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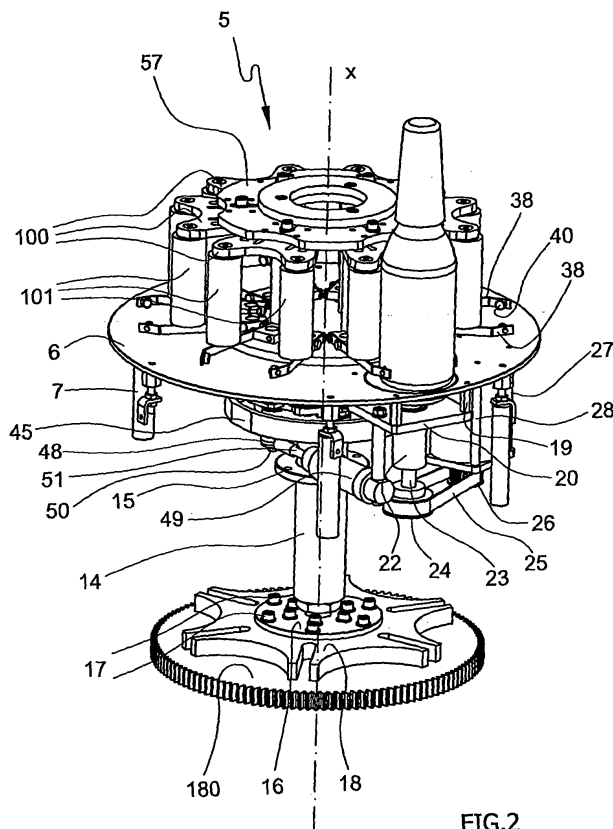
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(54) **Bottle cap sealing and labelling carousel machine**

(57) A bottle cap sealing and labelling carousel machine, comprising: a flat element (6) predisposed for supporting bottles; a rotating disc (30) which rotates coplanarly to the flat element (6) about a rotation axis (x) and supports, above the flat element (6), a plurality of

gripping devices (37, 38, 40), each of which is combined with a stop element (100, 101) at which a bottle abuts. A support element (57), solidly constrained to the flat element (6), supports the stop elements (100, 101) which are slidably constrained to the support element (57) along a radial direction to the rotation axis (x).



Description

[0001] The invention relates to a carousel machine for bottle sealing and labelling machines.

[0002] In particular, the invention relates to a carousel for a machine for final-packaging of bottles, in particular bottles such as champagne bottles, already filled and capped, which performs the operations of: positioning a capsule on the cap, closing the capsule, applying labels on the bottle, in particular on the neck about the capsule, and also labelling the bottle body (front label, back label and possibly a label exhibiting a points offer or a label bearing a bar code). The carousel rotates by steps and is provided with pliers which during the various displacements block the bottles. The labels are generally self-adhesive and the production of the machine is in the order of 1000 to 2000 bottles per hour.

[0003] Known-type machines comprise a carousel in which the bottles to be packaged are introduced, either by means of star-conveyors or directly from the conveyor belt. The carousel exhibits a certain number of housings or places which are predisposed to house a bottle. The number of the places depends on both the operations to be performed internally of the machine, and on the mode of introducing the bottles into the machine. In order to perform the above operations, the carousel moves in step-fashion.

[0004] Each place on the carousel is equipped with two or three rubberised vertical idle rollers, against which the bottles are placed. The reason the rollers are idle is that the operations of orienting the capsule and the subsequent labelling thereof are done by rotating the bottle on itself, pressing it against the rollers. The diameter of the circle tangential to the external surface of the rubberised rollers is equal to the bottle diameter. The angle identified by the axes of the two most external rollers is less than 180° by some tens of degrees in order to prevent the bottles fitting snugly between the rollers. The vertex of the angle identified by the rubberised rollers is substantially on the rotation axis of the carousel.

[0005] Carousels are known in which the rollers are mounted on the carriages, which can move radially among some fixed positions. This means that the carousel can correctly support only bottles of certain very precise diameters. Further, carousels of this type do not prevent the bottles from rotating about themselves, so that due to high rotating speeds (greater for example than 1000 bottles per hour) the bottles move, losing any previous positioning or centring priorly performed on them.

[0006] In order to prevent undesired displacements of the bottles, machines have been provided which have carousels formed by two discs on which external diameter semicircular housings are afforded, surrounded by rubberised idle rollers which receive the bottles. Carousels of this type are provided with a system of pliers which retain the bottle, preventing it from rotating during the various displacements. This solution exhibits the drawback of having high costs, as for each format of bottle to

be packaged, a complete equipping with pliers and rollers has to be mounted on the carousel. A further significant drawback is that with this solution conical bottles cannot be packaged.

[0007] The aim of the present invention is to provide a carousel for bottle capsuling and labelling machines which enables bottles of various diameters to be packaged, by using simple adjustment operations, without there being any need to substitute important and expensive parts of the carousel.

[0008] An advantage of the carousel of the present invention is that it enables a solid positioning of the bottles to be obtained, which bottles stay still during rotation of the carousel.

[0009] A further advantage of the carousel of the present invention is that it enables packaging of conical bottles.

[0010] Further characteristics and advantages of the invention will better emerge from the detailed description that follows, made with reference to the accompanying figures of the drawings, provided by way of non-limiting example, in which:

figure 1 is a perspective view of a packaging machine for bottles of sparkling wine equipping the carousel of the invention;

figure 2 is a perspective view of the carousel shown in figure 1;

figure 3 is an exploded view of figure 2;

figure 4 is a perspective view of a gripping device of the carousel;

figure 5 is an exploded view of the gripping device of figure 4;

figure 6 is a second perspective view of the gripping device of figure 4;

figure 7 is a perspective view of a detail of figure 6;

figure 8 is a vertical section of the carousel of figure 1;

figure 9 is a view from below of a component of the carousel of figure 1, in a preferred embodiment which is suitable for packaging conical bottles; figure 10 is a perspective view of the component of figure 9.

[0011] Figure 1 illustrates a packaging machine 1 for bottles during a paused stage. The bottles are positioned between rollers 100, which are fixed to support carriages 101 in the form of shaped plates, and arched guides 202.

[0012] A first bottle 206 is in an orientating first operating position, in which a photocell 200 detects a notch 201 in a capsule 207. The bottle is rotated about the vertical axis thereof on the basis of the position of the notch 201.

[0013] A second bottle 208 is in a second operating position, below a first capsule-applicator 203 which on descending performs a first bending operation of a capsule.

[0014] A third bottle 209 is in a third operating position, below a second capsule-applicator 204 which performs a final capsule-bending operation.

[0015] A fourth bottle 210 is in a fourth operating position, before a driven roller 205 which sets it in rotation for the labelling operation.

