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54 **Method and machine for filling containers with liquid products.**

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73 Proprietor: **Marchesini, Maurizio**
Via Giardino, 4/4
I-40065 Pianoro (Bologna) (IT)

72 Inventor: **Marchesini, Maurizio**
Via Giardino, 4/4
I-40065 Pianoro (Bologna) (IT)

74 Representative: **Dall'Olio, Giancarlo**
INVENTION s.n.c.
Via del Cestello, 13
I-40124 Bologna (IT)

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Description

The present invention relates to a method according to the preamble of claim 1 and to a machine according to the preamble of claim 2 for filling containers.

A variety of automatic machines are known which fill containers such as bottles or vials with liquids. These machines usually have carousels or starwheels which rotate about a vertical axis and which are designed to receive the bottles to be filled in orderly fashion from a feed line. The carousel mounts means for dispensing the liquid product which work in synchrony with the bottle handling means in such a way that the bottles are lined up with the corresponding nozzles of the dispensing units. The filled bottles are then transferred to an outfeed line.

The bottles are placed on supports arranged around the carousel and are lifted by the aforesaid handling means so that the corresponding filling nozzles are inserted into the bottle mouths. After being filled, the bottles are lowered again.

In other known machines, the bottles are rotated by the carousel without being lifted and the liquid dispensing units alternate with the carousel so as to insert the filling nozzles into the bottle mouths.

The liquid dispensing units consist of a plurality of cylinder and plunger assemblies, each related to a liquid feed tube. The liquid feed tubes are connected to the liquid tank through a set of valves mounted on the outermost edge of the carousel.

In the aforesaid machines the liquid dispensing units and the means which move the bottles relative to the filling nozzles must operate in perfect synchrony.

In traditional machines drive is achieved through complicated mechanisms which hinder machine efficiency, usually because the diverse operations making up the filling cycle are difficult to synchronize exactly.

In addition, the known machines require a large number of separate liquid filling means which encumber the carousel and make it difficult to carry out the necessary maintenance operations.

From the US-A-4 108 221 there is known a container filling machine in accordance with the preamble of claim 2 that comprises a plurality of filling stations each including a container support platform. The platform is raised and lowered by a cam controlled mechanism.

A controlled pumping mechanism operates a piston pump for drawing fluid into the pump, in a charge cycle, and then out of the pump in a discharge cycle, while an adjustable crank lever mechanism is included in the pumping mechanism

for providing adjustment of the volume of fluid being pumped.

A pair of cams operate with the filling station for operating the valves of each station and in combination with each pumping mechanism for continuously filling a container during the discharge cycle for each station.

The profile of the track for the cam controlling the pumping mechanism can be changed to program the exit velocity of the fluid in accordance with the viscosity of the fluid.

The object of the invention is to provide a method to synchronize the various different stages of a liquid filling cycle in a completely novel manner.

Another object of the invention is to provide a machine for filling bottles with liquid products according to a simple, reliable technique with mechanisms that occupy the minimum of space and that can be applied to a wide range of bottle sizes.

These objects are achieved in accordance with the claims below.

The characteristics of the invention are highlighted in the following detailed description, with reference to the accompanying drawings, where:

- Figure 1 is a schematic plan view of the container filling machine;
- Figures 2a and 2b are cross sections along line II-II of Fig.1, showing the upper and lower sections of the aforesaid carousel, respectively;
- Figure 3 is a plan view, with enlarged details, of the aforesaid grippers;
- Figure 4 is a vertical, cross sectional view of one of the filling valves of the machine;
- Figure 5 is a schematic plan view of the machine showing the different stages in the operation of the aforesaid filling valve;
- Figures 6a, 6b, 6c and 6d are partial cross sectional views of the machine during successive stages of operation;
- Figure 7 is a cross section of the lower portion of the aforesaid carousel when the latter is set for filling bottles of the largest size.
- Figures 8a and 8b are cross sections of the lower and upper portions of the aforesaid carousel, respectively, during cleaning of the aforesaid dispensing units.

With reference to the drawings just listed, the machine for filling bottles 1 with a liquid product has means 2 for feeding the said bottles to a carousel 3 which rotates about a vertical axis in the direction indicated by arrow A.

Feed means 2 consist of a bottle 1 conveying line 4 along which there is an auger 5 which rotates axially in such a manner as to space the conveyed bottles 1 apart. Auger 5 is designed to operate in

conjunction with a distributor 6, shaped like a star, for example, which rotates in the direction of arrow B.

The bottles to be fed are held and guided by recesses 6a in distributor 6 and by ring guide 7 which partially surrounds the distributor itself.

Carousel 3 receives bottles 1 fed by distributor 6 one by one at the point where the equally spaced grippers 8, mounted on the circumference of the carousel itself, are activated. Carousel 3 also mounts dispensing units, labelled 9 in the drawings, which fill the liquid product into bottles 1.

Downstream of carousel 3 there is a full bottle outfeed system 10 consisting of a conveyor line 11 and another distributor 12, shaped like a star, for example, which rotates in the direction of arrow C.

The outgoing bottles are received by distributor 12 at the point where they are released by grippers 8 and are held and guided by recesses 12a in the distributor and by a ring guide 13 which partially surrounds the distributor.

Dispensing units 9 consist of a plurality of cylinder and plunger assemblies mounted by carousel 3 which lines them up with grippers 8. Each of the said cylinder and plunger assemblies 14 is connected through a valve 15 to a liquid feed chamber 16 and to a filling nozzle 17 alternately. Chamber 16 is mounted on a platform 18 attached to the rotating part of carousel 3.

Platform 18 is secured to the top of a vertical shaft 19, rotated continuously by the drive motor of the machine through transmission means 20 located at the bottom of the said shaft where the lower face 21 of the carousel frame is situated. Shaft 19 is set inside a tubular casing 22 which rotates with it.

At the top, casing 22 is covered by a cylindrical sleeve 18a formed under platform 18. The base of sleeve 18a is surrounded by a trap 23 which collects the washing liquid of cylinder and plunger assemblies 14 to which it is connected via tubes 23a.

Between shaft 19 and casing 22 and coaxial to them there is a tubular element 24, with appropriate rotational means, about which shaft 19 and casing 22 rotate. The bottom end of tubular element 24 is attached to a plate 25 supported by columns 26 which pass through plate 21 and are fixed to plate 27. Plate 21 is adjustably mounted for height in relation to plate 27 according to the size of the bottles to be filled.

Grippers 8 and cylinder and plunger assemblies 14 are driven synchronously by drive means 28 which form a set of vertical columns arranged around the circumference of carousel 3. Each of the said drive means consists of a first sleeve 29 the top of which mounts casing 30 of grippers 8 and which is axially crossed by a stem 31. The first

sleeve 29 is in turn located inside a second sleeve 32 at the top of which there is a crosswise fitting 32a attached to stem 33a of plunger 33 of cylinder and plunger assembly 14.

Second sleeve 32 is guided by a bushing 34 mounted on the circumference of a plate 35 attached to tubular casing 22.

First sleeve 29, on the other hand, mounts on its bottom end a roller 36 which rotates about a radial axis in relation to the carousel, the said roller engaging a cam 37 made on a cylindrical wall 38 mounted on lower plate 21 and concentric with the axis of the carousel.

The bottom end of stem 31 mounts a lever 39 with a roller 40 that rotates about a vertical axis. Roller 40 engages a ring cam 41 formed on lower plate 21, as shown in Fig.3.

As shown by enlarged details P and R in the said Fig. 3, grippers 8 consist of a pair of jaws 8a and 8b which rotate on casing 30 by means of pins 42a and 42b respectively. Jaws 8a and 8b are attached to toothed gears 43a and 43b which mesh with each other. Pin 42a has inserted in it a fork 44 which engages a pin 45 vertically attached to stem 31. The rotation of stem 31 through a defined angle, by action of cam 41, thus determines the rotation of the gear pair formed by toothed gears 43a and 43b in such a way as to cause jaws 8a and 8b to move symmetrically from the gripping position P to the release position R and vice versa.

The bottom end of the aforesaid second sleeve 32 mounts a roller 46 which rotates diametrically in relation to the carousel. Roller 46 runs in a groove 47 defined by a ring 48 around tubular casing 22. One side of ring 48 is hinged at the bottom to a pivot 49 whose axis is horizontally tangent to a circle concentric with the axis of the carousel. Pivot 49 is mounted on a support 50 fixed to a ring shaped disc supported horizontally by columns 52 standing on lower plate 21. On the side diametrically opposite pivot 49, ring 48 is pivotally attached to stem 53a of an actuator 53. The said actuator is supported in vertical position by disc 51.

Chamber 16, concentric with the axis of carousel 3, is fed through a tube 54 connected to a tank outside the machine. Tube 54 is located above chamber 16, diametrically with respect to carousel 3, and is supported by a frame 55 attached to the fixed structure of carousel 3. Tube 54 is connected to a mouthpiece 56 leading out of chamber 16 in accordance with the axis of rotation of the carousel.

As shown in detail in Fig.4, valve 15 consists of a lower casing 57 fixed to carousel platform 18 and an upper casing 58 which rotates on a pin 59 about the vertical axis of valve 15 itself and in relation to lower casing 57. Upper casing 58 has a cap 60 held by pin 59 and pushed axially by a spring 61

which presses down on casing 58.

Lower casing 57 is crossed by a pair of parallel, vertical holes 62 and 63, which, at their bottom ends, are connected with a pair of ducts, respectively 64 and 65, made in platform 18. Duct 64 leads out of chamber 16, whilst duct 65 is connected to dispensing nozzle 17.

Platform 18 is also crossed by a vertical hole 66, whose bottom end is connected to cylinder and plunger assembly 14 and whose top end extends into lower casing 57 of the valve. The axes of holes 62, 63 and 66 are distributed around a circle concentric with the axis of rotation of upper valve casing 58.

Upper, rotating casing 58, on the other hand, is crossed by an approximately semicircular channel 67 in a horizontal plane. At each end and in the middle of channel 67 there are downward opening holes 67a, 67b and 67c which serve to connect hole 66 to ducts 64 and 65 alternately, in accordance with the angular position assumed by rotating valve casing 58.

Cap 60 of rotating casing 58 has on its top an eccentric pin 68 which rotates axially and held by a sprung bolt 69.

