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(54) Container capping and filling apparatus

(57) An apparatus for filling and capping containers (3) includes a rotary carrousel (2) which is driven in step and carries the containers (3) to be filled, that are fed to the carousel by a conveying line (5), to a station (6) where the containers (3) are filled with a liquid and then to a station (7) where the filled containers (3) are capped. The filling station (6) features a mobile element (15) carrying a group of liquid nozzle means (13) which can be connected to respective containers (3). The mobile element (15) is situated over the carrousel (2) and is operated in two strokes, a working stroke in synchrony with the carrousel (2) stepped movement in which the containers (3) are filled, and a return idle stroke in direction opposite to the carrousel (2) movement.

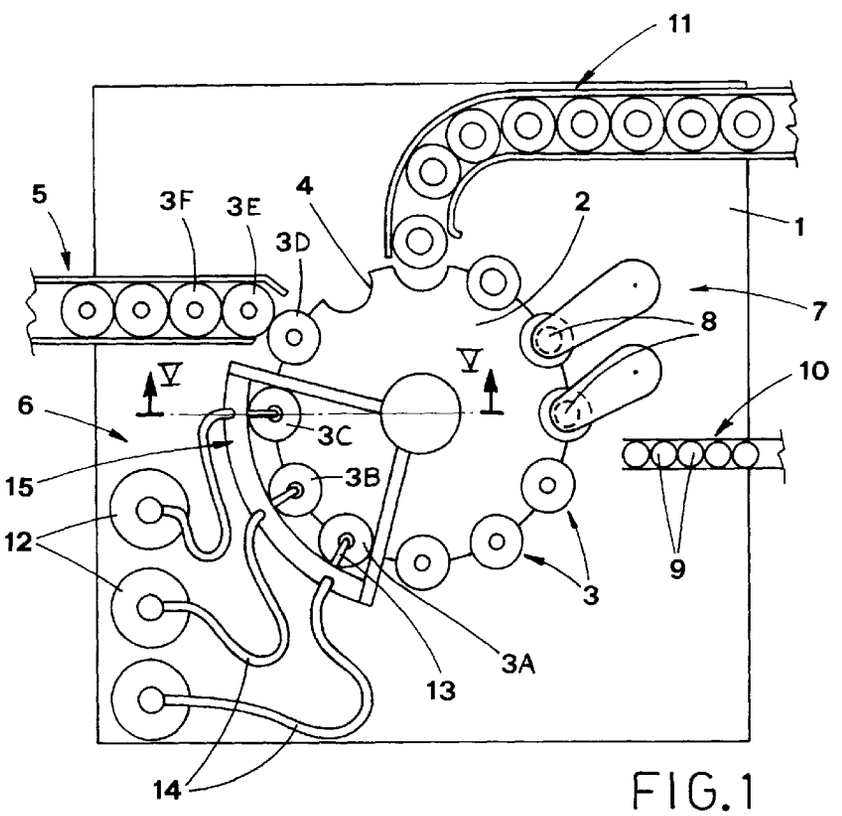

FIG.1

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Description

The present invention concerns filling containers like bottles and the like with liquids, and their subsequent capping.

It is known that at present containers are filled and capped by automatic machines generally equipped with a bed structure.

In particular, known filling and capping machines, driven in step, usually feature a conveying line for the containers to be filled, situated over the bed and feeding a rotary carrousel driven stepwise.

Liquid distributing means are situated over the said bed, in the region of the carrousel.

The containers filled with the liquid are moved to further working stations, in particular for caps application.

The throughput of these machines is usually low, mainly due to much time needed for filling the containers.

In fact, capping step is usually much shorter and therefore, would allow to increase the carrousel working speed.

The containers are filled by means of e.g. suitable distributing nozzles, introduced into the said containers when they stop in the above mentioned filling station.

Sometimes, the containers are filled in steps, i.e. filled with liquid by separate distributing nozzles placed in subsequent filling stations.

In order to increase the productivity of these alternately driven machines it has been proposed to use distributing means with multiple nozzles moving in time relation with the carrousel movement, so as to fill the containers when the carrousel moves.

These distributing means are introduced simultaneously into a group of containers and are kept therein while the containers are brought to the capping station along the carrousel rotation arc. This rotation lasts substantially the time needed to fill the containers.

Afterwards, the liquid distributing means are withdrawn and brought back to the initial position so as to be introduced in a subsequent group of containers, fed in the meantime to the carrousel by the conveying line.

However, this solution requires multiple capping means to cap containers fed simultaneously to the capping station, which results in the increase of the machine complexity and cost.