[0016] A conveyor belt 2 is located in the front part of the machine 1, which conveyor belt 2, via a batching Archimedes screw, brings the bottles to a star 4a which moves in steps in phase with a carousel 5. A second star 4b is located at the exit of the carousel 5, which second star 4b moves in step fashion in phase with the carousel 5. A shaped element 71 is located in an intermediate position between the two stars 4a, 4b, which shaped element 71 exhibits two arch-shaped concave portions, which face the two stars 4a, 4b such as to define two flanks for guiding the bottles.

[0017] The carousel 5 of the present invention comprises a preferably disc-shaped flat element 6, fixed to a plane 8 of the machine 1 by means of columns 7. The disc 6 is co-planar to the upper plane of the conveyor belt 2 (figures 2, 3, 4, 8).

[0018] In a central part thereof, the disc 6 exhibits a hole 9 having a diameter which is slightly larger than the diameter of a disc 10 fixed to a flange 11 which flange 11 is solidly constrained to an upper end 12 of a shaft 13. The shaft 13 rotates internally of a support 14 fixed to the plane 8 of the machine 1 by means of the flange 15.

[0019] A flange 16 is fixed at the other end of the shaft 13, to which a Maltese cross 18 is fastened, preferably by means of screws. A usual motor device, not shown in the figures, is coupled to the Maltese cross 18, which motor device rotates the Maltese cross by successive angular steps. A gearing 180 is located inferiorly of the Maltese cross 18 and is solid thereto. The gearing 180 is mechanically connected to the gearings, not shown in the figures, which cause the movement of the two stars 4a, 4b which supply the bottles in entry to and in exit from the machine.

[0020] A plane 20 is fixed by columns 19 to the disc 6, which plane bears a support 22 in which a shaft 23 is free to rotate. A cogged pulley 24 is fixed to the lower end of the shaft 23, on which a cogged belt 25 runs, moved by a pulley 26 fixed to the shaft of a step motor 27. The step motor 27 is fixed to the plane 6 by means of columns 28. A disc 21 is fixed to the upper part of the shaft 23, which disc 21 is concentric of a hole 29 a diameter of which is slightly larger than that of the disc 21. The upper surface of the disc 21 is covered with rubber, an external surface of which is knurled and coplanar to the upper surface of the disc 6.

[0021] A disc 30 is fixed to the flange 11, to which disc 30 a plurality of gripping devices for the bottles are associated. In particular, a plurality of first supports 32 and second supports 33 (figure 3) are fixed by means of screws 31 to the disc 30. The supports 32 and 33 are arranged in pairs and the number of pairs is equal to the number of places on the carousel. Internally of each support 32 and 33 there is a bearing 34 which respectively bears a first shaft 35 and a second shaft 36. Clamps 37 are arranged at the upper end of the shafts 35 and 36,

to which two pliers 38 are fixed. At an end thereof 39 the pliers 38 are bent and are associated to an insert 40, preferably made of rubber, destined to enter into contact with a bottle. The pliers 38 are shaped and sized such that the inserts 40 enter into contact with portions of the surface of the bottle which are more external of the median plane of the bottle with respect to the rotation axis of the carousel 5, such that the bottles cannot displace away from the rotation axis of the bottle. A first cogged sector 41 is associated to a lower end of the first shaft 35, which couples with a second cogged sector 42 fixed to a lower end of the second shaft 36.

[0022] A lever 43 is fixed to the lower end of the shaft 36 below the second cogged sector 42 (figures 4, 6, 7). A first bearing 44 is associated to the free end of the lever 43, which first bearing 44 faces downwards. The first bearing 44 laterally abuts internally of a cam 45. At least a bearing 46, in which the shaft 13 rotates, is concentric and solidly constrained to the cam 45 (figure 8). The shaft 13 preferably rotates internally of two bearings 46. The lower bearing 46 rests on a bearing 47 located at the upper end of a support 14 in which the shaft 13 rotates.

[0023] A pivot 50 projects below the cam 45 (figures 2, 8). A jointed head 48 is articulated to the pivot 50, which head 48 is located at the end of a stem 51 of a double-acting piston cylinder 49 (substantially the same as two cylinders located in series) which in turn is fixed to the late 20 by means of a pivot 53.

[0024] The cam 45 has a profile which is essentially constituted by two portions of circular crowns, having different diameters, which extend concentrically to the rotation axis x by an angle which is about 180° each and which are connected to one another by means of two ramps arranged in diametrically opposite positions with respect to the rotation axis x. When the bearing 44 of the lever 43 is on the part of the cam having the smallest mean diameter the pliers 38 are open, and which it is in the part of the cam having highest mean diameter the pliers 38 are closed. The length of the tract of cam having the largest diameter is such that the pliers are closed for a tract of the rotation of the carousel which is comprised between some degrees after the position of the first bottle 206 and some degrees before the position in which the fourth bottle 210 is located.

[0025] The places in the carousel are arranged such that when a bottle is in the first operating position (the position of the bottle 206 in figure 1), a second and a third bottle are respectively in the second and the third operating place in which the two capsuling devices 203, 204 (bottles 208 and 209 in figure 1) and a fourth bottle is in the fourth operating station, for application of the label or labels (bottles 210 in figure 1). When the bottles are in a similar position to the one indicated in figure 1, the carousel stops to enable the operations in the various places to be performed. In particular, the bottles which are in the first and fourth operating station must be able to rotate about their axes, the first to orientate correctly, the second for receiving the prime label and/or other labels. The

bottles which are in the second and third operating place must, on the other hand, be blocked. The rotations of the cam 45 about the rotation axis x performed by the piston cylinder 49 are synchronised to the rotation of the carousel such as to respect the above-described conditions.

[0026] In detail, when the carousel brings a first bottle 206 into the first operating position, the pliers 38 acting on the bottle are completely open while the pliers 38 acting on the bottle in the second, third and fourth position are closed.

[0027] On stopping the carousel, the bearing 44 of the lever 43 associated to the pliers 38 acting on the first bottle 206 is at the end of the smallest-diameter tract of the cam 45 (with a consequent open configuration of the associated pliers 38); the like bearing 44 relating to the fourth bottle 210 is instead in a diametrically opposite position at the end of the largest-diameter tract of the cam 45 and the corresponding pliers 28 are closed.

[0028] After stopping the carousel the piston cylinder 49 performs a first run, causing the cam 45 to rotate by an angle such that the bearing 44 associated to the pliers 38 which act on the bottle in the first operating place arrives at an intermediate point of a first connecting ramp of the cam 45; at the same time the bearing 44 associated to the pliers 38 which are active on the bottle in the fourth operating position locates at an intermediate point of the second connecting ramp of the cam 45. This causes a positioning of the pliers 38 acting on the first bottle 206 in a partially-closed configuration. In this configuration the pliers 38 are closer to the body of the bottle, at a distance such as to keep the bottle in the operating position in any case enabling the bottle to rotate about the axis thereof. The bottle is therefore free to rotate on itself in order to be orientated correctly. At the same time the pliers 38 acting on the fourth bottle 210 are brought into a similar configuration of partial opening, so that the fourth bottle too can rotate on itself in order to correctly receive a label. When a bottle arrives in the first operating position, i.e. in the position of the first bottle 206 in figure 1, it is blocked by a vertically-mobile idle buffer 54, located at an end of the rod of a piston cylinder 55. The bottle is thus set in rotation by the disc 21, activated in rotation by the motor 27, in order to be orientated in a predetermined way.

