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(54) Device for dispensing liquid products to rotating elements, especially in bottling machines.

(57) The device comprises a liquid feed chamber (16) concentrically mounted on a platform (18) of a carousel (3) which rotates about a vertical axis and a plurality of ducts (30,31) made in the platform (18) and designed to connect the chamber (16) to means (9), mounted on the carousel (3), for dispensing liquid product.

Valves (15) are mounted on the circumference of the platform (18), each related to one of the dispensing units (9), and designed to be activated in such a way that the liquid product can be supplied to the dispensing units (9) through the ducts (30,31).

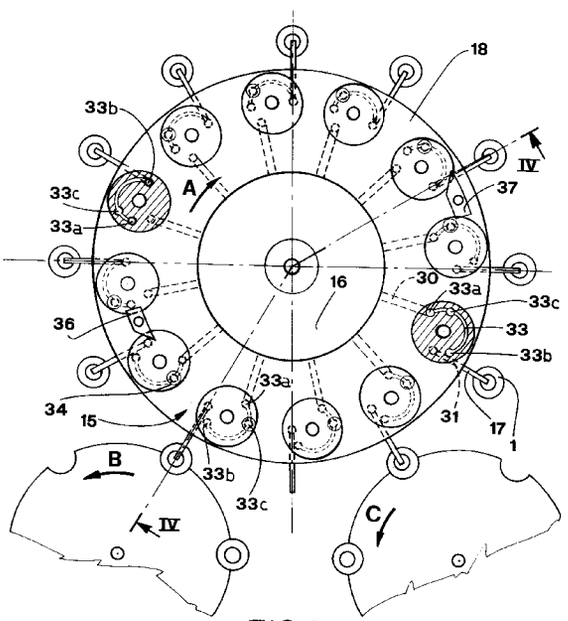

FIG.3

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The present invention relates to the technical sector of automatic machinery for filling containers with liquid products.

A variety of automatic machines are known which fill containers such as bottles or vials with liquids. These machines usually have carousels or star-wheels 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 means for lining up the bottles with the corresponding nozzles of the dispensing units themselves. The filled bottles are then transferred to an outfeed line.

The aforesaid dispensing units usually have a plurality of elements which exert a preset pressure on the liquid, and which are connected to liquid feed tubes. The feed tubes are connected to the liquid tank through valves mounted on the outermost edge of the carousel.

In the known machines, the dispensing of the liquid requires a complicated set of feed elements which can hamper machine operations. The main reason for this is that the large number of separate feed tubes encumber the carousel and make it difficult to carry out the necessary maintenance operations.

The object of the present invention is to provide a device which is capable of dispensing a liquid product to rotating elements and which is especially suitable for application on automatic bottle fillers.

Another object of the invention is to provide a device that uses a simple, reliable technique and that is suitable for a wide range of bottle sizes.

These objects are achieved in accordance with the claims below.

The space occupied by the claimed device is thus very limited, making for a very practical set-up, and allowing easy access to the internal parts of the carousel. Furthermore, since the structure of the device is very simple, the machine to which it is applied has added efficiency and reliability.

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 bottle filling machine;
- Figure 2 is a vertical, cross sectional view of one of the filling valves of the device claimed;
- Figure 3 is a schematic plan view of the machine showing the different stages in the operation of the device claimed;
- Figure 4 is a cross section, along line IV-IV, of the filling machine illustrated in Fig.3.

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.

In the preferred embodiment, 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.

Chamber 16, concentric with the axis of carousel 3, is fed through a tube 20 connected to a tank, which is not illustrated, outside the machine. Tube 20 is located above chamber 16, diametrically with respect to carousel 3, and is supported by a frame 21 attached to the fixed structure of the machine. Tube 20 is connected to a mouthpiece 22 leading out of chamber 16 in accordance with the axis of rotation of the carousel.

As shown in detail in Fig.2, valve 15 consists of a lower casing 23 fixed to carousel platform 18 and an upper casing 24 which rotates on a pin 25 about the vertical axis of valve 15 itself and in relation to fixed lower casing 23. Upper casing 24 has a cap 26 held by pin 25 and pushed axially by a spring 27 which presses down on casing 24.