Pin 68 is designed to intercept a pair of cams 70 and 71, respectively first and second cam, during the rotation of carousel 3, the said cams being carried by fixed frame 55 of the carousel in diametrically opposite positions in relation to the axis of the carousel itself. Cams 70 and 71 have a chamfered face designed to act as a sliding guide for pin 68. Cams 70 and 71 are supported by actuators 72 and 73 respectively driven in a vertical direction in such a manner that they can be lifted to positions 70a and 71a in which they are disengaged from pins 68. The raising of cams 70 and 71 make it possible for washing cycles to be performed on the machine.

The method by which the bottles are filled will now be described starting from the moment when grippers 8 and related cylinder and plunger assemblies 14, rotated by carousel 3, move to the area where the aforesaid bottles, fed by distributor 6, are picked up. Grippers 8 reach the said area with their jaws 8a and 8b open in release position R, in such a way that they can grip the neck of bottle 1 to be filled.

The closing of jaws 8a and 8b to gripping position P is effected by cam 41, which at the said pickup area, causes stem 31 to rotate axially (refer to Fig. 3). Stem 31 is carried in direction A by carousel 3, so that roller 40 slides in cam 41. The rotation of stem 31 through a defined angle is transmitted to gear pair 43a and 43b and hence to jaws 8a and 8b.

After being gripped by jaws 8a and 8b, bottle 1 is lifted vertically, as shown by arrow D in Fig.6a, in

such a way that nozzle 17 of dispensing unit 9 is inserted into the mouth of bottle 1. The raising of the bottle is achieved by the axial sliding of the first sleeve 29, attached to casing 30 of grippers 8. The said sliding motion is controlled by cam 37 in which roller 36 carried by sleeve 29 slides.

During this stage, channel 67 of upper casing 58 of valve 15, is connected through holes 67a and 67c to duct 64 and to hole 66 leading into cylinder and plunger assembly 14. The said cylinder and plunger assembly 14 is thus connected to feed chamber 16 and liquid is sucked into the cylinder when plunger 33 is driven downwards in the direction of arrow E shown in Fig. 6a.

When nozzle 17 has been inserted into bottle 1, cylinder and plunger assembly 14 is ready to discharge its fill of liquid. For this purpose, valve 15 switches the connection of cylinder and plunger assembly 14 from liquid suction duct 64 to duct 65 which conveys the liquid to nozzle 17. To obtain this action, eccentric pin 68 of the valve is intercepted by cam 70, thus causing upper casing 58 of the valve to rotate in relation to lower, fixed casing 57. In this way, channel 67 of casing 58 is connected through holes 67a and 67b to hole 66 and to duct 65, thus enabling the liquid to flow out through the nozzle.

The reciprocating motion of plunger 33 of cylinder and plunger assembly 14 is achieved by the axial sliding of second sleeve 32, attached to stem 33a of the plunger. This sliding motion is effected by roller 46, mounted by sleeve 32, which runs in the circumferential groove of ring 48.

The stroke of plunger 33 may be adjusted by varying the angle of ring 48, usually set in an oblique plane in relation to carousel 3. To adjust the stroke, the ring may be shifted using actuator 53, to the side opposite its pivot 49, as shown schematically by dashed line 74 in Fig.2b. Adjusting the stroke of the plunger makes it possible to vary the amount of liquid to be filled into the bottles.

As it is being filled, bottle 1 is gradually lowered, as shown by arrow G in Fig.6b, through the sliding of first sleeve 29 controlled by cam 37.

When the bottle is full, the flow of liquid stops, whilst bottle 1 continues moving down until nozzle 17 is disengaged (refer to Fig. 6c). The flow of liquid is stopped by cam 71 which intercepts eccentric pin 68, causing casing 58 of valve 15 to rotate to the initial position, that is to say, with channel 67 connected to duct 64 and cylinder and plunger assembly 14. At the same time, the next suction stage begins and liquid flows into cylinder and plunger assembly 14 (Fig. 6d).

The full bottle is transferred to distributor 12 of outfeed system 10. To do this, cam 41 causes jaws 8a and 8b to open at release position R in such a

way that distributor 12 of outfeed system 10 can engage the bottle and move it away. Obviously, the work cycle described above is carried out by all the dispensing units mounted on the circumference of carousel 3.

The machine described thus makes it possible to synchronize the driving of cylinder and plunger assembly 14, the opening and closing of bottle grippers 8 and the vertical movement of the said grippers 8, in such a way as to work in conjunction with nozzle 17 of liquid dispensing units 9.

It should be stressed in particular that the above movements are obtained with a device that forms a sort of upright column arranged around carousel 3.

The device therefore occupies very little space and allows easy access to the internal parts of the carousel.

It should also be noted that the supply of liquid to dispensing units 9 is effected by a single valve for each dispensing nozzle 17. The said valves are rotated by carousel 3 and are fed by a chamber mounted on the same axis as carousel 3 itself. The space occupied by the valves is thus very limited, making for a very practical set-up.

In addition, the machine may be adjusted in accordance with the size of the bottles to be filled, as shown in Fig. 7, which shows carousel 3 set for filling bottles of the largest size. Such adjustment is effected by moving plate 21 upwards away from plate 27 in such a manner as to also raise drive means 28, which are attached to plate 21, and thus vary the distance between grippers 8 and the feed level of bottles 1, the said level being defined by rotary distributor 6 (position X in Figures 2b and 7).

Finally, Figures 8a and 8b show carousel when cylinder and plunger assemblies 14 are being washed. To effect washing, ring 48 is moved to a horizontal position (position Y, Fig. 8b), by rotating it about its pivot 49 by means of actuator 53. In this way, roller 46, which runs in groove 47 of ring 48, is not moved in vertical direction and the reciprocating motion of plunger 33 of cylinder and plunger assemblies 14 is stopped. Column 19 is lowered by means of elements 80 (Fig.8b). In this way, plunger 33 stops in the raised position Z (Fig. 8a) where the inside diameter of the cylindrical lining of cylinder and plunger assembly 14 is larger and does not form a hydraulic seal. At the same time, cams 70 and 71 are moved to raised positions 70a and 71a through their respective actuators 72 and 73, so as to interrupt drive to valves 15. Valves 15 are stopped in the position where chamber 16 is connected to cylinder and plunger assemblies 14.

Under these conditions, cylinder and plunger assemblies 14 may be filled with an appropriate washing liquid. The washing liquid flows to the bottom of cylinder and plunger assemblies 14 and

collects in trap 23.

Claims

- 5 1. Method for filling containers with liquid products said method including:
 10 picking up containers (1) to be filled by means of holding means carried by a carousel (3) rotating about a vertical axis and which receives the containers (1) from feed units (2);
 15 vertically raising said containers (1) together with the said holding means in such a way that nozzles (17) of liquid dispensing units (9), carried by said carousel (3) above said holding means, are inserted into the mouths of the containers;
 20 discharging the liquid into said containers (1) through said nozzles (17);
 gradually lowering said containers;
 25 releasing said containers (1) when full and transferring them to an outfeed system (10);
 the said method being **characterized in that** it includes:
 30 holding said containers by grippers (8);
 rotating a stem (31) about its longitudinal axis, said axial rotation being caused by a cam (41) made in the shape of a ring on a horizontal plate (21) and acting on a roller (40) mounted at the bottom end of said stem (31), said stem being connected to said grippers so that the said containers are picked up;
 35 raising of a first sleeve (29) surrounding said stem (31) connected to said grippers, said raising being caused by a cam (37) made on a cylindrical wall (38) concentric with the axis of said carousel (3) and acting on a roller (36) mounted at the bottom end of the said first sleeve (29), so that said containers are made to rise;
 40 lowering said first sleeve (29), said lowering being caused by said cam (37) made on said cylindrical wall (38), and simultaneously acting on said dispensing units (9) by means of a second sleeve (32) surrounding said first sleeve (29), which is linked to plunger (33) of a cylinder and plunger assembly (14) of one of said dispensing units (9) and which mounts a roller (46) running in a groove, (47) made along the circumference of a ring (48) which surrounds the axis of carousel (3) and which is set in an oblique plane in relation to carousel (3), so that said containers are gradually lowered while the liquid is simultaneously discharged into them by said nozzles (17);
 45 rotating said stem (31) about its longitudinal axis by said cam (41) made on said horizontal plate (21), so that the said containers (1) already full are released.

2. Machine for filling containers with liquid products, comprising means (2) for feeding containers (1) to be filled, a carousel (3) rotating about a vertical axis and designed to receive containers (1) one by one from said feed means (2), liquid dispensing units (9) mounted on the circumference of said carousel (3), and an outfeed unit (10) for moving the full containers away from said carousel (3); holders for holding said containers(1); a device (28) for synchronously driving said holders and said dispensing units (9), said device (28) being designed to vertically move said holders alternately between a lowered position where said containers (1) are picked up and released, and a raised position where nozzles (17) of said dispensing units (9) are inserted into the mouths of the containers; a chamber (16) for supplying the liquid product mounted on, and concentric with, a platform (18) of carousel (3); a plurality of ducts (64,65) made in said platform (18) and designed to connect chamber (16) to said dispensing units (9); a plurality of valves (15) mounted on the circumference of said platform (18), each related to one of the said dispensing units (9), and designed to be activated in such a way that the liquid product can be supplied to said dispensing units (9) through said ducts (64,65); the said machine being **characterized in that** said holders are grippers (8) with jaws, the said jaws closing at a gripping position (P) in an area where said containers (1) are fed in, and opening at a release position (R) in an area where the said containers (1) are moved away and in that said device (28) for synchronously driving grippers (8) and dispensing units (9) consists of:
- a first sleeve (29) the top of which mounts casing (30) of grippers (8) and the bottom of which mounts a roller (36) which engages a cam (37) made on a cylindrical wall (38) concentric with the axis of said carousel (3);
- a second sleeve (32), with said first sleeve (29) concentric with and extending through said second sleeve (32), said second sleeve (32) being linked to a plunger (33) of a cylinder and plunger assembly (14) of one of said dispensing units (9) and mounting a roller (46) able to rotate according to a diametrical axis in relation to the carousel (3), the said roller running in a groove (47) defined by the circumference of a ring (48) which surrounds the axis of carousel (3) and which is set in an oblique plane in relation to carousel (3);
- a stem (31) through said first sleeve (29), the bottom of said stem (31) mounting a roller (40) able to rotate about a vertical axis and designed to engage a cam (41) in the shape of a ring on a horizontal plate (21), whilst the top of said stem (31) is designed to rotate a gear pair (43a,43b) through a defined angle, which transmits motion to aforesaid grippers (8) in such a way as to cause the pair of jaws (8a,8b) to rotate from position (P) where said containers (1) are gripped to release position (R) where the containers are released.
3. A machine according to claim 2, characterized in that said jaws (8a,8b) are rotatably mounted on said casing (30) of the grippers (8) and have attached to them toothed gears (43a,43b), which mesh with each other to form a gear pair, and one of which has inserted in its centre a fork (44) designed to engage a pin (45) vertically attached to stem (31).
4. A machine according to claim 2, characterized in that one side of said ring (48) is hinged at the bottom to a pivot (49) whose axis is horizontally tangent to a circle concentric with the axis of carousel (3), whilst the diametrically opposite side of said ring (48) is pivotally attached to an actuator (53) with a vertical axis.
5. A machine according to claim 2, characterized in that each of said valves (15) consists of a lower casing (57), fixed to said platform (18) of carousel (3) and an upper casing (58) which rotates about the vertical axis of the valve (15) itself in relation to said lower casing (57), said upper casing (58) being crossed by a channel (67) designed to be connected to said ducts (64,65) alternately.
6. A machine according to claim 5, characterized in that said channel (67) has the shape of an arc, forming almost a semicircle, in a horizontal plane, at each end and in the middle of said channel (67) there being downward opening holes (67a,67b,67c) which serve to connect a cylinder and plunger assembly (14), rotated by carousel (3), to ducts (64,65) alternately, in such a way as to enable the liquid product to be sucked in from said chamber (16) and then to flow into dispensing nozzle (17).
7. A machine according to claim 5, characterized in that the top of said upper casing (58) has on it an eccentric pin (68) which rotates axially and which is designed to intercept a pair of cams (70,71), respectively first and second cam, during the rotation of carousel (3), the said cams being carried by fixed frame (55) of the carousel in diametrically opposite positions