[0029] At the end of the two orientation and labelling operations, which occur at practically the same time, before the carousel begins moving the piston cylinder 49 performs a second tract of run which causes a second rotation of the cam 45 (again in an anticlockwise direction in the illustrated embodiment), bringing the pliers 38 acting on the first bottle 206 to complete closure and the pliers 38 acting on the fourth bottle 210 to complete opening in order to enable removal of the fourth bottle 210 from the carousel. The pliers 38 operating on the second and third bottle 208, 209 remain closed.

[0030] Only when the carousel has restarted (in the clockwise direction in the illustrated embodiment) and has performed a rotation equal to the angular extension

of the first connecting ramp, will the piston cylinder 49 return into the initial rest position, causing the cam 45 to rotate in the direction of the carousel. If this succession is not respected, the pliers 38 acting on the first bottle 206 will be open during the movement of the carousel, thus not performing their primary function of constraining the bottle in rotation during the movement thereof.

[0031] The double run of the piston cylinder 49 enables a first tract of closing and opening movement of the pliers 38 which are acting on the first and the fourth bottle 206, 210 during the brief intervals of time in which the carousel slows down and stops, in any case keeping the bottles still, in particular against displacements in a centrifugal and tangential direction to the rotation of the carousel.

[0032] In order to adjust the pliers 38 to the various diameters of the bottles, inserts 40 of various lengths are included. The elasticity of the material of the pliers 38 contributes to compensating any variations in the diameter of the bottle.

[0033] A further device which enables the carousel to be adapted to bottles of different diameters will now be described (in particular see figure 5).

[0034] Some columns 56 are fixed to the disc 10, preferably three, to which upper end a support element is fixed 57, in the form of a shaped disc, by means of screws 58. The disc 57 exhibits four holes 60 for each carriage. Pins are engaged in the holes 60, which pins project downwards with respect to the disc 57.

[0035] The carriage 101 exhibits, in the front part thereof, two vertical pivots 68, fixed by means of screws 70, which bear the rubberised idle rollers 100 (figure 5). In the lower part the rollers 100 are supported by stops 69 screwed to the ends of the pivots 68. If the bottles to be packaged are cylindrical, the pivots 68 are arranged vertically. If the bottles to be packaged are conical, two flat portions 71 and 72 of the carriage, on which the pivots 68 rest, are inclined to one another by an angle α and an angle β with respect to the upper horizontal plane, such that the axes of the pivots 68 are inclined by an angle γ and the external generatrices of the roller 100 are tangential of the generatrices of the conical part of the bottle (figures 9 and 10).

[0036] The carriage 101 exhibits two parallel slots 63 in which the pins 59 house (figure 5). The lengths of the parallel slots 63 is such as to enable the carriage 101 to perform a predetermined run, in particular greater than 30 mm. The carriage 101 exhibits at its halfway point a threaded hole 62 in which the screw 61 engages. The screw 61 slides in a slot 64, afforded on the disc 57, the length and position of which are such as to enable the carriage 101 to perform the whole run thereof. The pins 59 are aligned along two rows parallel to the slot 64, such that the carriage 101 can slide in a radial direction, keeping its orientation. The radial position of each carriage 101 can thus be regulated continuously within a determined run. The movement and the shaping of the pliers 58 are such as to guarantee the grip of the bottle in any radial position of the carriage 101.

[0037] The adaptation of the machine to a determined bottle involves installing an Archimedes screw 3, a shaped element 71, arched guides 202 and inserts 40 of a shape and size which are suitable for interaction with the bottle to be packaged. For each diameter of the bottle to be packaged there is an adjustment disc 65 which serves to perfectly regulate the position of the carriages. The adjusting of the position of the carriages is done very simply in the following way.

[0038] Initially it is preferable to loosen the screws 61 which block the carriages 101 such as to be able to move the carriages 101 completely towards the outside. Then the regulating disc 65 can be rested on the disc 57 after having inserted the heads of the screws 61 internally of the holes 66 afforded through the regulating disc 65. At this point the carriages 101 can be displaced internalwise up until the heads of the screws 61 are brought into contact with the external surface 67 of the regulating disc 65, and in this position they block the carriage by means of the screws 61. With the carriages in this position the axes of the bottles, the axes of the cylinder 54 and the capsuling devices 203 and 204 intersect the primitive circumference of the gearing 180.

Claims

1. A bottle cap sealing and labelling carousel machine, comprising: a flat element (6) predisposed for supporting bottles; a rotating disc (30) which rotates coplanarly to the flat element (6) about a rotation axis (x) and supports, above the flat element (6), a plurality of gripping devices (37, 38, 40), each of which is combined with a stop element (100, 101) at which a bottle abuts; **characterised in that** it comprises a support element (57), solidly constrained to the flat element (6), which supports the stop elements (100, 101) which are slidably constrained to the support element (57) along a radial direction to the rotation axis (x).
2. The carousel machine of claim 1, wherein each stop element (100, 101) comprises a shaped plate or carriage (101) to which at least two idle rollers (100) are constrained, predisposed to be positioned in contact with a lateral surface of a bottle, the shaped plate or carriage (101) being constrained to the support element (57) by means of at least a fastening screw (61) arranged crossing a slot (64) afforded through the support element (57,) which slot (64) is oriented radially of the rotation axis (x).
3. The carousel of claim 2, wherein each shaped plate or carriage (101) is provided with two parallel slots (63) in which pins (59) can be housed, which pins project inferiorly from the support element (57) and are aligned parallel to the slot (64) of the support element (57) in which the fastening screw (61) is engaged.
4. The carousel of at least one of the preceding claims, comprising an adjustment disc (65) which is removably associable to the support element (57) in a concentric position to the rotation axis (x), the adjustment disc (65) being provided with an external surface (67) against which the heads of the fastening screws (61) can abut such that the shaped plates or carriages (101) assume a predetermined radial position with respect to the rotation axis (x).
5. The carousel of claim 4, comprising a plurality of adjustment discs (65) which can selectively be associated to the support element (57) such that the shaped plates or carriages (101) can be arranged in various predetermined radial positions with respect to the rotation axis (x) according to the diameter of the bottles to be packaged.
6. The carousel of at least one of the preceding claims, wherein the gripping devices (37, 38, 40) each comprise a pair of pliers (38), which are mobile between at least closed position thereof, in which the pliers (38) can exert a gripping action on a bottle, and at least an open position thereof.
7. The carousel of claim 6, wherein the pairs of pliers (38) are mobile by action of an actuator device (45, 49) which comprises a double-acting piston cylinder (49) mechanically connected to a cam (45) which is concentric of the rotation axis (x) such as to activate the cam to rotate about the rotation axis (x), the cam (45) having a profile shape essentially constituted by two portions of circular crown having different diameters, which each extend concentrically to the rotation axis (x) to an angle of about 180°, and which are reciprocally connected by means of two ramps arranged in diametrically opposite positions with respect to the rotation axis (x).
8. The carousel of claim 7, wherein the piston cylinder (49), starting from an initial retracted position, is predisposed to perform a first tract of an extension run, in which it rotates the cam (45) into a first position, in which the pliers (38) acting on a first bottle (206) in the open position thereof are partially closed, thus moving into a partially closed configuration thereof in which the pliers (38) do not prevent rotation of the bottle about the axis thereof, and the pliers (38) acting on a fourth bottle (210) in the closed position thereof partially open in order to move into a partially closed configuration in which also the fourth bottle can rotate about the axis thereof.
9. The carousel of claim 8, wherein the piston cylinder (49), following the first tract of run, is predisposed to perform a second tract of run which rotates the cam