The object of the present invention is to propose an apparatus that allows to fill and cap containers in a simple way and with a high throughput.

The above mentioned object is obtained in accordance with contents of the claims.

The characteristic features of the invention will become pointed out in the following description, with particular reference to the enclosed drawings, in which:

- fig. 1 shows a plan schematic view of the filling and capping machine being the subject of the present invention;
- figs. 2, 3 and 4 show the same plan views of this machine, during subsequent working steps;
- fig. 5 shows a partial vertical section taken along the plane V-V of fig. 1;
- figs. 6a and 6b show correspondent schematic front views, during different working steps of the containers filling.

With reference to the above mentioned figures, numeral 1 indicates the bed structure, which supports the rotary carrousel 2 of an apparatus for filling containers 3, e.g. bottles and the like with liquid and subsequently capping the already filled containers.

The rotary carrousel 2 is driven into a stepped movement by driving means, not shown.

Each single step of the carrousel 2 movement corresponds to the angular distance between the housings 4 made peripherally in the same carrousel 2 for engaging the containers 3.

The carrousel 2 is fed by a line 5 conveying the containers 3 which is situated over the bed 1, on the same plane as the carrousel 2.

A known containers singling device, not shown, can be situated between the conveying line 5 and the carrousel 2.

The carrousel 2 carries the containers 3 to the filling station 6 and capping station 7.

The capping station 7 is equipped with capping means 8 for application of caps 9 to the containers 3. The caps 9 are fed to the carrousel 2 by a feeding line 10.

Then the carrousel 2 carries the capped containers 3 to an exit line 11.

The filling station 6 is equipped with suitable dosing elements 12 fed by a suitable tank, not shown, containing the liquid for filling the containers 3.

The containers 3 are filled by a group of distributing nozzles 13 connected to the respective dosing elements 12 by means of flexible pipes 14.

The nozzles 13 are carried by a mobile element 15 situated over the carrousel 2 and rotated stepwise in synchrony with the carrousel stepped movement when the containers 3 are being filled.

The mobile rotating element 15 includes substantially a circular section plate 16, coaxial with the carrousel 2, carrying the nozzles 13.

The circular section plate 16 is supported by a frame 17, driven into rotation, by not shown driving means, about the vertical axis of the carrousel 2.

A reciprocating actuator 18 drives the circular section plate 16 and moves it vertically with respect to the frame 17 between a raised position, in which the nozzles 13 are withdrawn from the containers 3 (fig. 6a), and a lowered position, in which the nozzles 13 are introduced into the containers 3 (fig. 6b).

The containers 3 to be filled, fed one by one by the conveying line 5, are transferred to the rotary carrousel 2 which subsequently brings them, with a step movement, to the filling station 6 and to the capping station 7.

When in the filling station 6, the containers 3 are connected to respective nozzles 13, supported by the mobile element 15.

For this purpose, the nozzles 13, initially arranged in the raised position, as shown with broken line 13a in fig. 5, are moved, by the vertical movement of the circular section plate 16 of the mobile element 15, to the lowered position, in which they are introduced into respective containers 3.

As has already been said, the moving element 15 carries a group of nozzles 13, spaced apart along the circular section 16.

In the illustrated case, there are three of these distributing nozzles 13, so as to fill simultaneously as many containers, for clarity indicated with 3A, 3B and 3C.

The containers fed subsequently by the conveying line 5 are indicated with 3D, 3E and 3F (see fig. 1).

Obviously, it is possible to provide a different number of nozzles 13.

After the nozzles 13 have been introduced into the aforementioned containers 3A, 3B and 3C, the mobile element 15 performs its working stroke, in synchrony with the carrousel 2 movement, so as to follow the said containers during their filling.

Therefore, one movement step of the containers 3A, 3B and 3C coincides with one movement step of the distributing nozzles 13, supported by the moving element 15.

At the same time, a subsequent container 3D is fed to the carrousel 2 by the conveying line 5 (fig. 2).

Likewise, further movement by a step of the containers 3A, 3B and 3C, as well as of the distributing nozzles 13 connected therewith, causes simultaneous transferring of subsequent containers 3E and 3F to be filled (fig. 3).

When the filing step is completed, the group of the nozzles 13 is brought to the raised position, so as to be withdrawn from the containers 3A, 3B and 3C, and the mobile element 15 performs its return idle stroke to return to the initial position, in direction opposite to the carrousel 2 movement direction, and fill a subsequent group of containers 3D, 3E and 3F.

It is to be noted that it is not necessary to stop the carrousel 2 movement to withdraw the distributing nozzles 13 from the containers 3 after the filling step had been completed, as indicated with broken line 15a in fig. 3.