in relation to said carousel (3).

8. A machine according to claim 7, characterized in that said cams (70,71) are supported by actuators (72,73), respectively, driven in a vertical direction in such a manner that they can be lifted to positions (70a,71a) in which they are disengaged from pins (68) of valves (15), in order to stop said valves (15) in the position where chamber (16) is connected to cylinder and plunger assemblies (14).
9. A machine according to claim 2, wherein the cylindrical lining of the said cylinder and plunger assemblies are attached to said carousel (3) in such a way that they are perpendicular to the axis of the carousel itself, said machine being characterized in that the said linings, at their top ends, are larger in diameter than at their bottom ends, so that at the said top ends they do not form a hydraulic seal with the related plungers (33), in that there is a trap (23) to which the bottom of each lining is connected via a tube (23a), in that it comprises means (19,80) for moving the said carousel downwards in such a way that, with aforesaid ring (48) rotated about its pivot (49) until it is transverse to the axis of the said carousel, each plunger (33) may be moved to the topmost position so as to enable washing liquid to flow into all said linings, the said washing liquid flowing down the sides of the linings and into said trap (23).
10. A machine according to claim 2 characterized in that said chamber (16) is supplied through a tube (54) connected to a tank outside the machine and located above chamber (16), diametrically with respect to carousel (3), said tube (54) being supported by a fixed frame (55) and connected to a mouthpiece (56) leading out of chamber (16) in accordance with the axis of rotation of said carousel (3).

Patentansprüche

1. Verfahren zur Füllung von Behältern mit flüssigen Produkten, das folgende Schritte beinhaltet:
Aufnehmen der zu füllenden Behälter (1) durch Haltevorrichtungen, die an einem Karussell (3) befestigt sind, das sich um eine senkrechte Achse dreht und das die von Zuführvorrichtungen (2) kommenden Behälter (1) entgegennimmt;
senkrecht Anheben der genannten Behälter (1) zusammen mit den genannten Haltevorrichtungen, so daß die Düsen (17) von Flüssig-

keitsspendern (9), die oberhalb der Haltevorrichtungen auf dem genannten Karussell (3) angebracht sind, in die Öffnungen der Behälter eingeführt werden;

Abgabe der Flüssigkeit in die genannten Behälter (1) durch die genannten Düsen (17);
langsames Absenken der Behälter;
Loslassen der gefüllten Behälter (1) und Übergabe an ein Auslaufsystem (10);

das genannte Verfahren ist dadurch gekennzeichnet, daß es folgende Schritte beinhaltet:
das Halten der genannten Behälter durch Greifer (8);

das Drehen eines Stabes (31) um seine Längsachse, wobei die genannte Axialdrehung durch einen Nocken (41) bewirkt wird, der in Form eines Ringes auf einer waagerechten Platte (21) ausgeführt ist und eine Rolle (40) steuert, die am unteren Ende des genannten Stabes (31) montiert ist; der genannte Stab ist so mit den Haltevorrichtungen verbunden, daß die Behälter aufgenommen werden;

das Anheben einer ersten Manschette (29), die den Stab (31) umhüllt und mit den genannten Greifern verbunden ist, wobei das Anheben durch einen Nocken (37) bewirkt wird, welcher auf einer zylinderförmigen, zur Achse des genannten Karussells (3) konzentrischen Wand (38) ausgeführt ist und der eine Rolle (36) betätigt, die am unteren Ende der genannten Manschette (29) montiert ist, so daß die Behälter angehoben werden;

das Absenken der genannten ersten Manschette (29), wobei das Absenken durch den genannten Nocken (37) bewirkt wird, welcher auf der genannten zylinderförmigen Wand (38) ausgeführt ist, sowie das gleichzeitige Betätigen der genannten Spendevorrichtungen (9) durch eine zweite Manschette (32), welche die erste Manschette (29) umhüllt und mit dem Kolben (33) einer Zylinder-Kolben-Gruppe (14) einer der genannten Spendevorrichtungen (9) verbunden sowie mit einer Rolle (46) versehen ist, die in einer Rille (47) läuft, welche entlang des Umfangs eines Ringes (48) ausgeführt ist, der die Drehachse des Karussells (3) umschreibt und in schräger Ebene zum Karussell (3) angeordnet ist, so daß die genannten Behälter langsam abgesenkt werden, während die Flüssigkeit durch die genannten Düsen (17) eingefüllt wird;

das Drehen des genannten Stabes (31) um seine Längsachse durch den genannten Nocken (41), der auf der genannten waagerechten Platte (21) ausgeführt ist, so daß die bereits gefüllten Behälter (1) losgelassen werden.

2. Maschine zum Füllen von Behältern mit flüssigen Produkten, bestehend aus einer Zuführvorrichtung (2) für die zu füllenden Behälter (1); einem Karussell (3), das sich um eine senkrechte Achse dreht und die von der Zuführvorrichtung (2) kommenden Behälter (1) einzeln aufnimmt; Flüssigkeitsspender (9), die ebenfalls außen um das Karussell (3) herum montiert sind; sowie eine Auslaufeinheit (10) um die gefüllten Behälter von dem Karussell (3) wegzubefördern;

Haltevorrichtungen zum Festhalten der Behälter (1);

Vorrichtung (28) zum synchronen Antrieb der Haltevorrichtungen und der genannten Spendevorrichtungen (9), wobei die genannte Vorrichtung (28) so ausgelegt ist, daß sie die genannten Haltevorrichtungen abwechselnd zwischen einer unteren Position, in der die Behälter (1) aufgenommen und losgelassen werden, und einer oberen Position, in der die Düsen (17) der genannten Spendevorrichtungen (9) in die Behälteröffnungen eingeführt sind, auf und ab bewegt;

eine Kammer (16) für die Zufuhr des flüssigen Produkts, die konzentrisch auf eine Plattform (18) des Karussells (3) montiert ist;

mehrere Leitungen (64,65), die in der Plattform (18) ausgeführt sind und dazu dienen, die Kammer (16) mit den genannten Spendevorrichtungen (9) zu verbinden;

mehrere Ventile (15), die entlang des Umfangs der Plattform (18) angebracht sind, wobei jedes Ventil mit jeweils einer der genannten Spendevorrichtungen (9) verbunden und so ausgelegt ist, daß es in einer Weise betätigt wird, daß das flüssige Produkt durch die genannten Leitungen (64,65) den genannten Spendevorrichtungen (9) zugeführt werden kann;

die genannte Maschine ist dadurch gekennzeichnet, daß die genannten Haltevorrichtungen Greifer (8) mit Backen sind, wobei sich die genannten Backen im Einlaufbereich der genannten Behälter (1) zu einer Greifposition (P) schließen und im Auslaufbereich der Behälter (1) zu einer Freigabeposition (R) öffnen; und ist weiter dadurch gekennzeichnet, daß die Vorrichtung (28) zum synchronen Antrieb der Greifer (8) und der Spendevorrichtungen (9) folgendes umfaßt:

eine erste Manschette (29), auf der oben das Gehäuse (30) der Greifer (8) und unten eine Rolle (36) angebracht ist, die in einen Nocken (37) eingreift, welcher auf einer zylinderförmigen, zur Achse des genannten Karussells (3) konzentrischen Wand (38) ausgeführt ist;

eine zweite Manschette (32), in der die mit ihr

konzentrische erste Manschette (29) verläuft, wobei die zweite Manschette (32) mit dem Kolben (33) einer Zylinder-Kolben-Gruppe (14) einer der genannten Spendevorrichtungen (9) verbunden und mit einer Rolle (46) versehen ist, die sich entsprechend einer diametrischen Achse im Verhältnis zum Karussell (3) drehen kann. Die Rolle (46) läuft in einer Rille (47), die durch den Umfang eines Ringes (48) gebildet wird, der die Drehachse des Karussells (3) umringt und in schräger Ebene zum Karussell (3) angeordnet ist;

einen durch die genannte erste Manschette (29) geführten Stab (31), der unten mit einer Rolle (40) versehen ist, die sich um eine senkrechte Achse drehen kann und in einen Nocken (41) in Form eines Ringes auf einer waagerechten Platte (21) eingreift, während das obere Ende des Stabes (31) so ausgeführt ist, daß es ein Zahnradpaar (43a,43b) in einem festgelegten Winkel dreht, welches die Bewegung auf die genannten Greifer (8) überträgt, wodurch das Backenpaar (8a,8b) von einer Greifposition (P), in der die Behälter (1) festgehalten werden, in eine Freigabeposition (R) gedreht wird, in der die Behälter losgelassen werden.

3. Maschine gemäß Anspruch 2, dadurch gekennzeichnet,

daß die genannten Backen (8a,8b) drehbar auf dem genannten Gehäuse (30) der Greifer (8) montiert sind und daß an ihnen zwei ineinandergreifende Zahnräder (43a,43b) angebracht sind, die zusammen ein Getriebepaar bilden; und daß eines der Zahnräder in seiner Mitte eine Gabel (44) aufweist, in die ein senkrecht an dem Stab (31) angebrachter Bolzen (45) eingreift.