(45) into a second position in which the pliers (38) acting on the first bottle (206) are brought into the closed position thereof and the pliers (38) acting on the fourth bottle (210) are brought into the open position thereof in order to enable removal of the fourth bottle (210) from the carousel. 5

10. The carousel of claims 8 or 9, wherein in the first position of the cam (45), a bearing (44), associated to the pliers (38) which act on the bottle (206) in the first operating position, is at an intermediate point of a first connecting ramp of the cam (45), and a bearing (44), associated to the pliers (38) which act on the bottle (210) in the fourth operating position, is at an intermediate point of a second connecting ramp of the cam (45). 10 15

11. The carousel of at least one of claims from 6 to 10, wherein two inserts (40) are arranged at an end of the pliers (38), which inserts (40) are removable and interchangeable with other inserts (40) of different sizes and shapes, predisposed to adapt to the diameter and the shape of the bottles to be packaged. 20 25

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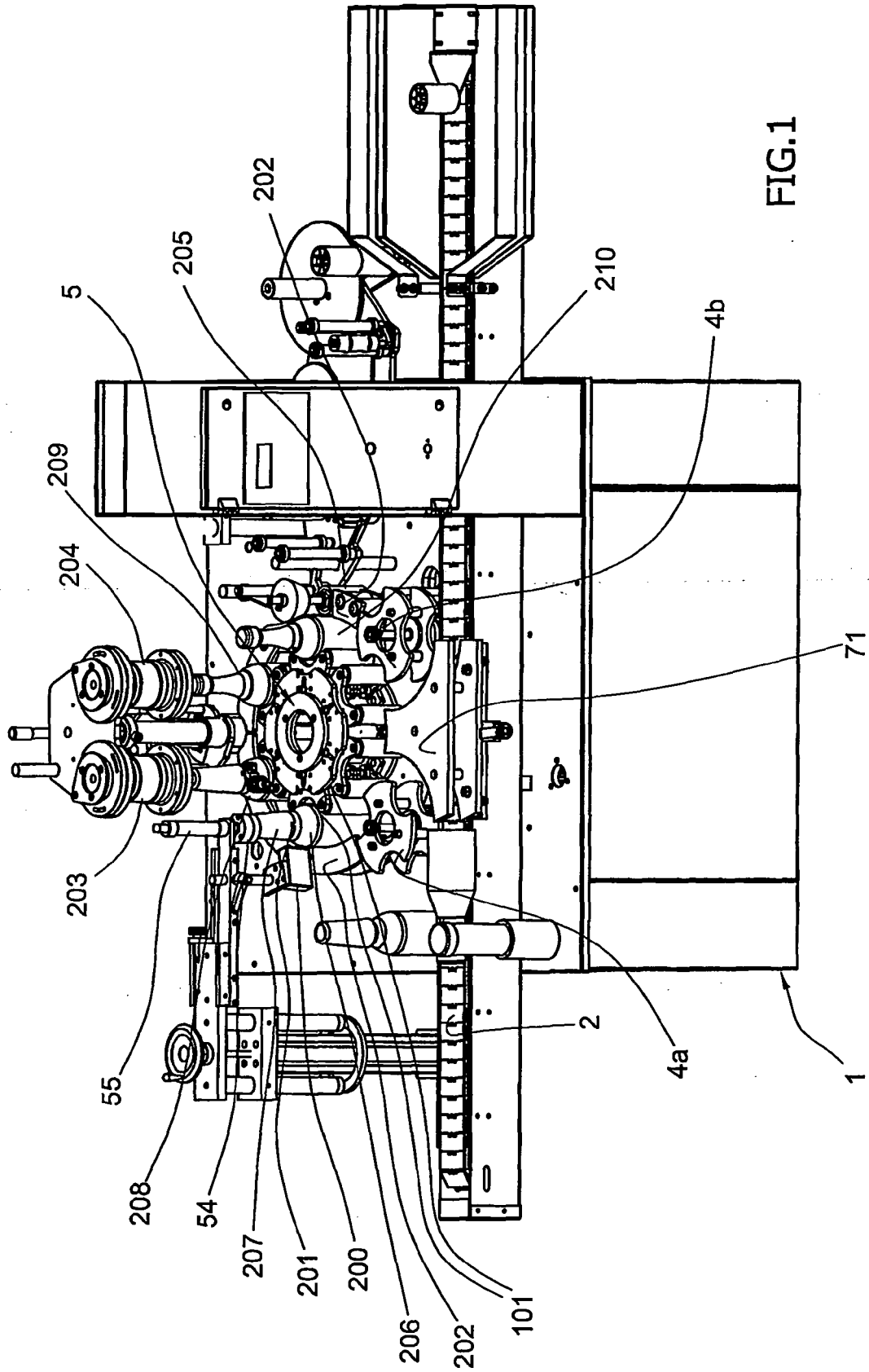