Thus it is possible to reduce idle times, since the whole return stroke of the moving element 15 can be performed during the carrousel 2 moving cycle.

After the return stroke of the moving element 15, the group of distributing nozzles 13 is brought back to the lowered position, so as to fill the subsequent group of containers 3D, 3E and 3F, in the previously described way (fig. 4).

When the containers 3D, 3E and 3F are filled, the previously filled containers 3A, 3B and 3C move stepwise, carried by the carrousel 2, toward the capping station 7, where they are capped and then brought to the exit line 11.

Practically, the containers 3 filled with a determined amount of liquid are sent one by one to the capping station 7 and are capped separately with a cap 9 by capping means 8 of the aforementioned station 7 in time relation with the stepwise movement of the carrousel 2.

Substantially, during each principal cycle of the carrousel 2, including the movement and dwell steps, one single container 3 is capped.

Obviously, it is possible to cap the containers 3 in two subsequent steps; in this case two containers 3 are present in the capping station 7 at the same time, as shown in the drawings.

It is also possible for the capping means 8 to provide a double cap on the containers 3, according to known techniques.

Consequently, one of the features of the subject apparatus includes simple capping means which operate on one single container during each main cycle of the carrousel 2.

Therefore, the described apparatus achieves the object of filling and capping containers in a simple and very productive way.

In fact, the containers are filled during the stepwise movement of the carrousel, the speed of which is determined by the capping means speed, so as a high throughput is obtained.

From the other side, the containers are capped by simple capping means, which results in the apparatus simplicity and cost saving.

Claims

1. Apparatus for filling and capping containers (3) characterised in that it includes a rotary carrousel (2), equipped with housings (4) made therein peripherally and angularly spaced apart, said rotary carrousel (2) being driven in stepwise movement, wherein each step corresponds to the angular distance between two adjacent housings (4) carrying the containers (3) to be filled, with this last mentioned containers fed by a conveying line (5) to a station (6), where said containers (3) are filled with a liquid, and then to a container capping station (7) where the filled containers (3) are capped;
a rotating element (15), situated in said filling station and carrying a group of liquid ejecting means (13) connected to respective containers (3), said mobile element (15) being situated over the carrousel (2) and operated in two strokes, i.e. a working stroke, performed in synchrony with the carrousel (2) forward movement, in which the containers (3) are

filled, and a return stroke, performed in the direction opposite to the carrousel (2) movement.

2. Apparatus, according to claim 1, characterised in that said liquid ejecting means (13) are carried by said mobile element (15) with a possibility to be displaced vertically by a suitable actuator between a raised position, in which they are withdrawn from said containers (3) and a lowered position, in which they are introduced into said containers (3).

3. Apparatus, according to claim 1, characterised in that said mobile element (15) includes a circular section plate (16), concentric with said carrousel (2) and carried, with a possibility to move vertically between a raised and a lowered position, by a frame (17) which is rotated angularly about the vertical axis of the carrousel (2), said circular section plate (16) supporting said ejecting means (13) spaced apart.

4. Apparatus, according to claim 1, characterised in that said container capping station (7) is equipped with capping means (8) for capping single containers (3), fed one by one to said container capping station (7) during a principal cycle of said carrousel (2).

