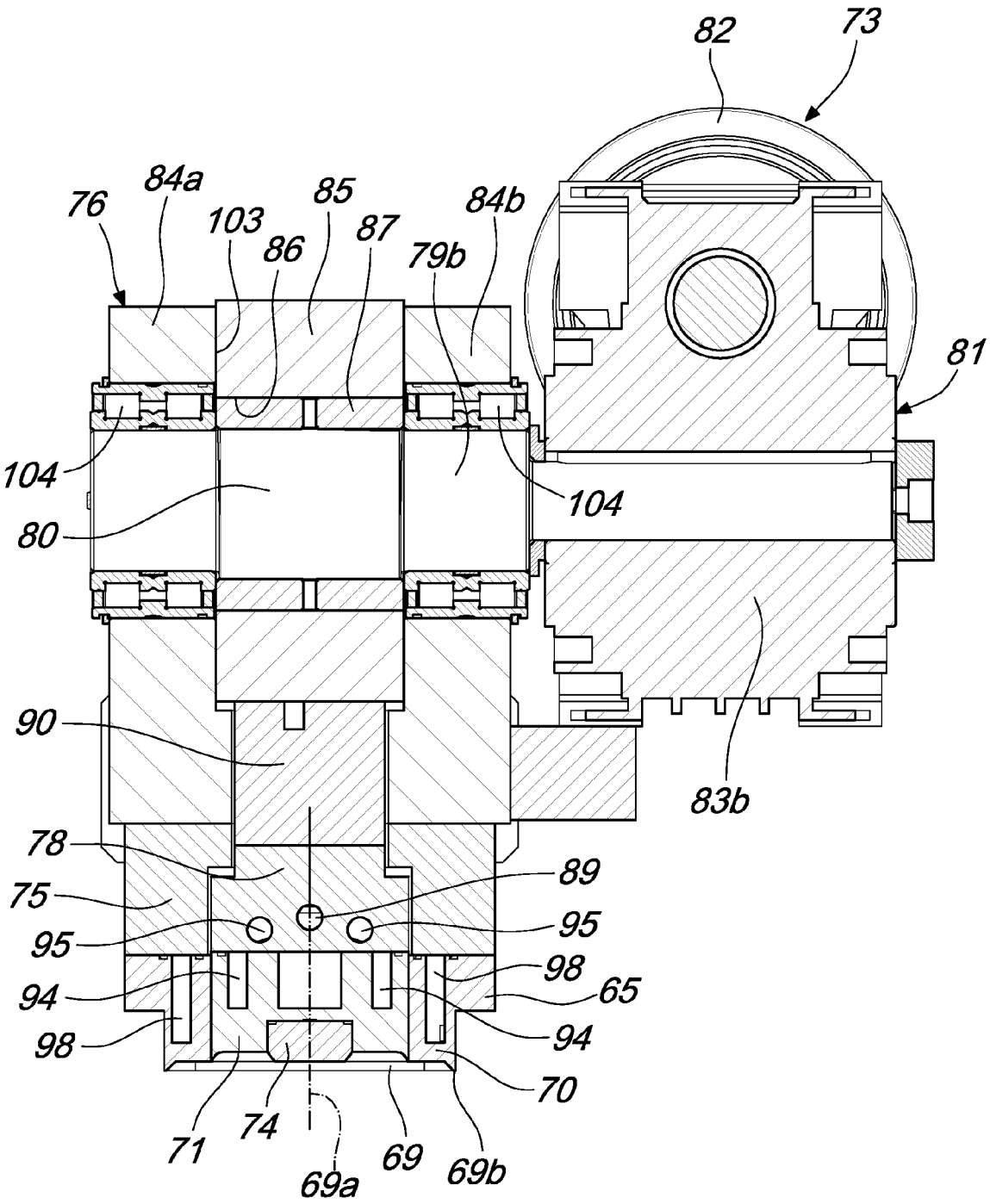
Fig. 12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69b