Lower casing 23 is crossed by a pair of parallel, vertical holes 28 and 29, which, at their bottom ends, are connected with a pair of ducts, respectively 30 and 31, made in platform 18. Duct 30 leads out of chamber 16, whilst duct 31 is connected to dispensing nozzle 17.

Platform 18 is also crossed by a vertical hole 32, whose bottom end is connected to cylinder and

plunger assembly 14 and whose top end extends into lower casing 23 of the valve. The axes of holes 28, 29 and 32 are distributed around a circle concentric with the axis of rotation of upper valve casing 24.

Upper, rotating casing 24, on the other hand, is crossed by an approximately semicircular channel 33 in a horizontal plane. At each end and in the middle of channel 33 there are downward opening holes 33a, 33b and 33c which serve to connect hole 32 to ducts 30 and 31 alternately, in accordance with the angular position assumed by rotating valve casing 24.

Cap 26 of rotating casing 24 has on its top an eccentric pin 34 which rotates axially and held by a sprung bolt 35.

Pin 34 is designed to intercept a pair of cams 36 and 37, respectively first and second cam, during the rotation of carousel 3, the said cams being carried by fixed frame 21 of the machine in diametrically opposite positions in relation to the axis of the carousel itself. Cams 36 and 37 have a chamfered face designed to act as a sliding guide for pin 34. Cams 36 and 37 are supported by actuators 38 and 39 respectively driven in a vertical direction in such a manner that they can be lifted to positions 36a and 37a in which they are disengaged from pins 34. The raising of cams 36 and 37 make it possible for washing cycles to be performed on the machine.

The device claimed will now be described, with reference to Fig.3 in particular, 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. In this area, grippers 8 grip the neck of bottle 1 to be filled, and the bottle is then lifted in the direction of nozzle 17 of dispensing unit 9, as shown by arrow D in Fig.4. During this stage, channel 33 of upper casing 24 of valve 15, is connected through holes 33a and 33c to duct 30 and to hole 32 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 14a is driven downwards in the direction of arrow E shown in Fig. 4.

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 30 to duct 31 which conveys the liquid to nozzle 17. To obtain this action, eccentric pin 34 of the valve is intercepted by cam 36, thus causing upper casing 24 of the valve to rotate in relation to lower, fixed casing 23. In this way, channel 33 of casing 24 is connected through holes 33a and 33b to hole 32 and to duct 31, thus enabling the liquid to flow out through the nozzle.

Filling is completed when the flow of liquid stops and, in synchrony with the interruption of liquid flow, bottle 1 is lowered again until nozzle 17 is disengaged.

When the nozzle is disengaged, cam 37 intercepts eccentric pin 34, causing casing 24 of valve 15 to rotate to the initial position, that is to say, with channel 33 connected to duct 30 and cylinder and plunger assembly 14. At the same time, the next suction stage begins and liquid flows into cylinder and plunger assembly 14.

The full bottle is transferred to distributor 12 of outfeed system 10. Obviously, the work cycle described above is carried out by all dispensing units 9 mounted on the circumference of carousel 3.

In short, the device described constitutes a reliable, efficient means to supply a liquid product to the dispensing units 9 rotated by the carousel.

It should be stressed in particular 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.

In this way the space occupied by the device is very limited, making for a very practical set-up, and allowing easy access to the internal parts of the carousel, while the simple structure of the device gives efficiency and reliability.

Claims

1) A device for dispensing liquid products to rotating elements, especially in automatic machines for filling such liquid substances into containers (1), these machine consisting of:
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 feed means (2);
grippers (8) for holding containers (1), said grippers being mounted on the circumference of said carousel (3);
liquid dispensing units (9), also mounted on the carousel (3), which operate synchronously with said grippers (8) in order to fill said containers (1); and
an outfeed unit (10) for moving the full containers away from said carousel (3);
the said device being **characterized in that** it comprises a liquid feed chamber (16) concentrically mounted on a platform (18) of carousel (3);
a plurality of ducts (30,31) made in said platform (18) and designed to connect said 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 (30,31).