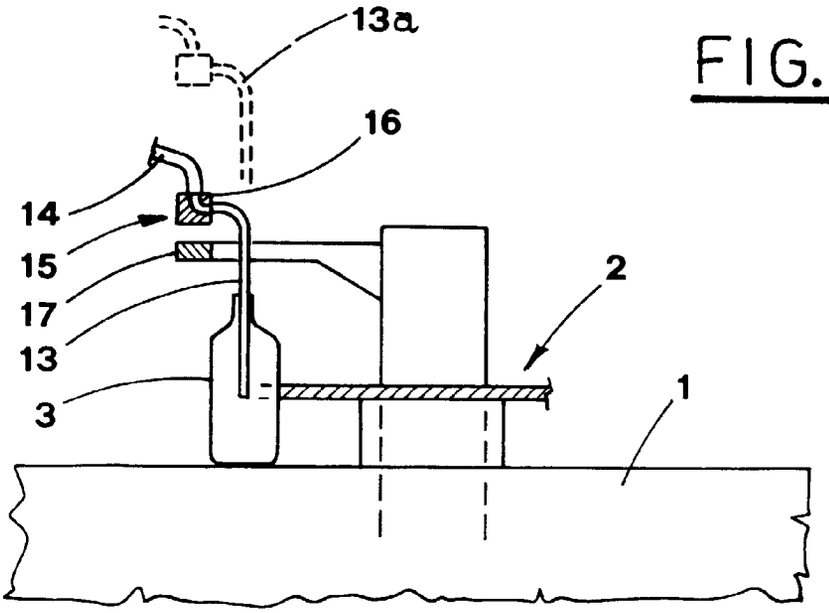

13a
16
14
15
17
13
3
2
1

FIG. 5

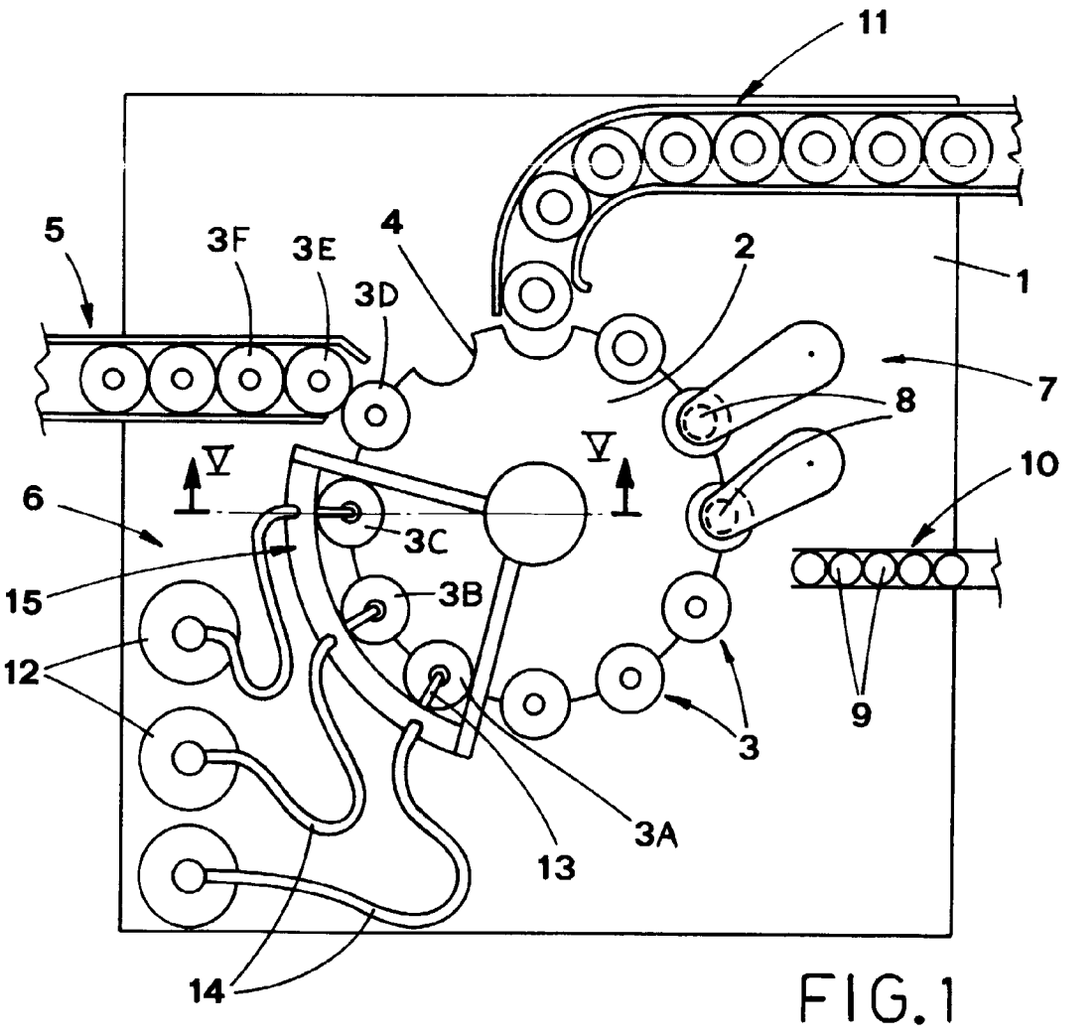

11
5
3F
3E
4
3D
2
1
7
8