4. Maschine gemäß Anspruch 2, dadurch gekennzeichnet,

daß eine Seite des genannten Ringes (48) an der Unterseite drehbar in einen Zapfen (49) eingehängt ist, dessen Achse horizontal tangential zu einem zur Karussellachse (3) konzentrischen Kreis ist. Die diametrisch gegenüberliegende Seite des genannten Ringes (48) ist drehbar mit einem Antrieb (53) mit senkrechter Achse verbunden.

5. Maschine gemäß Anspruch 2, dadurch gekennzeichnet,

daß jedes der genannten Ventile (15) aus einem an der Plattform (18) des Karussells (3) befestigten unteren Gehäuse (57) und einem oberen Gehäuse (56) besteht, das sich gegenüber dem unteren Gehäuse (57) um die Verti-

- kalachse des Ventils (15) dreht, und daß durch das obere Gehäuse (58) ein Kanal (67) führt, der abwechselnd mit den genannten Leitungen (64,65) verbunden werden kann.
6. Maschine gemäß Anspruch 5, dadurch gekennzeichnet, daß der genannte Kanal (67) bogenförmig ist und fast einen Halbkreis auf einer horizontalen Ebene beschreibt; an den beiden Enden und in der Mitte dieses Kanals (67) sind nach unten weisende Öffnungen (67a,67b,67c) ausgeführt, die dazu dienen, eine durch das Karussell (3) gedrehte Zylinder-Kolben-Gruppe (14) abwechselnd mit den Leitungen (64,65) zu verbinden, so daß das flüssige Produkt aus der genannten Kammer (16) angesaugt werden und anschließend in die Spendedüse (17) fließen kann.
7. Maschine gemäß Anspruch 5, dadurch gekennzeichnet, daß sich oben auf dem oberen Gehäuse (58) ein Exzenterstift (69) befindet, der axial drehbar und so ausgeführt ist, daß er während der Drehung des Karussells (3) in ein Paar Nocken (70,71) (erster bzw. zweiter Nocken) eingreift, wobei die Nocken auf einem festen Rahmen (55) des Karussells angebracht sind, und zwar im Verhältnis zum Karussell (3) in diametral gegenüberliegenden Positionen.
8. Maschine gemäß Anspruch 7, dadurch gekennzeichnet, daß die genannten Nocken (70,71) jeweils von Stellgliedern (72,73) getragen werden, die in vertikaler Richtung so angetrieben werden, daß sie in die Positionen (70a,71a) gehoben und somit von den Exzenterstiften (68) der Ventile (15) getrennt werden können, so daß die Ventile (15) in der Position angehalten werden, in der die Kammer (16) mit den Zylinder-Kolben-Gruppen (14) verbunden ist.
9. Maschine gemäß Anspruch 2, in der die zylindrische Ummantelung der genannten Zylinder-Kolben-Gruppe so an dem Karussell (3) befestigt ist, daß sie im rechten Winkel zur Karussellachse steht, wobei die genannte Maschine dadurch gekennzeichnet ist, daß die genannten Ummantelungen an ihrem oberen Ende einen größeren Durchmesser als an ihrem unteren Ende aufweisen, so daß die genannten oberen Enden keine hydraulische Abdichtung mit den entsprechenden Kolben (33) bilden; daß die Maschine mit einem Wasserverschluß (23) versehen ist, an den jedes Mantelunterteil über ein Rohr (23a) angeschlossen ist; daß die Maschine Vorrichtungen (19,80) umfaßt, die zur
- Bewegung des genannten Karussells nach unten dienen, so daß, wenn der genannte Ring (48) um seinen Zapfen (49) gedreht wird, bis er quer zur Achse des genannten Karussells (3) steht, jeder Kolben (33) in die oberste Position bewegt werden kann, damit eine Reinigungsflüssigkeit in alle genannten Ummantelungen einfließen, an den Seiten der Ummantelungen herab und in den genannten Wasserverschluß (23) hineinfließen kann.
10. Maschine gemäß Anspruch 2, dadurch gekennzeichnet, daß die genannte Kammer (16) über einen Schlauch (54) versorgt wird, der an einen außerhalb der Maschine, oberhalb der Kammer gegenüber dem Karussell (3) angebrachten Vorratsbehälter angeschlossen ist, wobei der genannte Schlauch (54) von einem festen Rahmen (55) gehalten wird und an ein Mundstück (56) angeschlossen ist, das in Übereinstimmung mit der Drehachse des Karussells (3) aus der Kammer (16) austritt.

Revendications

1. Méthode pour le remplissage de récipients au moyen de produits liquides, ladite méthode comprenant :
- le prélèvement des récipients (1) à remplir au moyen d'éléments de préhension portés par un carrousel (3) tournant autour d'un axe vertical et recevant les récipients (1) de l'alimenteur (2) ;
- le positionnement vertical desdits récipients (1) au moyen desdits éléments de préhension, de façon à ce que les buses (17) des têtes de remplissage liquide (9) portées par ledit carrousel (3) au-dessus desdits éléments de préhension soient introduites dans l'ouverture des récipients. ;
- le déchargement du liquide à l'intérieur desdits récipients (1) au moyen desdites buses (17) ;
- l'abaissement graduel desdits récipients ;
- le relâchement desdits récipients (1) une fois remplis et leur acheminement vers un système d'évacuation (10) ;
- ladite méthode se caractérisant en ce qu'elle comprend :
- la rotation d'un tige (31) autour de son axe longitudinal, cette rotation axiale étant transmise par une came (41) en forme d'anneau sur une plaque horizontale (21), agissant sur un rouleau (40) monté à l'extrémité inférieure de ladite tige (31), ladite tige étant reliée auxdits éléments de préhension de façon à assurer le prélèvement des récipients ;
- le soulèvement d'une première chemise (29)

entourant ladite tige (31), reliée auxdits éléments de préhension, ce soulèvement étant assuré par une came (37) fixée à une paroi cylindrique (38), concentrique par rapport à l'axe dudit carrousel (3) et agissant sur un rouleau (36) monté à l'extrémité inférieure de ladite première chemise (29), de façon à ce que lesdits récipients s'élèvent ;

l'abaissement de ladite première chemise (29), ledit abaissement étant assuré par la même came (37), fixée à une paroi cylindrique (38), et l'actionnement simultané desdites têtes de remplissage (9), au moyen d'une deuxième chemise (32), entourant ladite première chemise (29), qui est reliée au piston (33) d'un cylindre et à l'assemblage (14) desdites têtes de remplissage (9) et muni d'un rouleau (46) coulissant dans un rail (47) le long de la circonférence d'un anneau (48) qui entoure l'axe du carrousel (3) et qui est installé sur un plan oblique par rapport au carrousel (3), de façon à ce que les récipients soient graduellement abaissés au fur et à mesure qu'ils reçoivent le liquide desdites buses (17).

la rotation de ladite tige (31) autour de son axe longitudinal assurée par ladite came sur ladite plaque horizontale (21), de façon à ce que lesdits récipients (1) une fois remplis soient relâchés.

2. Machine pour le remplissage de récipients au moyen de produits liquides (2), comprenant un système d'alimentation (2) des récipients (1) à remplir, un carrousel (3), tournant autour d'un axe vertical et destiné à recevoir les récipients (1) un par un dudit système d'alimentation (2), des têtes de remplissage liquide (9) montées sur la circonférence dudit carrousel (3) et un système d'évacuation (10) destiné à transporter les récipients pleins hors dudit carrousel (3) ;
des éléments de préhension destinés à prélever lesdits récipients (1) ;
un dispositif (28) servant à synchroniser les mouvements desdits éléments de préhension et desdites têtes de remplissage (9), ce dispositif (28) étant destiné à déplacer verticalement lesdits éléments de préhension de façon alternée entre une position basse, où lesdits récipients (1) sont prélevés, et une position haute, où les buses (17) desdites têtes de remplissage (9) sont introduites dans l'ouverture des récipients ;
une chambre (16) contenant le produit liquide, montée de façon concentrique sur une plate-forme (18) du carrousel (3) ;
une série de conduits (64, 65) pratiqués dans ladite plate-forme (18) et destinés à relier la

chambre (16) auxdites têtes de remplissage (9) ;

une série de valves (15) montées sur la circonférence de ladite plate-forme (18), reliées chacune à l'une desdites têtes de remplissage (9), et destinées à être activées de façon à ce que le produit liquide soit amené auxdites têtes de remplissage (9), par lesdites conduites (64, 65) ;

la dite machine se caractérisant en ce que lesdits éléments de préhension sont des pinces munies de mâchoires, lesdites mâchoires se fermant dans une position de prélèvement (P), dans une zone où lesdits récipients (1) sont alimentés, et s'ouvrant dans une position de relâchement (1), dans une zone où lesdits récipients (1) sont évacués, et en ce que ledit dispositif (28) destiné à synchroniser les mouvements des pinces (8) et des têtes de remplissage (9) consiste en :

une première chemise (29) sur l'extrémité supérieure de laquelle est monté le corps (30) des pinces (8) et sur l'extrémité inférieure de laquelle est monté un rouleau (36) relié à une came (37) installée sur une paroi cylindrique (38), concentrique par rapport à l'axe dudit carrousel (3) ;

une deuxième chemise (32), concentrique par rapport à ladite première chemise (29) avec une extension à travers ladite deuxième chemise (32), ladite deuxième chemise (32) étant reliée au piston (33) d'un cylindre et à l'assemblage (14) de l'une desdites têtes de remplissage (9), et surmontée d'un rouleau (46) à même de tourner selon un axe diamétral par rapport au carrousel (3), ledit rouleau coulissant dans un rail (47) défini par la circonférence d'un anneau (48) qui entoure l'axe du carrousel (3) et qui se trouve sur un plan oblique par rapport au carrousel (3) ;

une tige (31) passant à travers ladite première chemise (29), et dont l'extrémité inférieure est surmontée d'un rouleau (40) à même de tourner autour d'un axe vertical et destiné à recevoir la came (41) en forme d'anneau sur une plaque horizontale (21), tandis que l'extrémité supérieure de ladite tige (31) est destinée à faire tourner selon un angle défini un couple d'engrenages (43a, 43b) qui transmet le mouvement aux pinces (8) mentionnées ci-dessus, de façon à ce que la paire de mâchoires (8a, 8b) passe de la position (P), où lesdits récipients (1) sont prélevés, à la position de relâchement (R), où lesdits récipients sont relâchés.