2) A device according to claim 1, **characterized**

in that said valves (15) serve to connect each cylinder and plunger assembly (14), rotated by said carousel (3), to said ducts (30,31) alternately so as to suck liquid from said chamber (16) and then allow it to flow into a dispensing nozzle (17).

3) A device according to claim 1 **characterized in that** each of said valves (15) consists of a lower casing (23), fixed to said platform (18) of carousel (3) and an upper casing (24) which rotates about the vertical axis of the valve (15) itself in relation to said lower casing (23), said upper casing (24) being crossed by a channel (33) designed to be connected to said ducts (30,31) alternately.

4) A device according to claim (3) **characterized in that** said channel (33) has the shape of an arc, forming almost a semicircle, in a horizontal plane, at each end and in the middle of said channel (33) there being downward opening holes (33a,33b,33c) which serve to connect a cylinder and plunger assembly (14) to ducts (30,31) alternately.

5) A device according to claim 3 **characterized in that** the top of said upper, rotary casing (24) has on it an eccentric pin (34) which rotates axially and which is designed to intercept a pair of cams (36,37), respectively first and second cam, during the rotation of carousel (3), the said cams being carried by fixed frame (21) of the machine in diametrically opposite positions in relation to said carousel (3).

6) A device according to claim 5 **characterized in that** said cams (36,37) are supported by actuators (38,39), respectively, driven in a vertical direction in such a manner that they can be lifted to positions (36a,37a) in which they are disengaged from said eccentric pin (34).

7) A device according to claim 3 **characterized in that** said lower casing (23) is crossed by a pair of parallel, vertical holes (28,29), which, at their bottom ends, are connected with a pair of ducts, respectively (30,31), made in platform (18), the said platform being also crossed by a vertical hole (32), whose bottom end is connected to cylinder and plunger assembly (14) and whose top end extends into lower casing (23) of the valve, the axes of said holes (28,29,32) being distributed around a circle concentric with the axis of rotation of upper valve casing (24).

8) A device according to claim 1 **characterized in that** said chamber (16) is supplied through a tube (20) connected to a tank outside the machine and located above chamber (16), diametrically with respect to carousel (3), the said tube (20) being supported by a fixed frame (21) and connected to a mouthpiece (22) leading out of chamber (16) in accordance with the axis of rotation of carousel (3).