Fig. 13

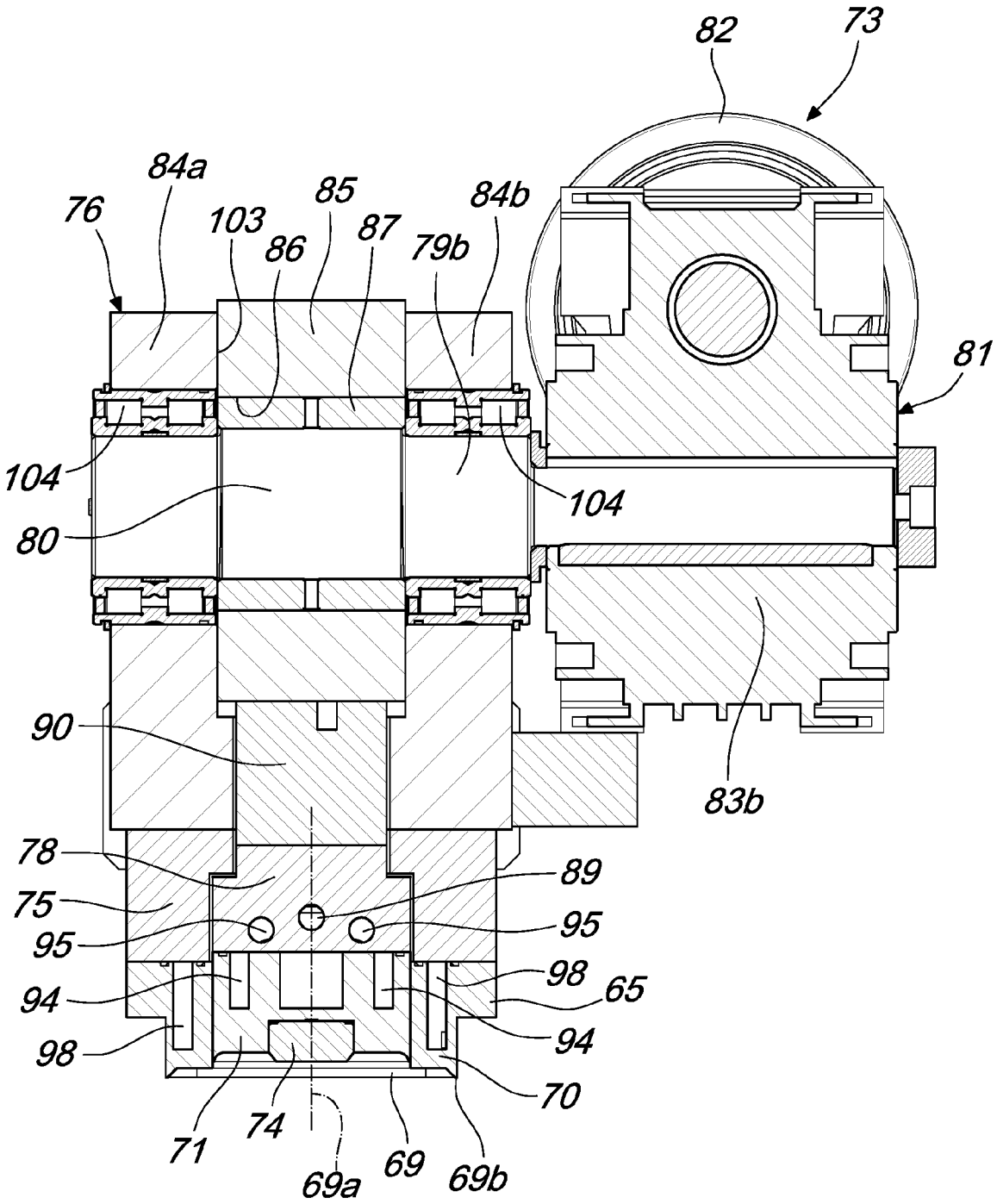
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Fig. 14

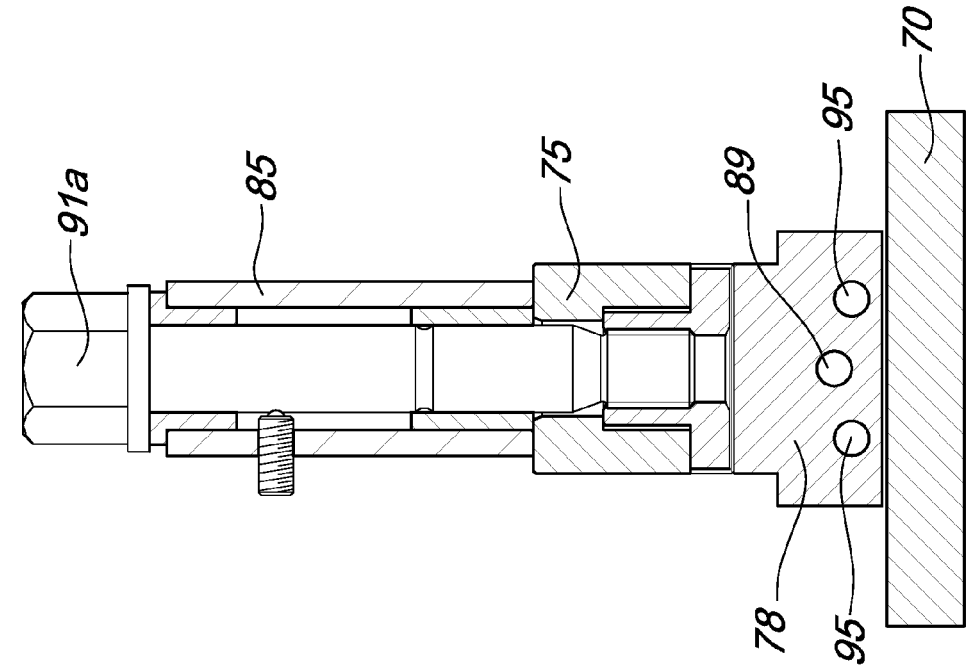
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Fig. 16