3. Une machine, selon la revendication 2, caractérisée en ce que lesdites mâchoires (8a, 8b)

- sont montées de façon rotative sur le logement (30) des pinces (8) et qu'y sont fixés des engrenages dentés (43a, 43b), qui sont en prise l'un sur l'autre de façon à former une paire d'engrenages, l'un des deux étant muni en son centre d'une fourche (44) destinée à recevoir un élément (45) fixé verticalement au tube (31). 5
4. Une machine selon la revendication 2, caractérisée en ce que l'un des côtés dudit anneau (48) est relié par son extrémité inférieure à un pivot (49), dont l'axe est tangent horizontalement à un cercle concentrique par rapport à l'axe du carrousel (3), tandis que le côté diamétralement opposé dudit anneau (48) est fixé de façon pivotante à un actionneur (53) selon un axe vertical. 10 15
5. Une machine selon la revendication 2, caractérisée en ce que chacune desdites valves (15) consiste en un corps (57) inférieur (57), fixé à ladite plate-forme (18) du carrousel (3) et en un corps supérieur (58) qui tourne autour d'un axe vertical de la valve (15) elle-même par rapport audit corps inférieur (57), ledit corps supérieur (58) étant traversé par une canalisation (67) destinée à être reliée alternativement auxdites conduites (64, 65). 20 25
6. Une machine selon la revendication 5, caractérisée en ce que ladite canalisation (67) présente la forme d'un arc, formant presque un demi-cercle, sur un plan horizontal, les extrémités et le milieu de ladite canalisation (67) étant munis d'orifices s'ouvrant par le bas (67a, 67b, 67c) servant à relier alternativement un cylindre et un assemblage (14), mus par le carrousel (3), aux conduites (64, 65), de façon à permettre que le produit liquide présent dans la chambre (16) soit aspiré puis amené aux têtes de remplissage (17). 30 35 40
7. Une machine selon la revendication 5, caractérisée en ce que l'extrémité supérieure dudit corps supérieur (58) est munie d'un élément excentré (68) qui tourne de façon axiale et qui est destiné à intercepter un couple de cames (70, 71), respectivement première et deuxième came, durant la rotation du carrousel (3), lesdites cames étant amenées par un châssis (55) du carrousel dans des positions diamétralement opposées par rapport audit carrousel (3). 45 50
8. Une machine selon la revendication 7, caractérisée en ce que lesdites cames (70, 71) sont supportées par des actionneurs (72, 73), respectivement, amenés dans une position verticale de façon à ce qu'ils puissent être soulevés dans des positions (70a, 71a) dans lesquelles ils sont dégagés des éléments (68) des valves (15), afin d'arrêter lesdites valves (15) dans une position où la chambre (16) est reliée au cylindre et aux assemblages de piston (14). 5
9. Une machine selon la revendication 2, dans laquelle l'enveloppe cylindrique dudit cylindre et les assemblages sont fixés audit carrousel (3) de façon à ce qu'ils soient perpendiculaires à l'axe du carrousel, ladite machine étant caractérisée en ce que lesdites enveloppes, à leurs extrémités supérieures, présentent un diamètre supérieur qu'à leurs extrémités inférieures, de façon à ce que lesdites extrémités supérieures ne forment pas un joint d'étanchéité avec les pistons (33) correspondants, en ce qu'elle est munie d'un siphon (23) auquel l'extrémité inférieure de chaque enveloppe est reliée par un tube (23a) et en ce qu'elle est munie d'un système (19,80) destiné à mouvoir ledit carrousel vers le bas de façon à ce que, l'anneau (48) mentionné ci-dessus tournant autour de l'axe dudit carrousel, chaque piston (33) puisse être amené dans la position supérieure maximale afin de permettre au liquide de nettoyage de s'écouler à l'intérieur desdites enveloppes, ledit liquide de nettoyage coulant sur les côtés des enveloppes et à l'intérieur dudit siphon (23). 30
10. Une machine, selon la revendication 2, caractérisée en ce que ladite chambre (16) est alimentée par un tube (54) relié à un réservoir situé à l'extérieur de la machine, ledit tube (54) étant supporté par un châssis (55) et relié à un raccord (56) sortant de la chambre (16) selon l'axe de rotation dudit carrousel (3). 35 40