FIG.1

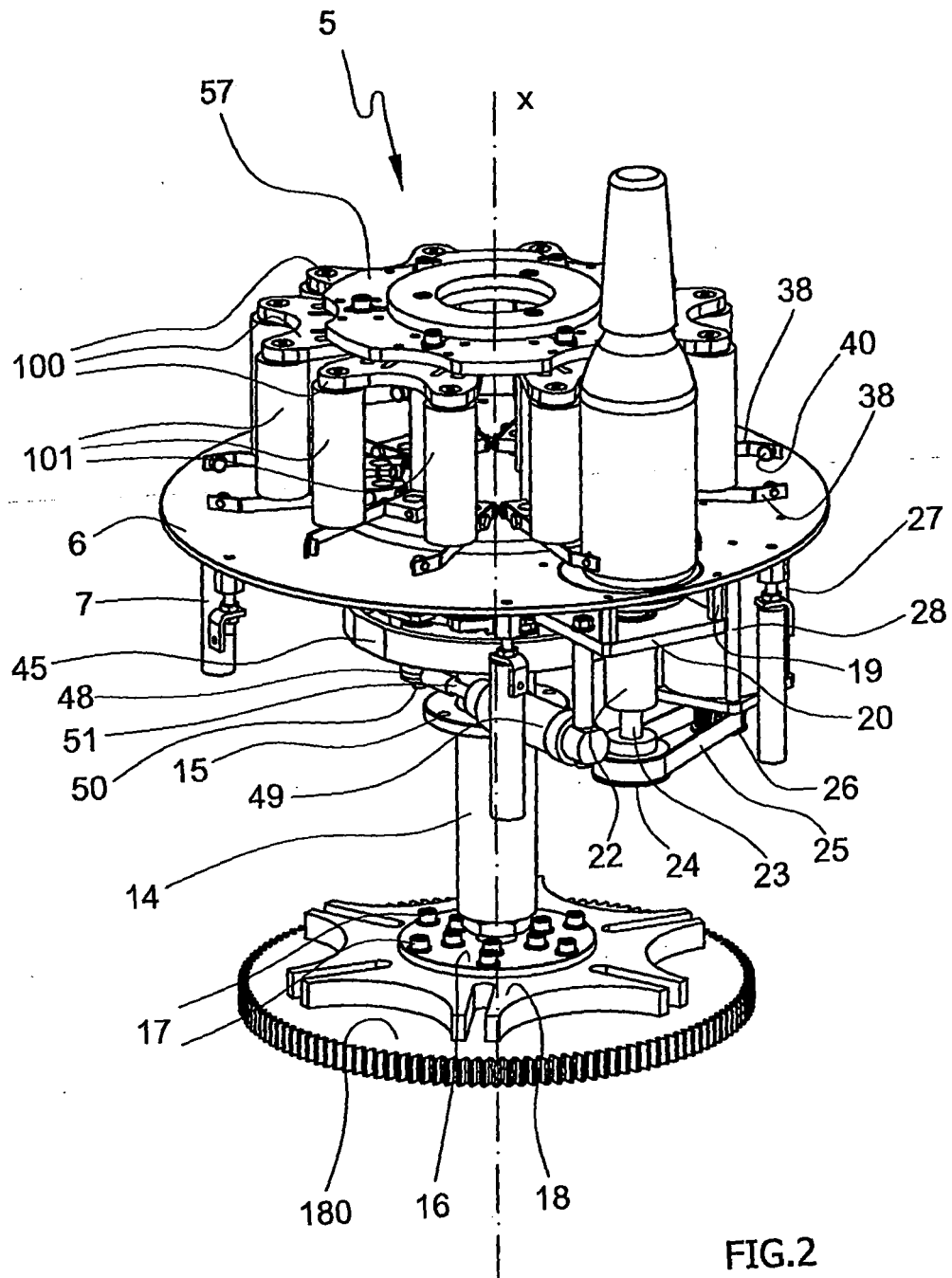


FIG.2

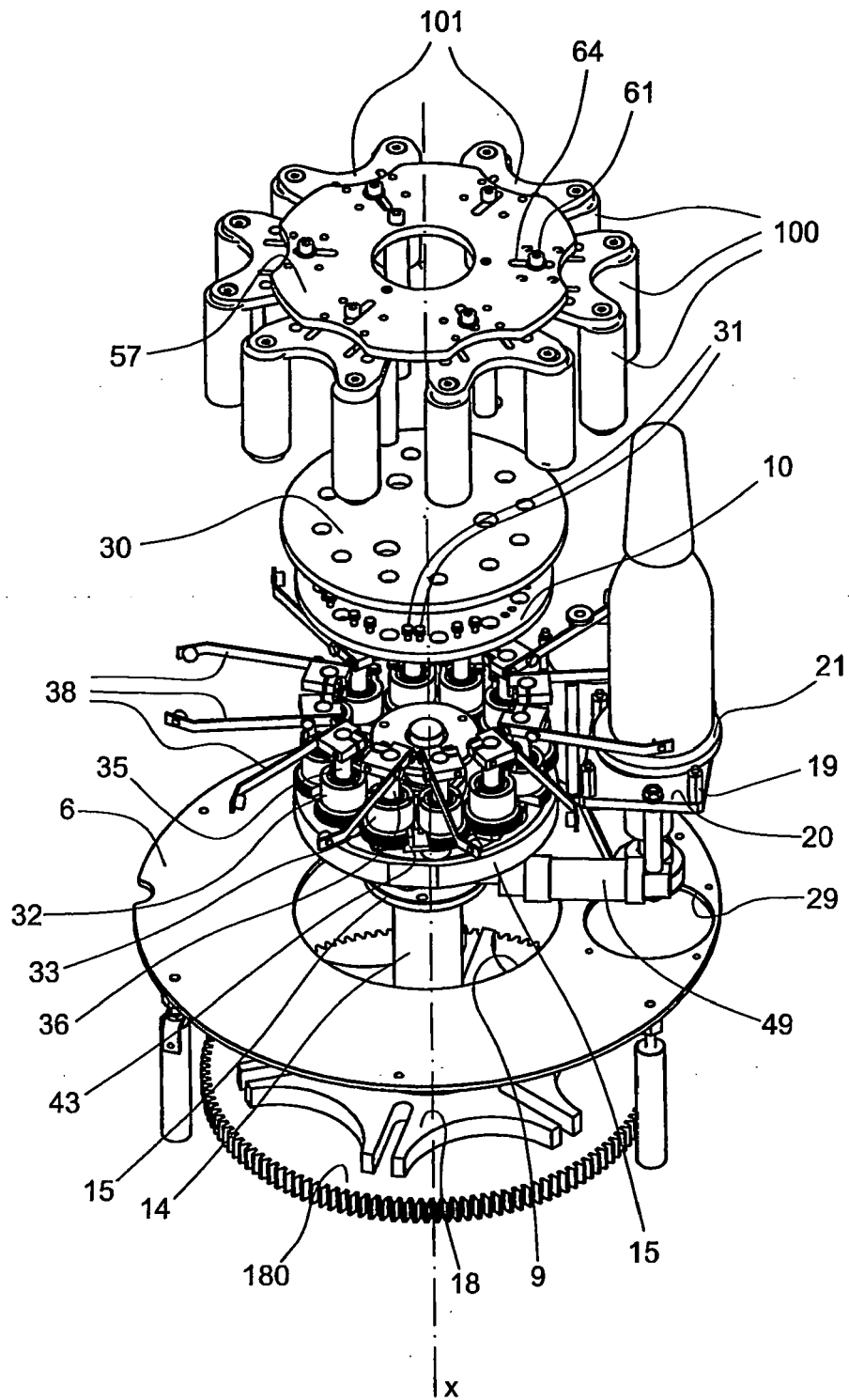


FIG.3

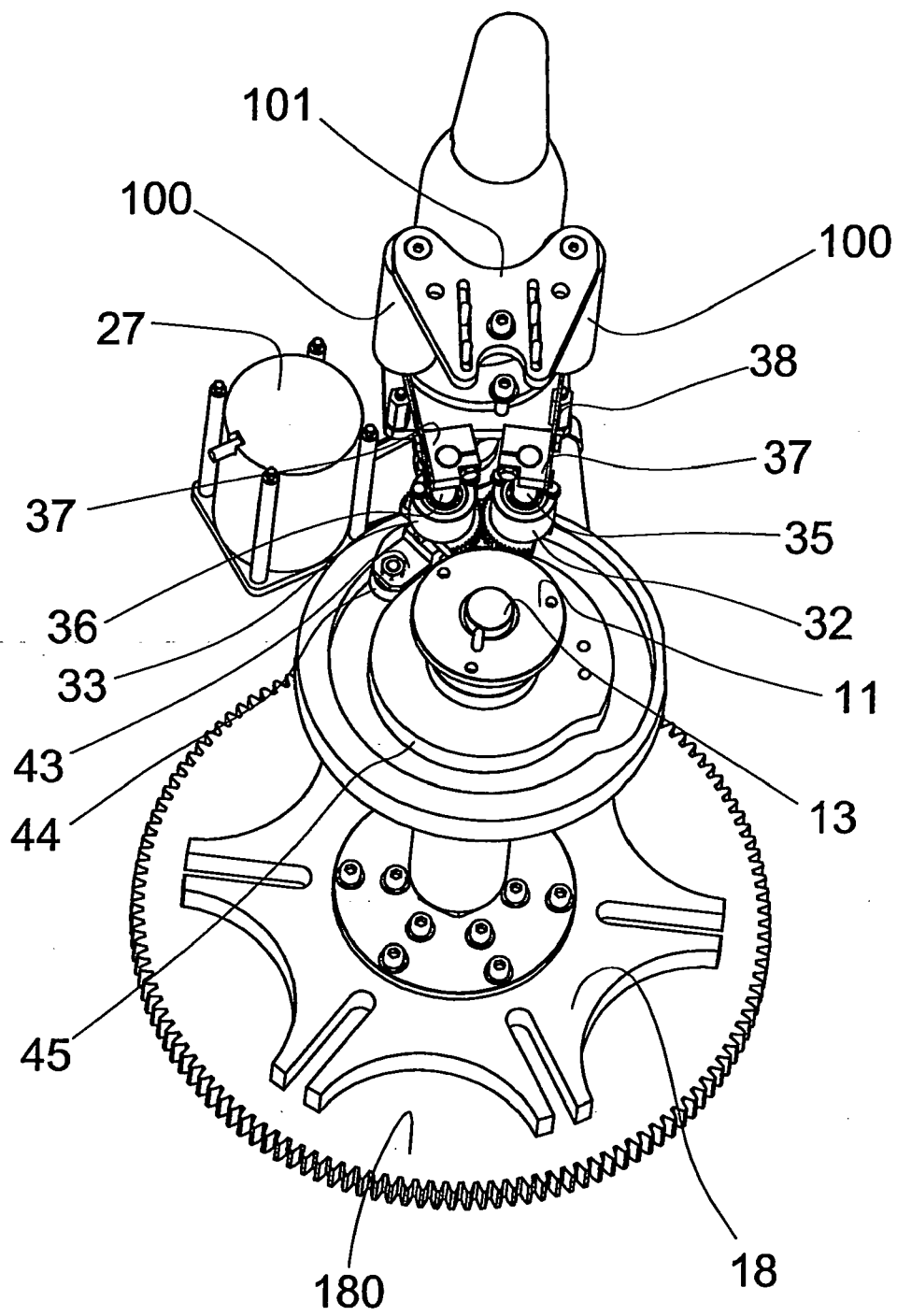


Fig.4

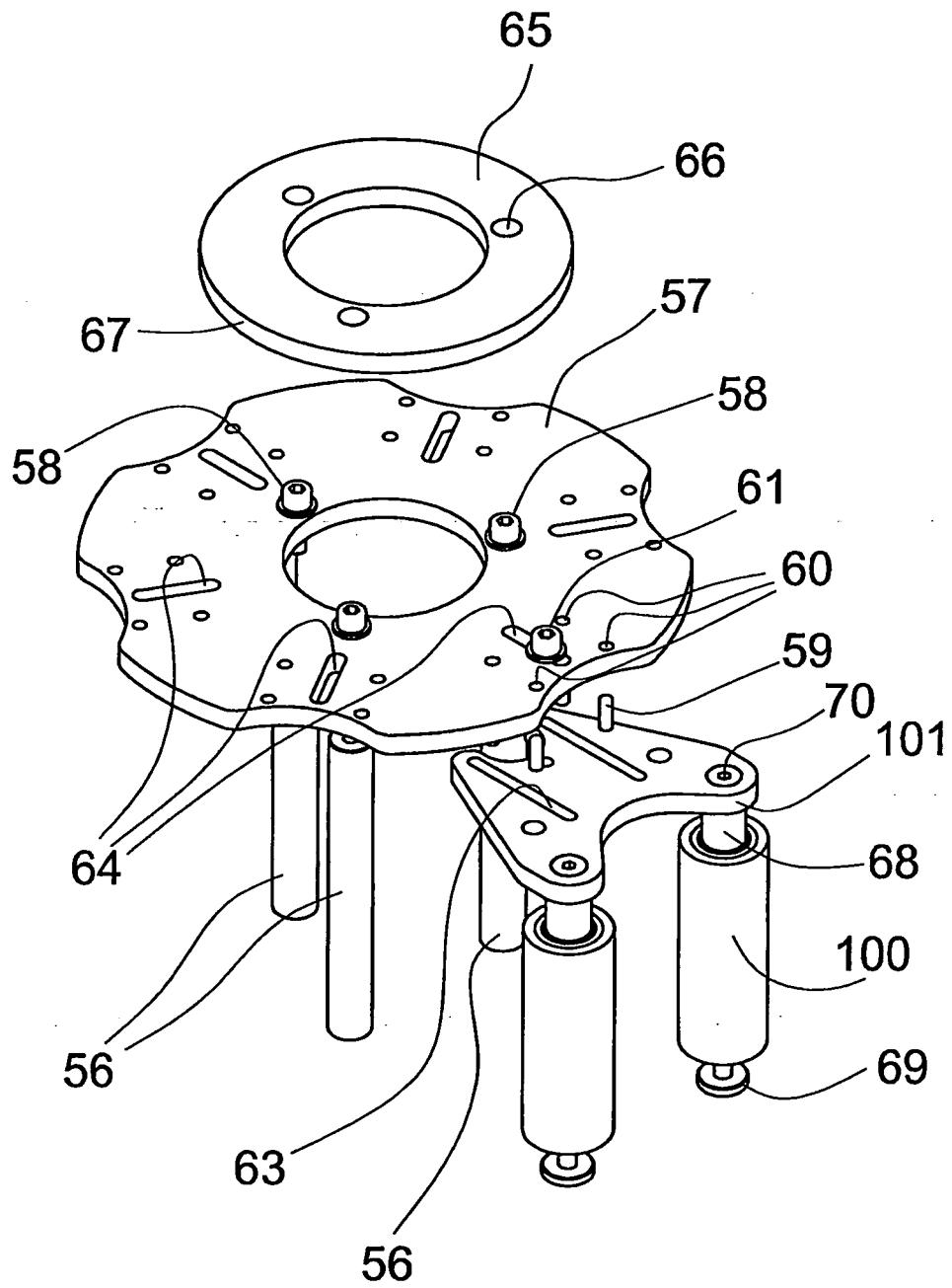


Fig.5

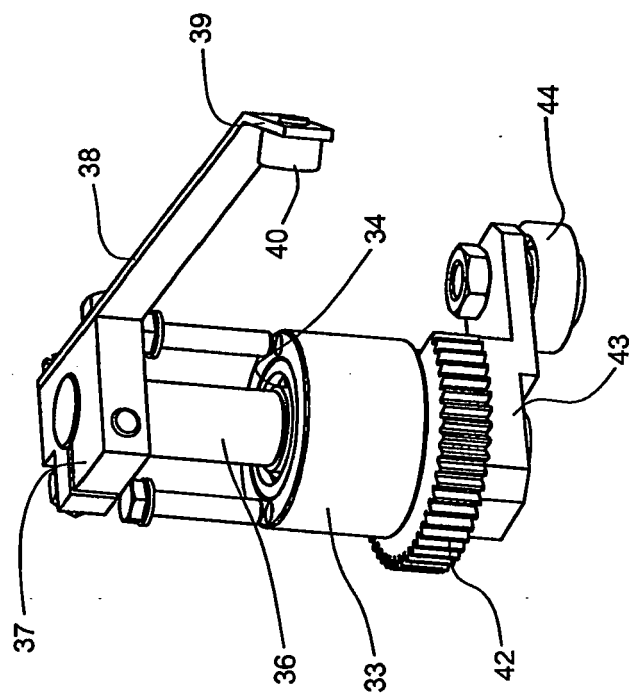


FIG. 6

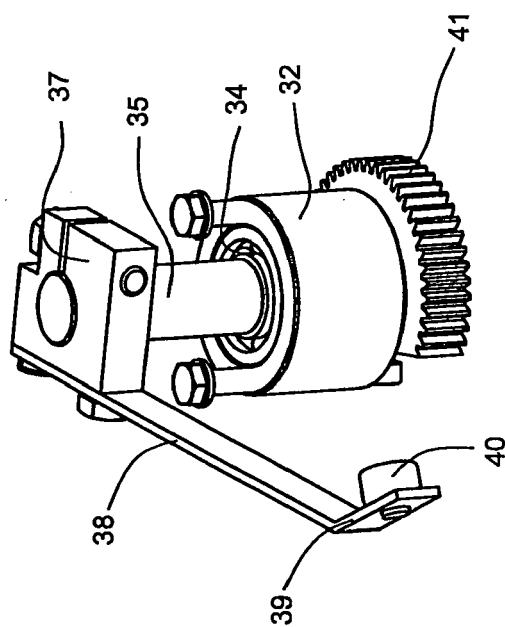