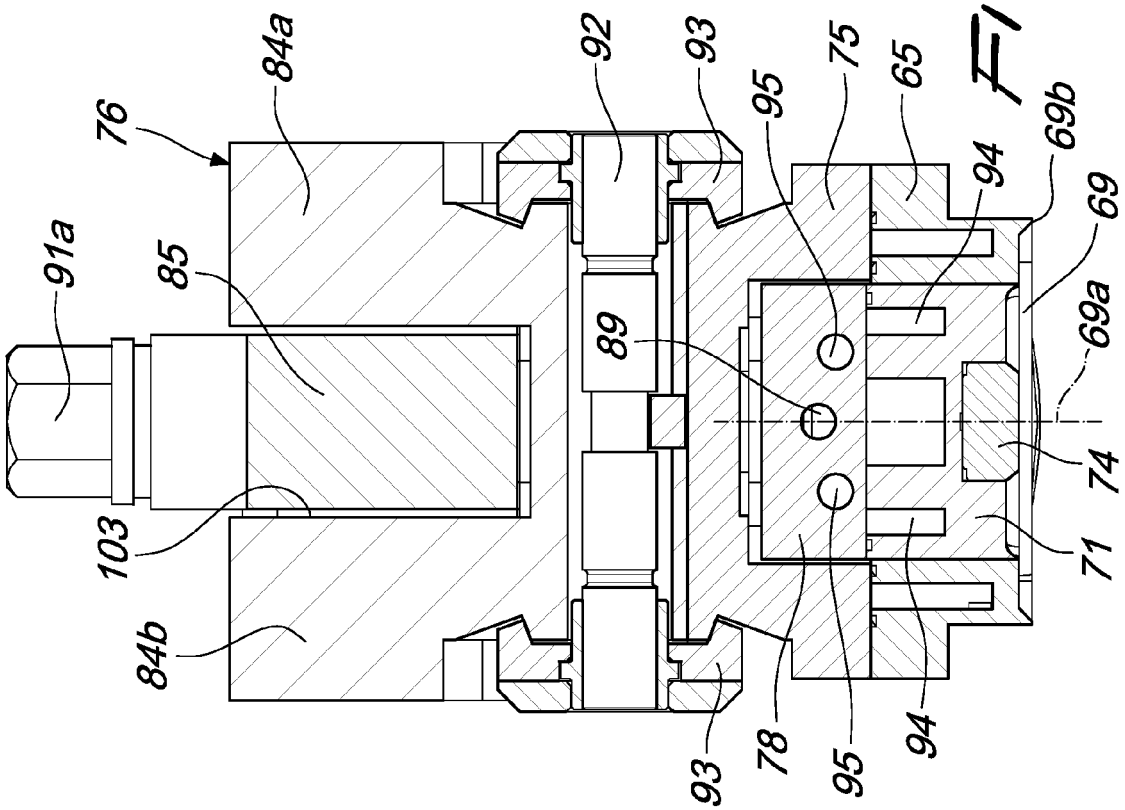
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Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 15 15 2895

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 1 391 975 A (OCTAVIOUS PHILLIPS CECIL) 27 September 1921 (1921-09-27) * page 2, line 31 - line 52; claims; figures *	1	
X	FR 920 188 A (KERFOOT) 31 March 1947 (1947-03-31) * page 4, line 55 - line 69; claims; figures *	1-12	
X	DE 482 735 C (FRITZ KILIAN) 1 October 1929 (1929-10-01) * the whole document *	1-4,6-16	
X	GB 164 341 A (AMERICAN COTTON OIL COMPANY) 6 October 1922 (1922-10-06) * page 2, line 82 - line 90; claims; figures *	1-4,7-9	TECHNICAL FIELDS SEARCHED (IPC) B30B C11D
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 July 2015	Baradat, Jean-Luc

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22-07-2015

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