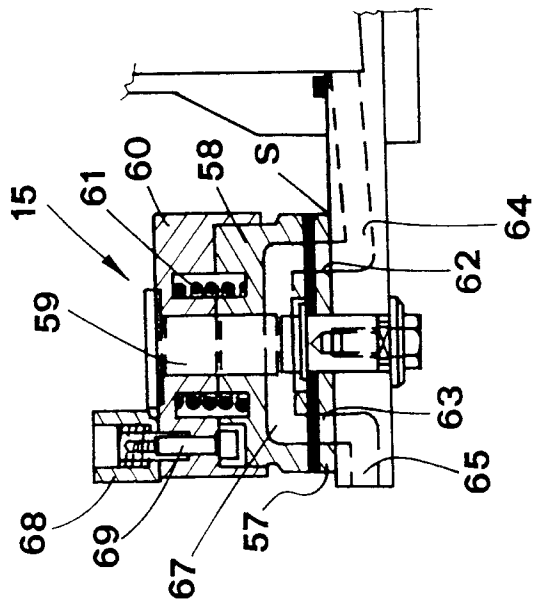


FIG. 4

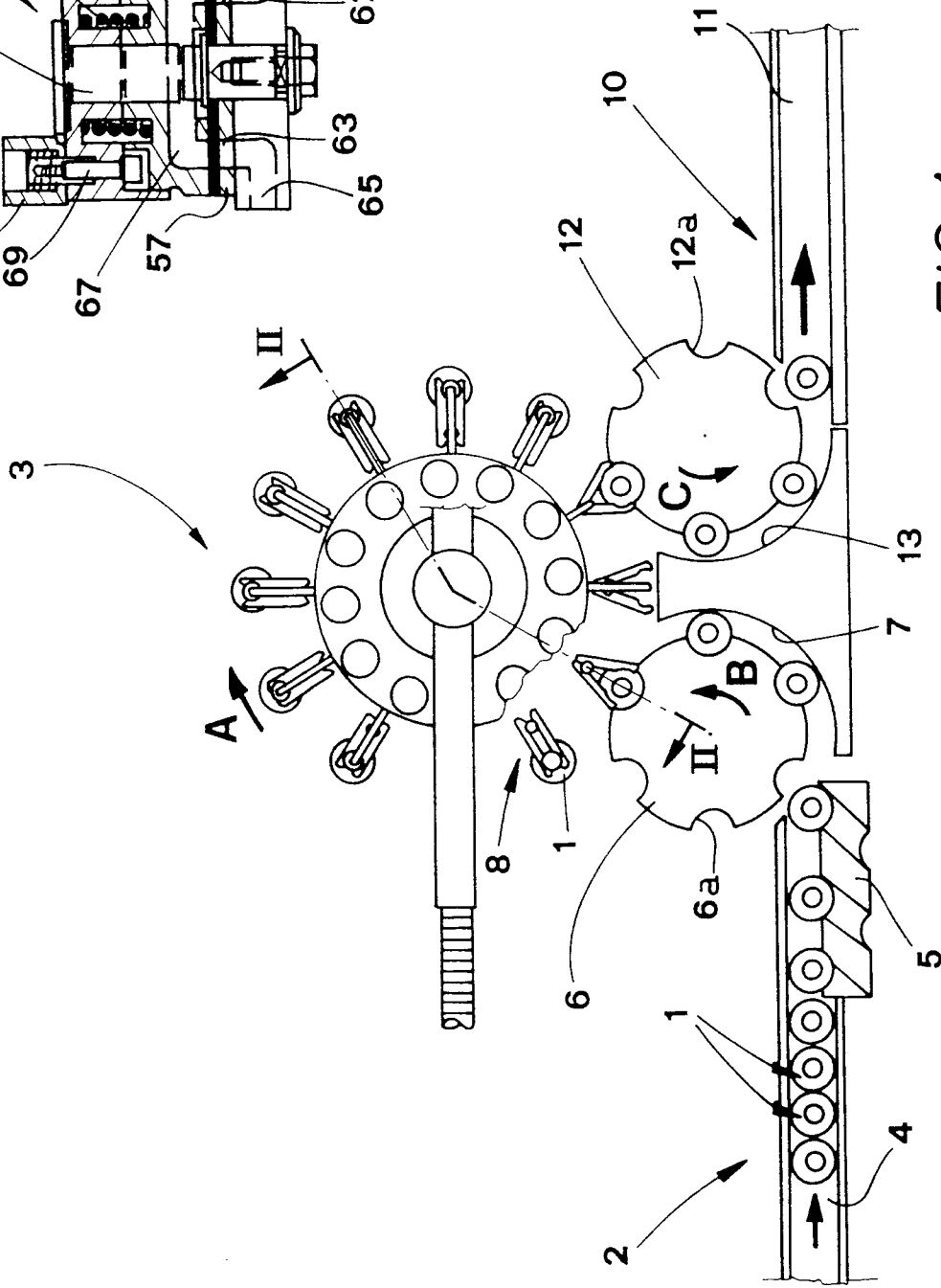


FIG. 1

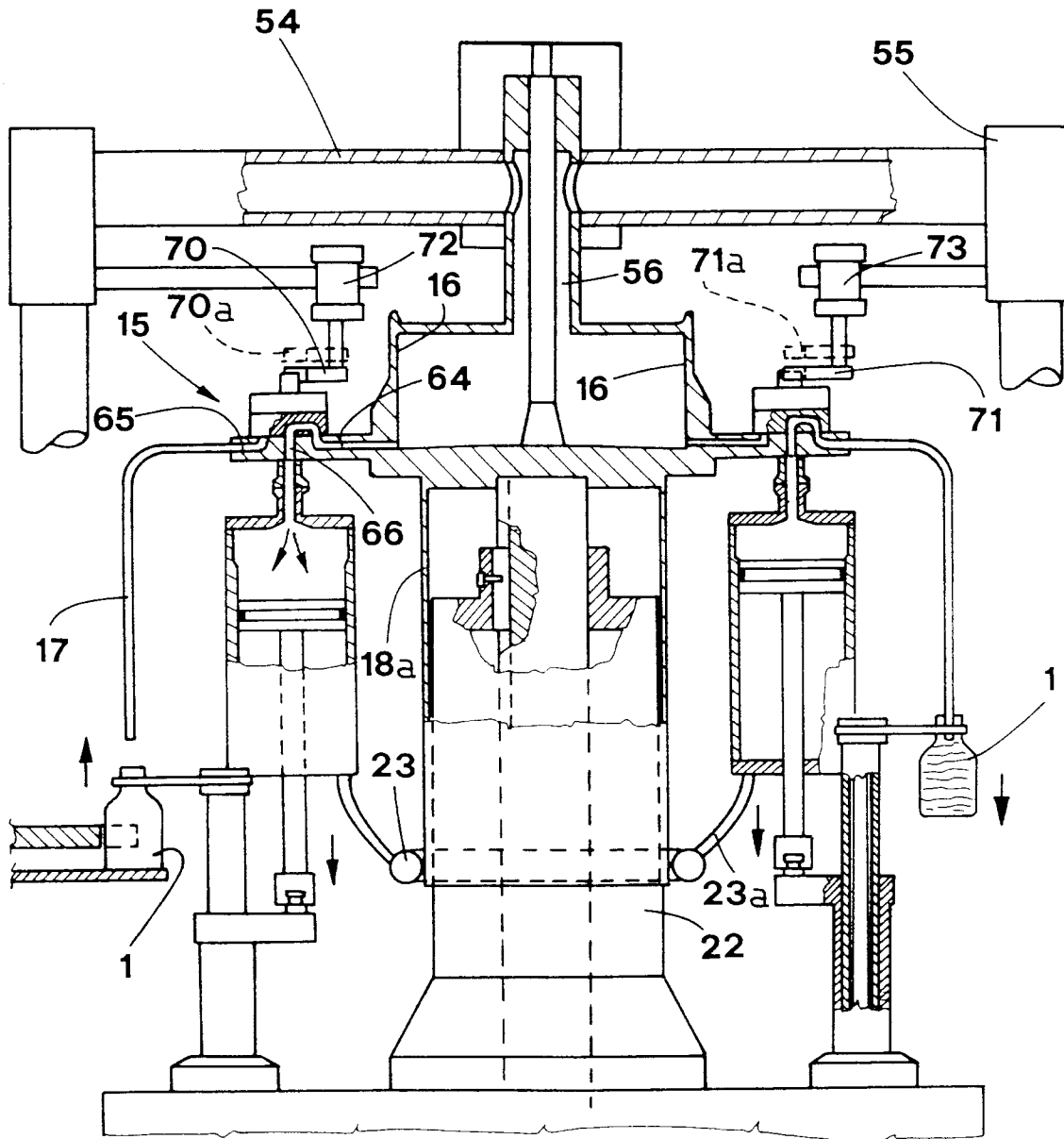
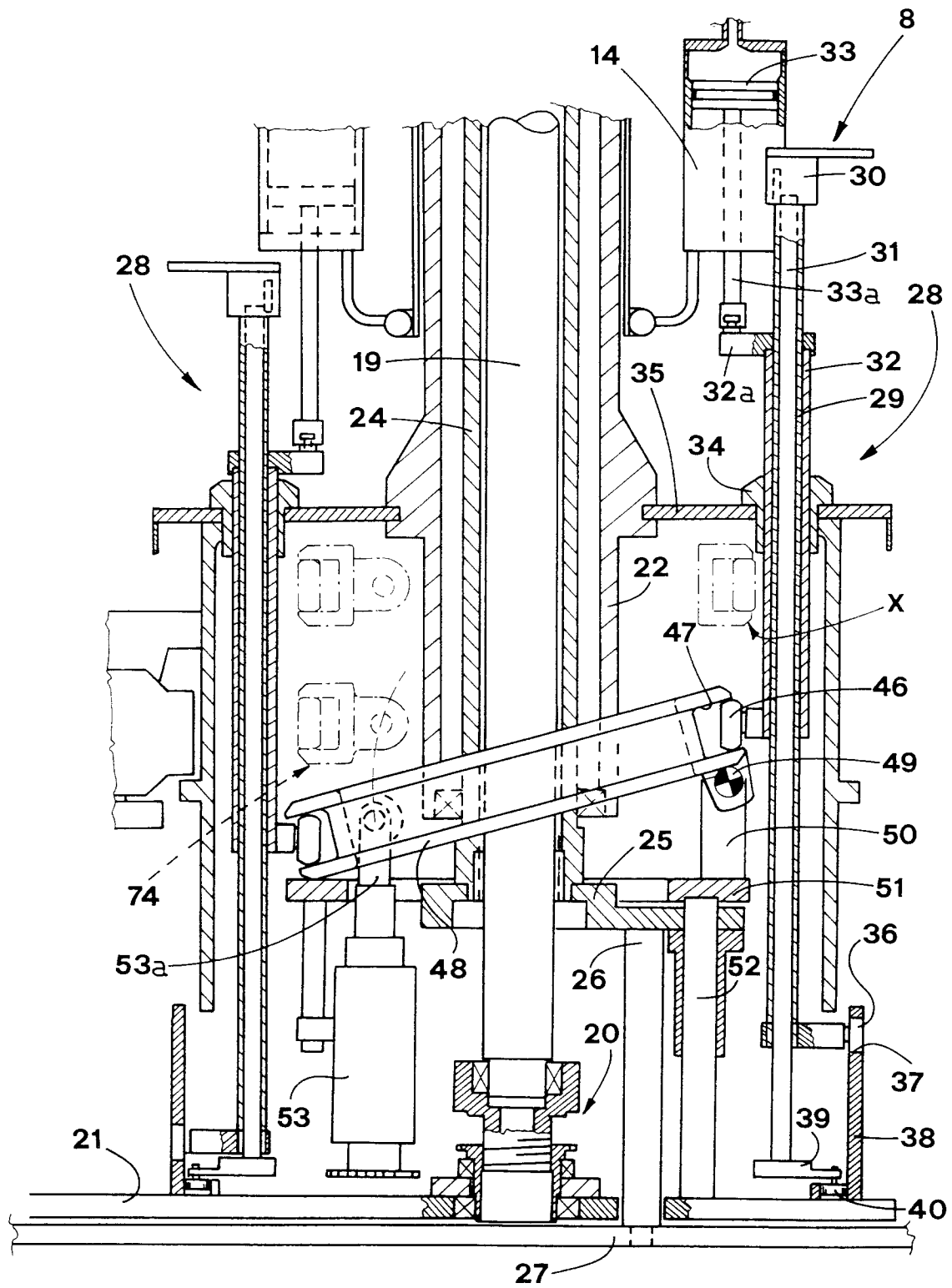