FIG. 7

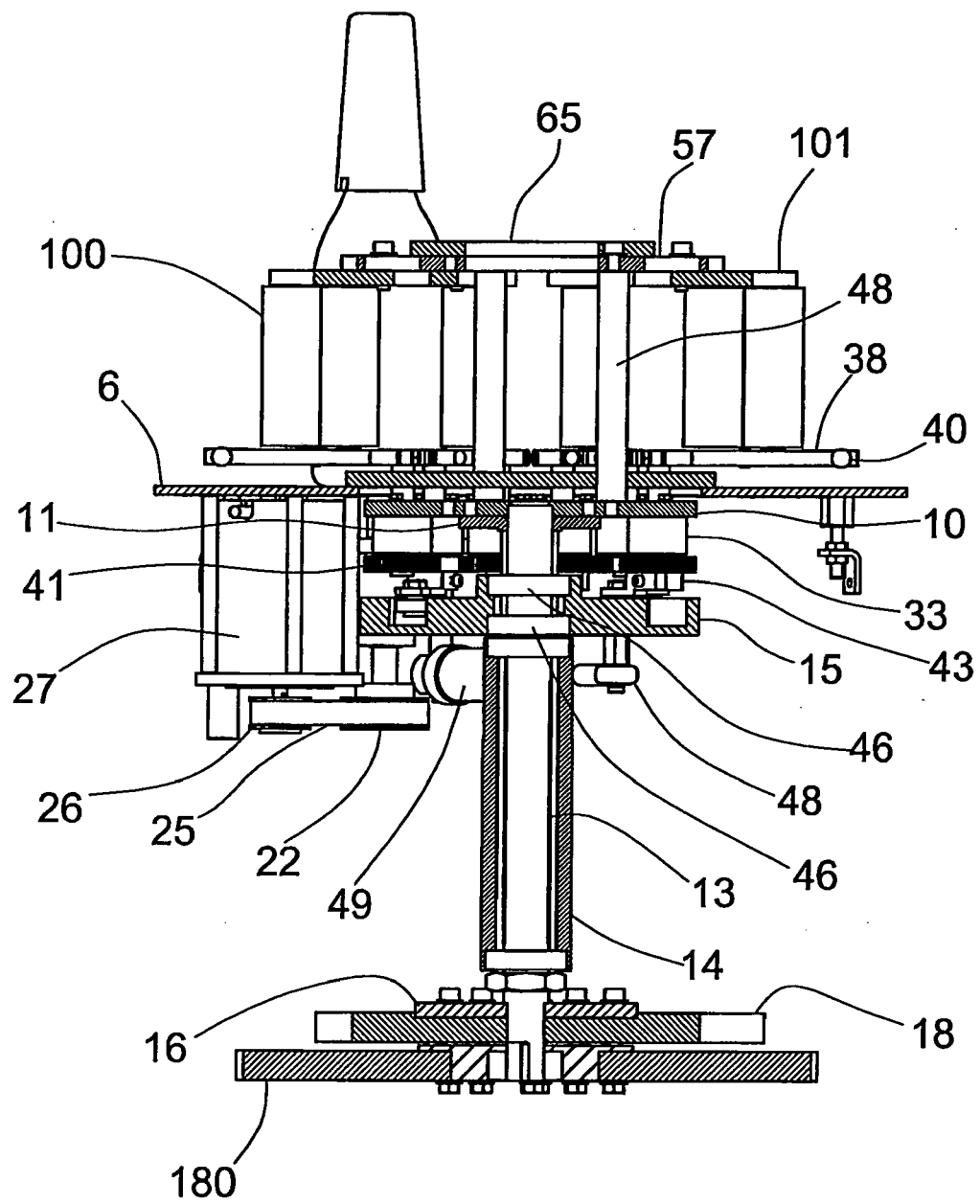


Fig.8

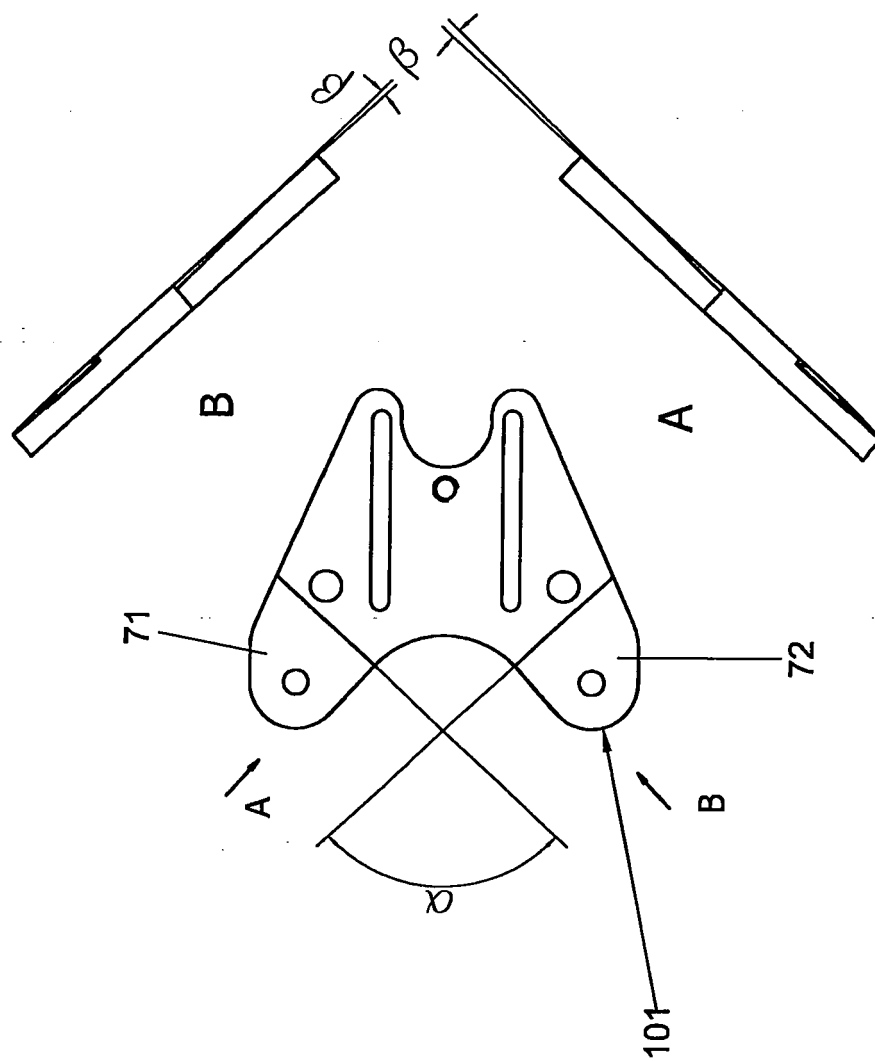


FIG. 9

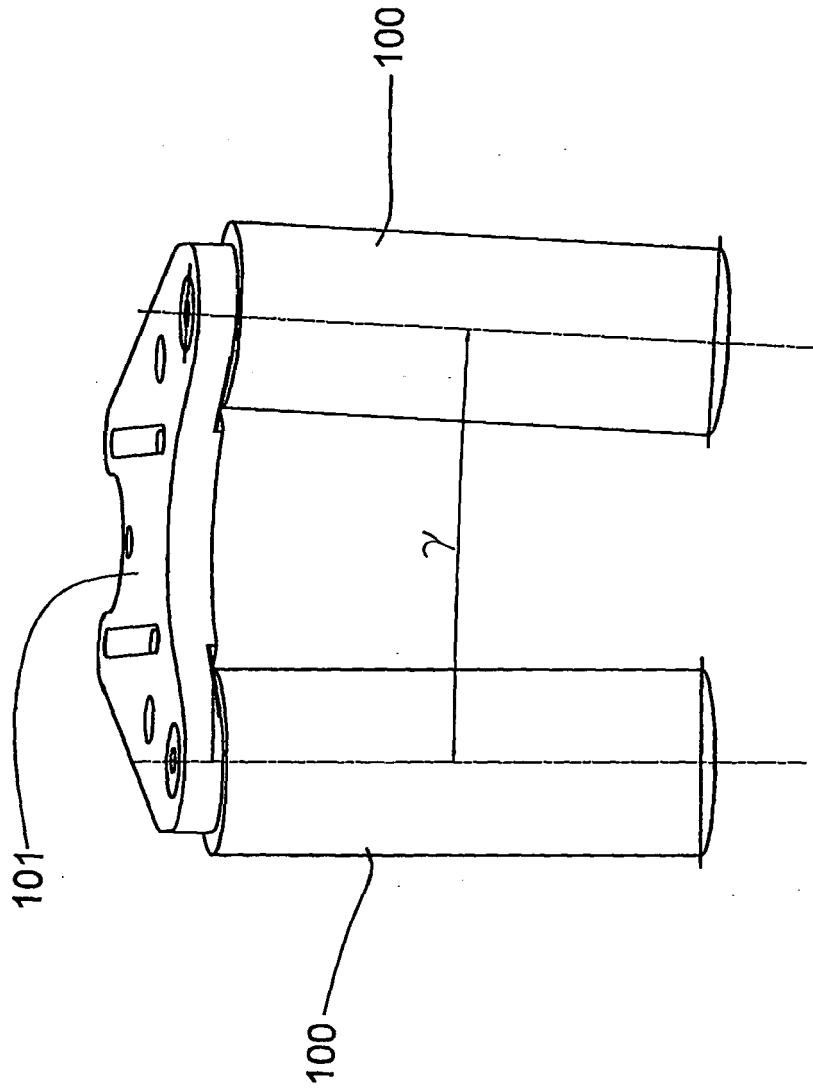


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 08 07 5851

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 14 82 616 A1 (DATZ HERMANN DR) 9 January 1969 (1969-01-09) * pages 6,8; figures 1,2 *	1,6	INV. B65C9/04 B67C3/24
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			TECHNICAL FIELDS SEARCHED (IPC)
			B65C B67C B67B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 February 2009	Examiner Martínez Navarro, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 07 5851

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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02-02-2009

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