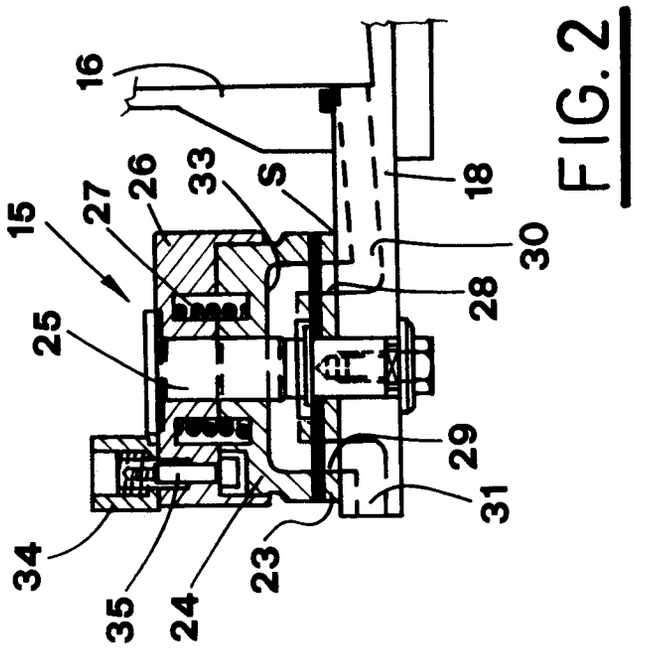
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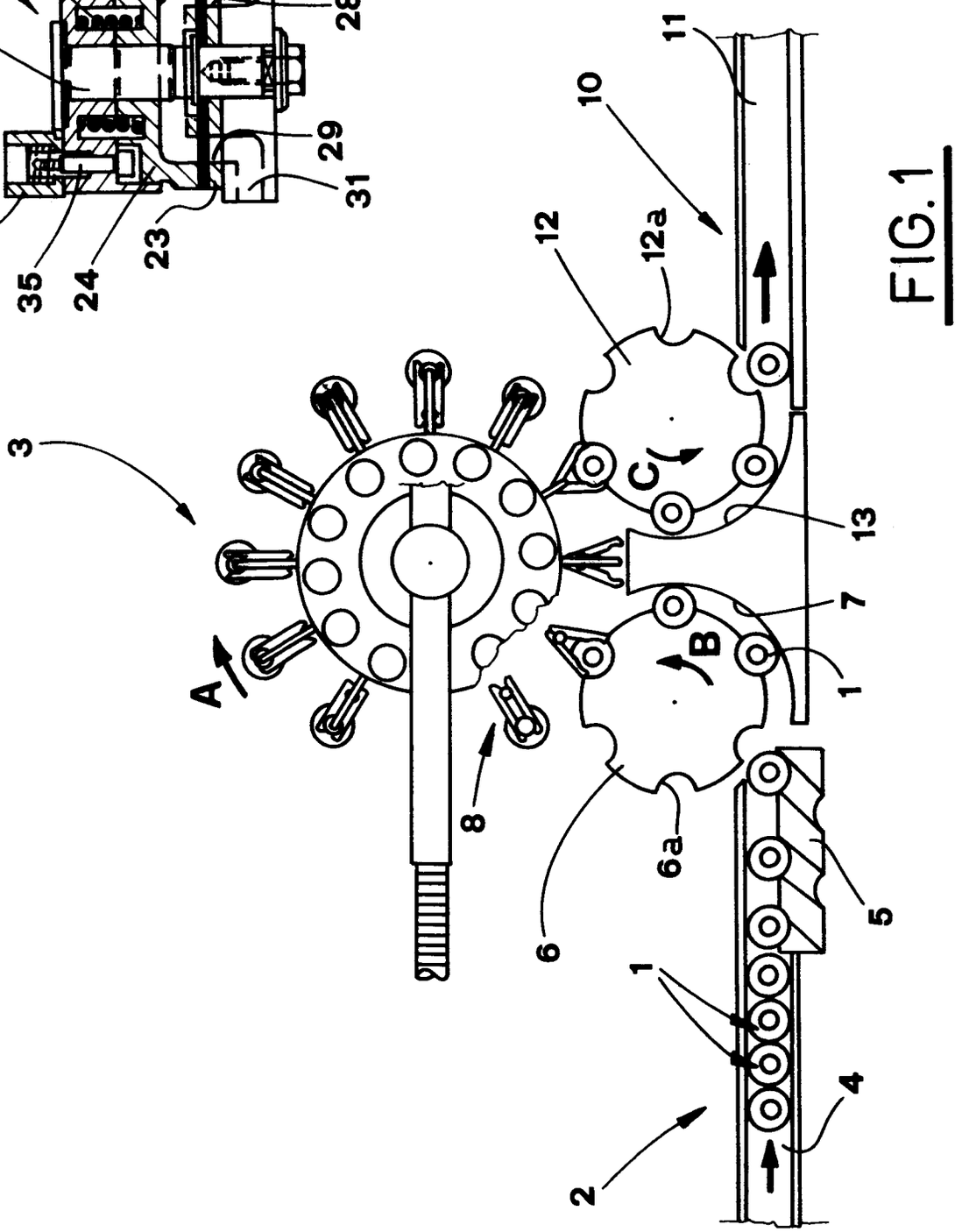
FIG. 2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6a
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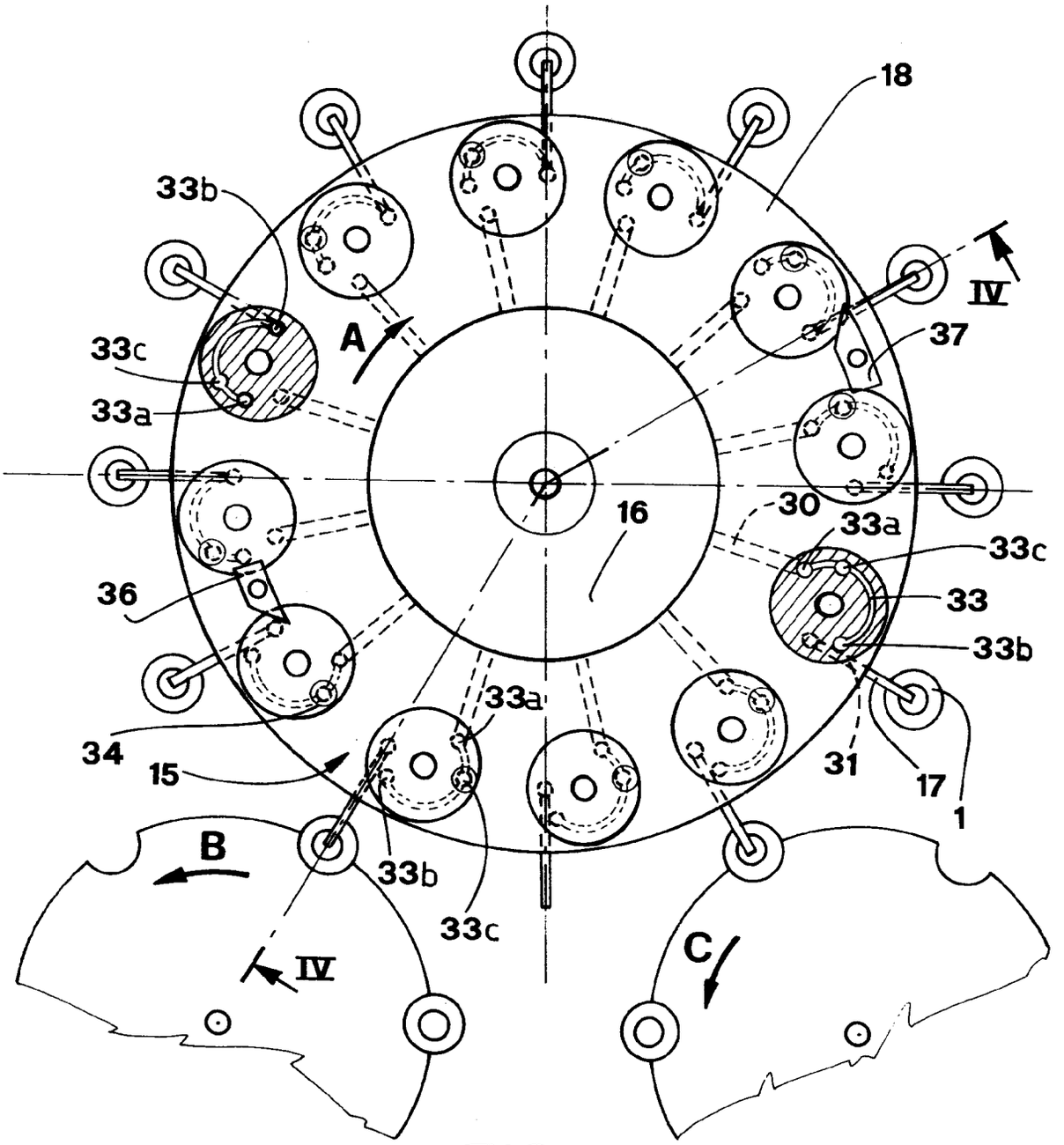
FIG. 1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33c
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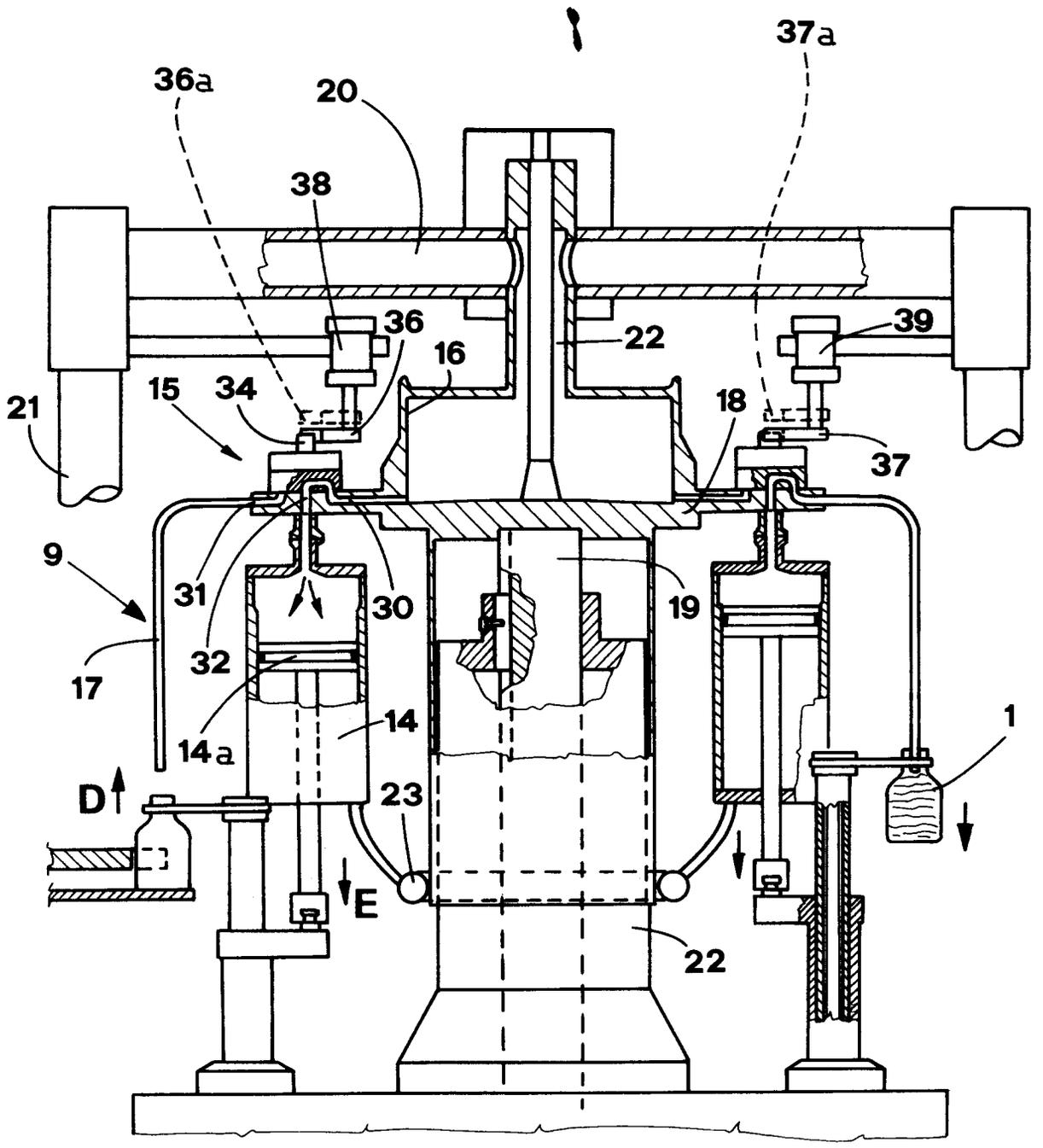
FIG.3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14a
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FIG.4

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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0492

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2 067 530 (PONT-A-MOUSSON SA) * column 1, line 109 - column 2, line 8; figures 2,3 *	1	B65B3/32 B67C3/28
A	EP-A-0 350 974 (SIMONAZZI A. & L. S.P.A.) * abstract; figures 5,6 *	1	
A	US-A-4 060 109 (SOTOMA) * column 2, line 57 - column 3, line 2; figure 1 *	1	
A	FR-A-2 179 188 (MATHER & PLATT LIMITED) * figures 1-5 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65B
B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 FEBRUARY 1992	MARTINEZ NAVAR

CATEGORY OF CITED DOCUMENTS

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