FIG. 2a



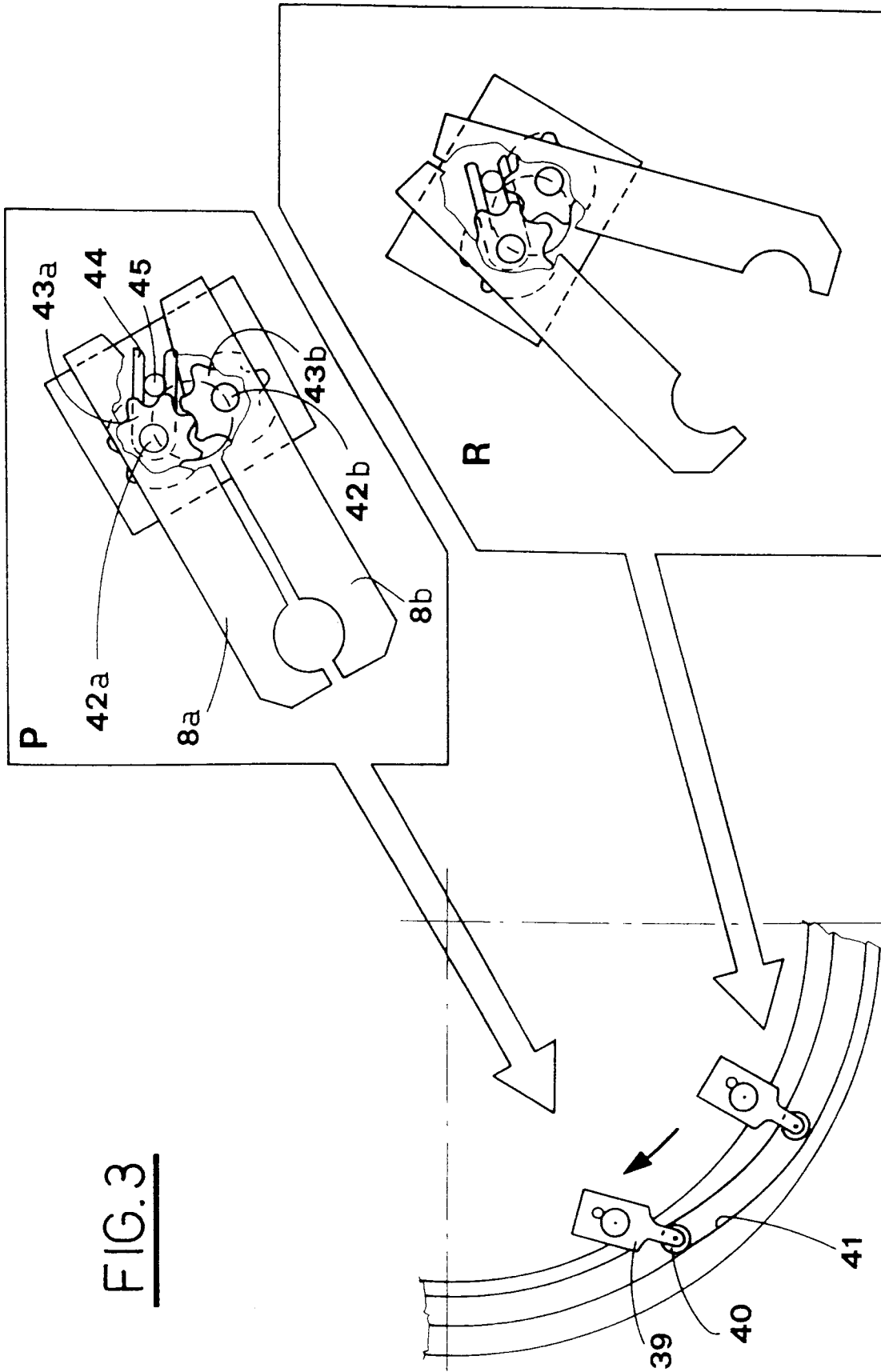


FIG. 3

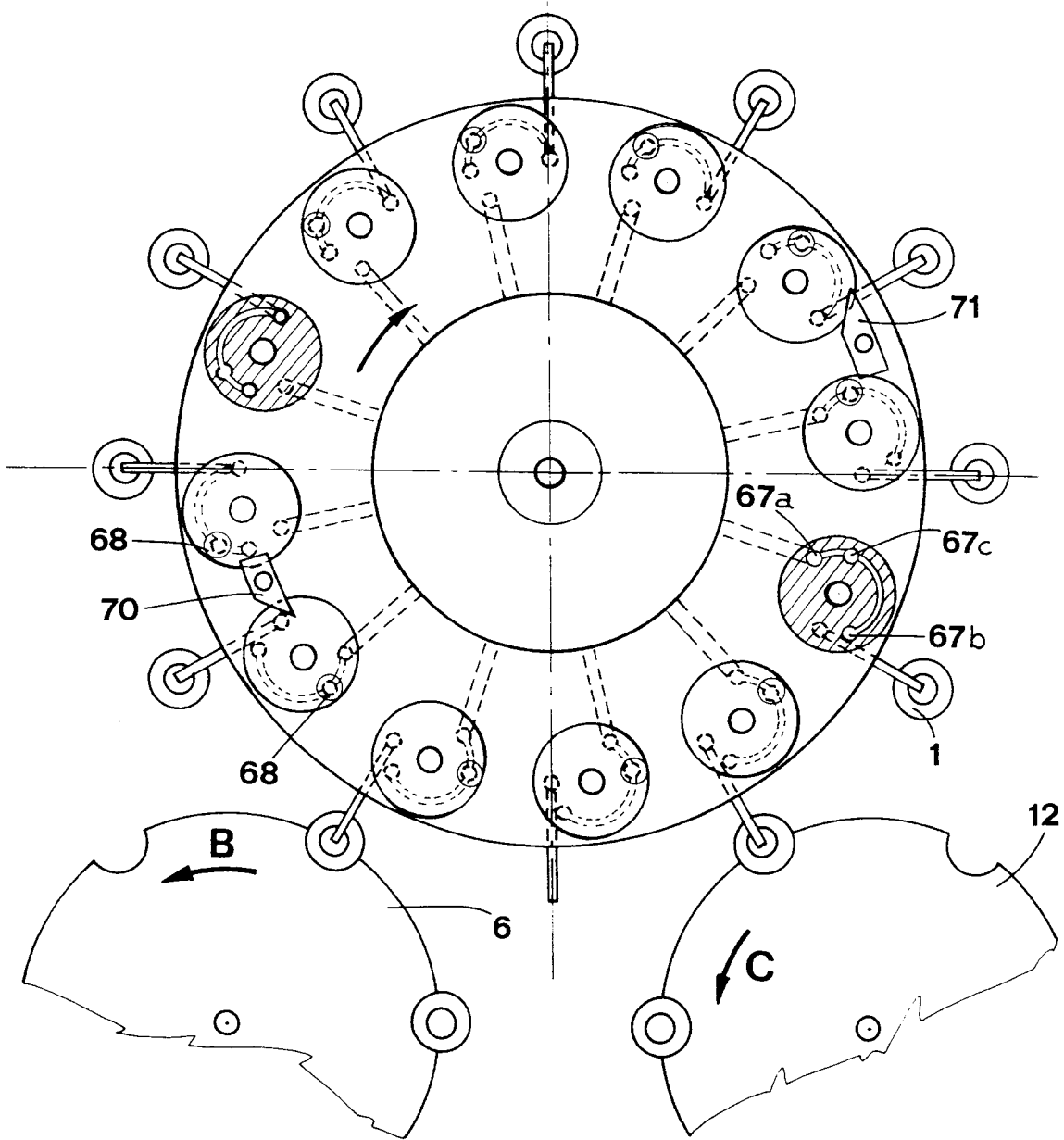


FIG. 5

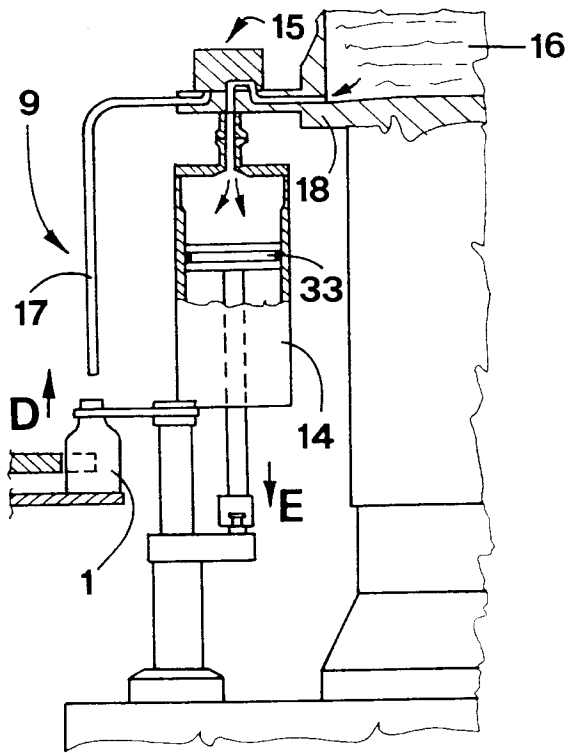


FIG. 6a

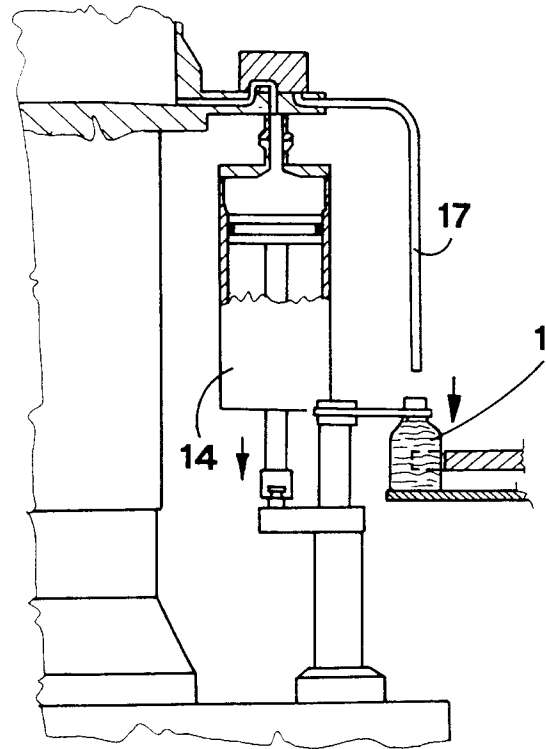


FIG. 6d

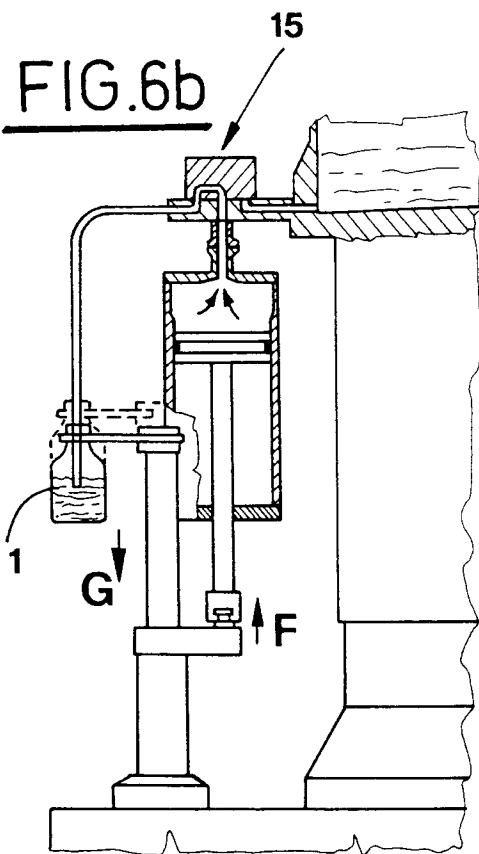


FIG. 6b

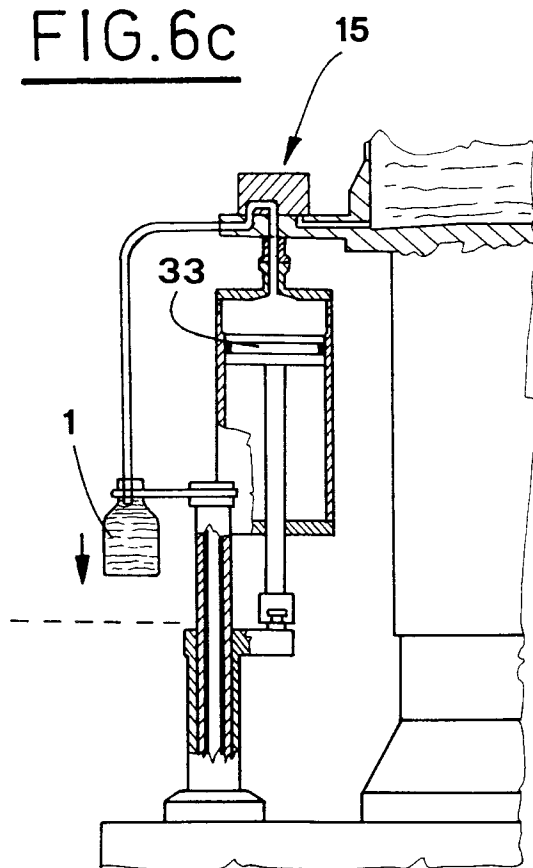


FIG. 6c

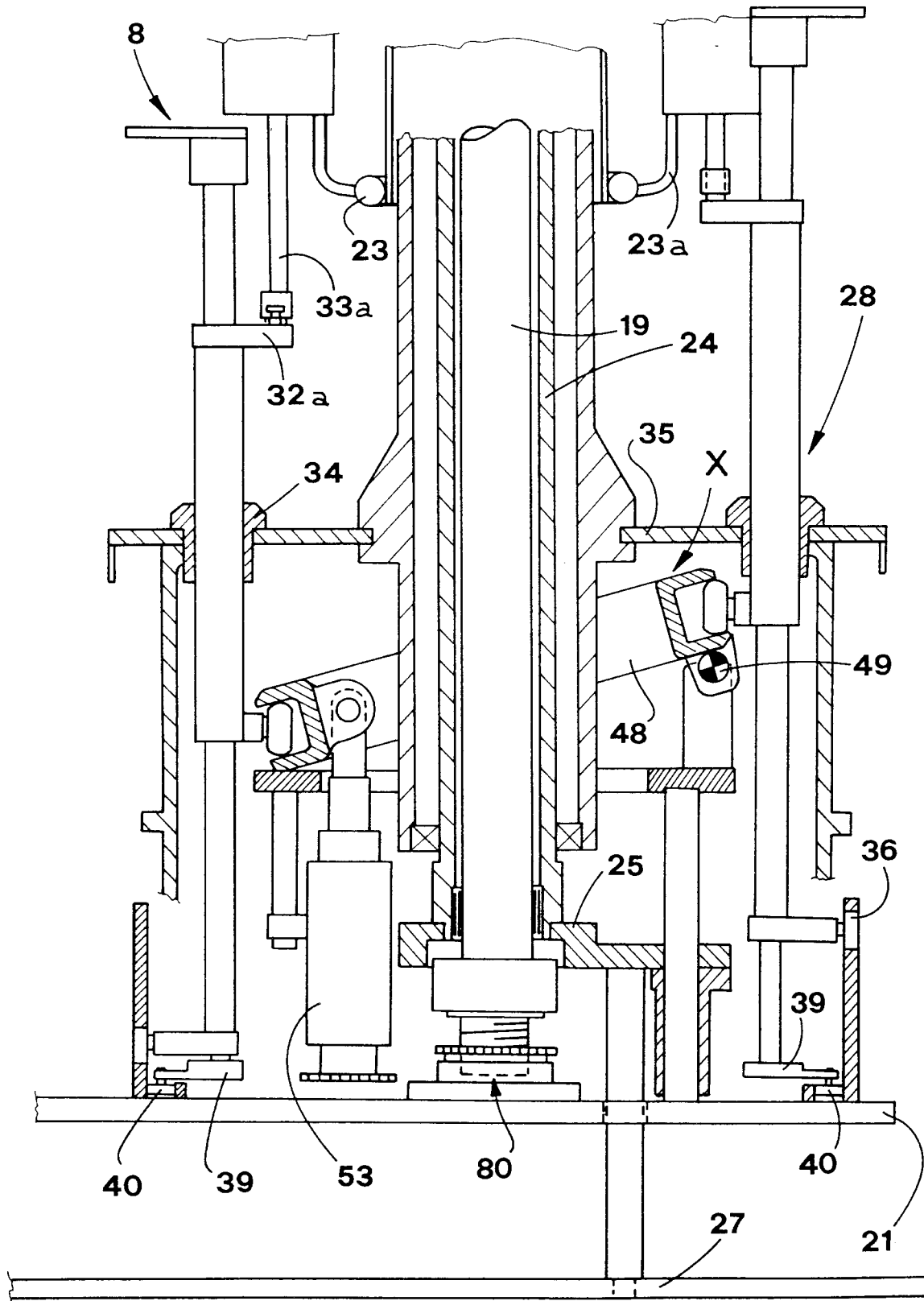


FIG. 7

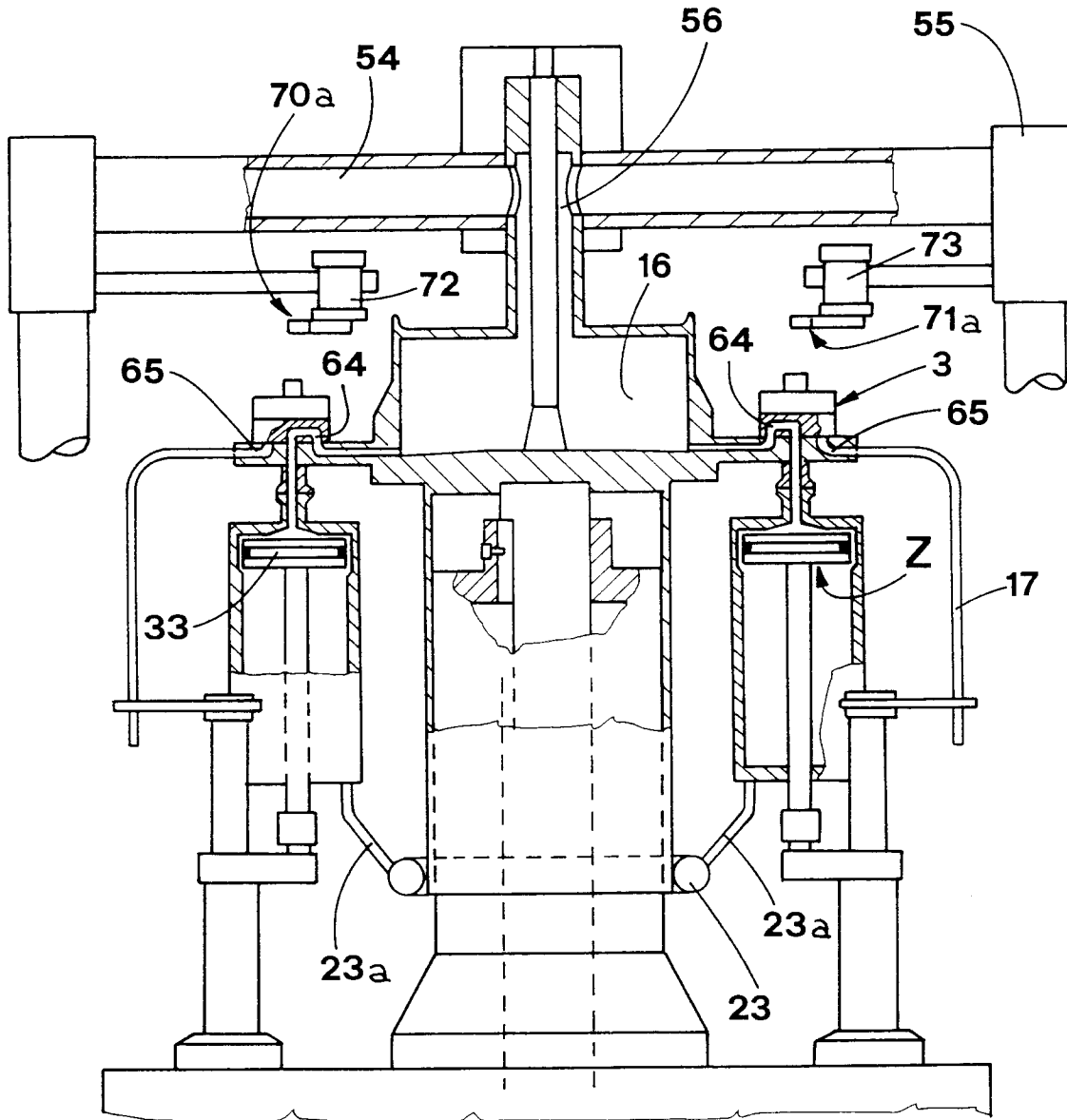


FIG. 8a

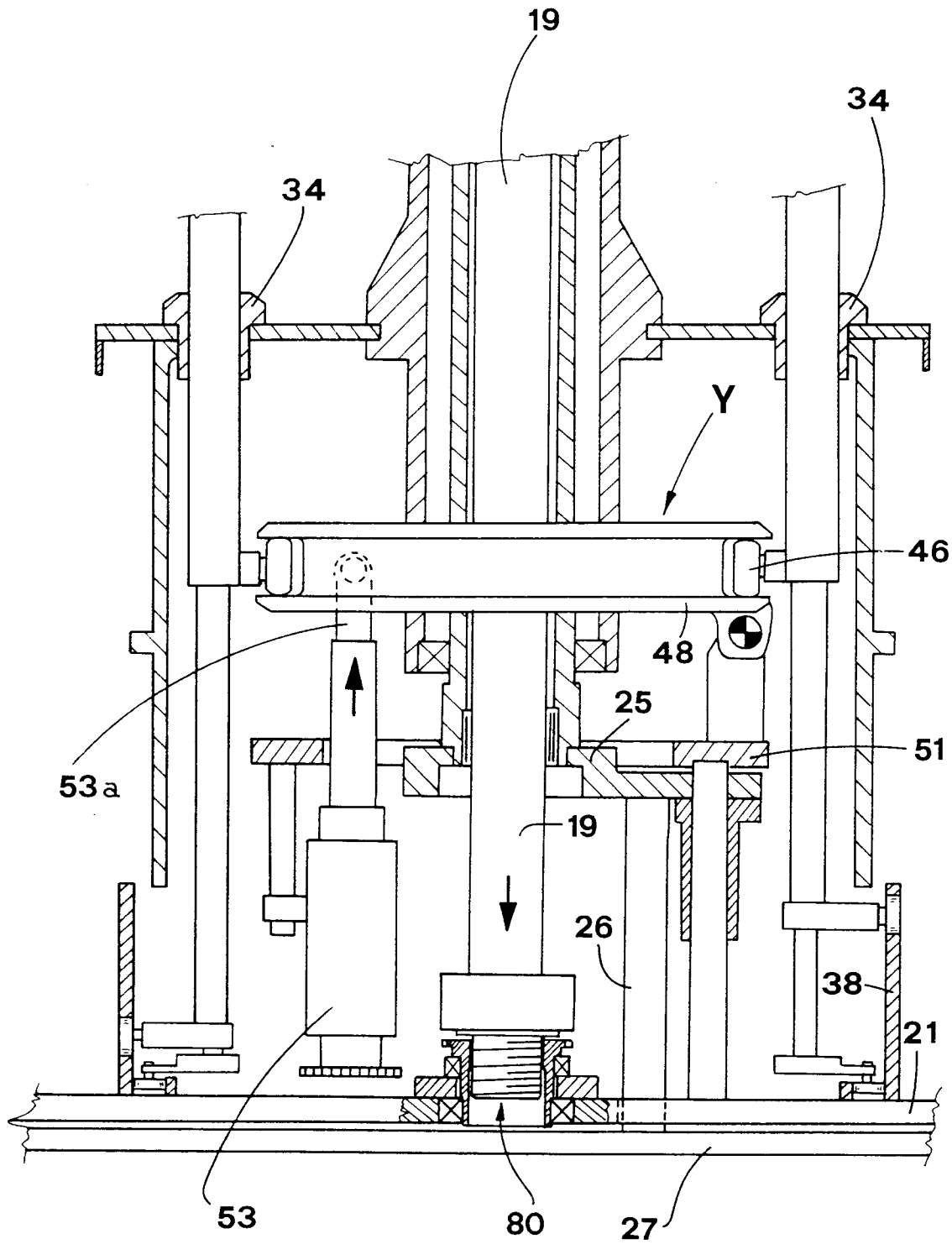


FIG. 8b