V
V
10
6
3C
15
3B
12
3
9
3A
13
14

FIG. 1

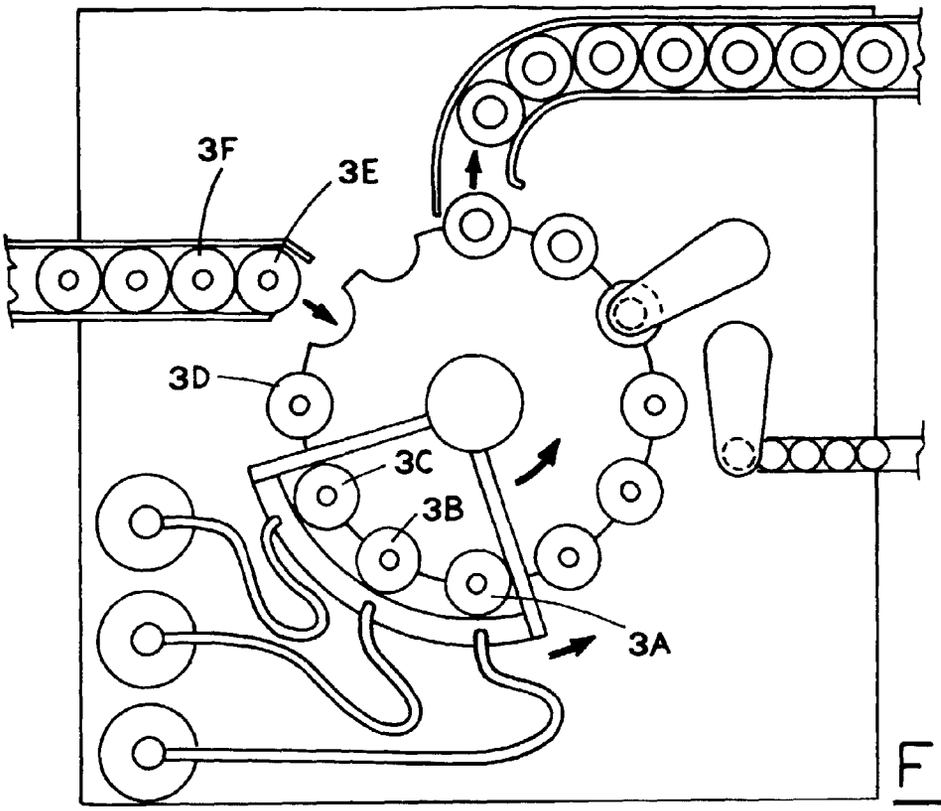


FIG.2

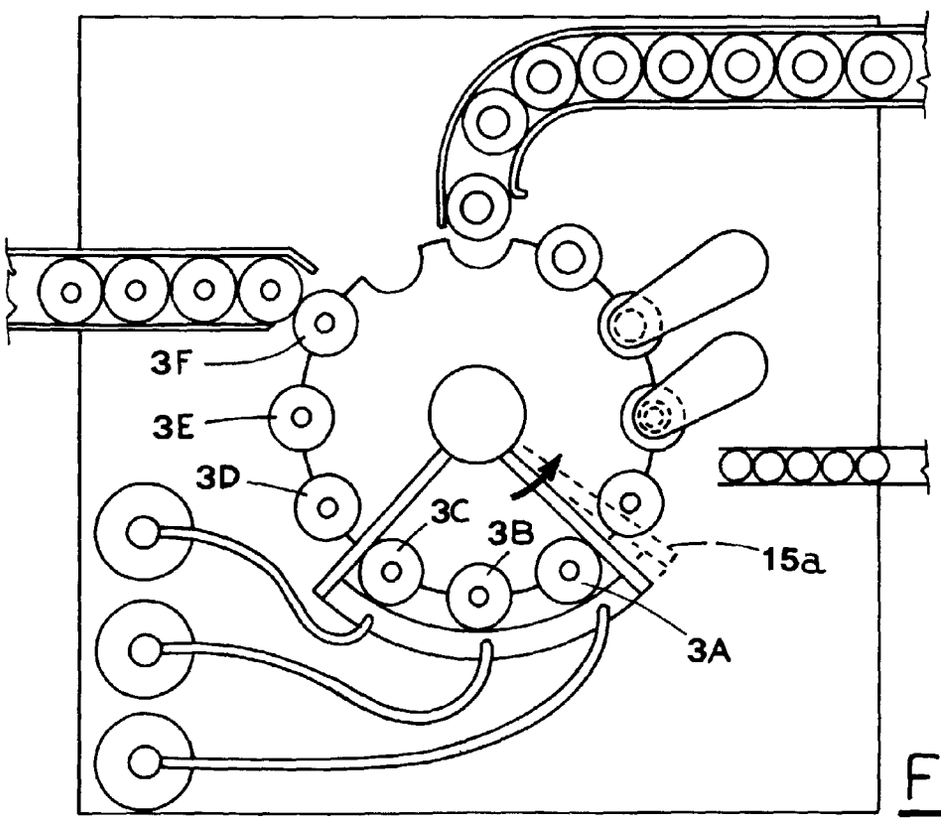


FIG.3

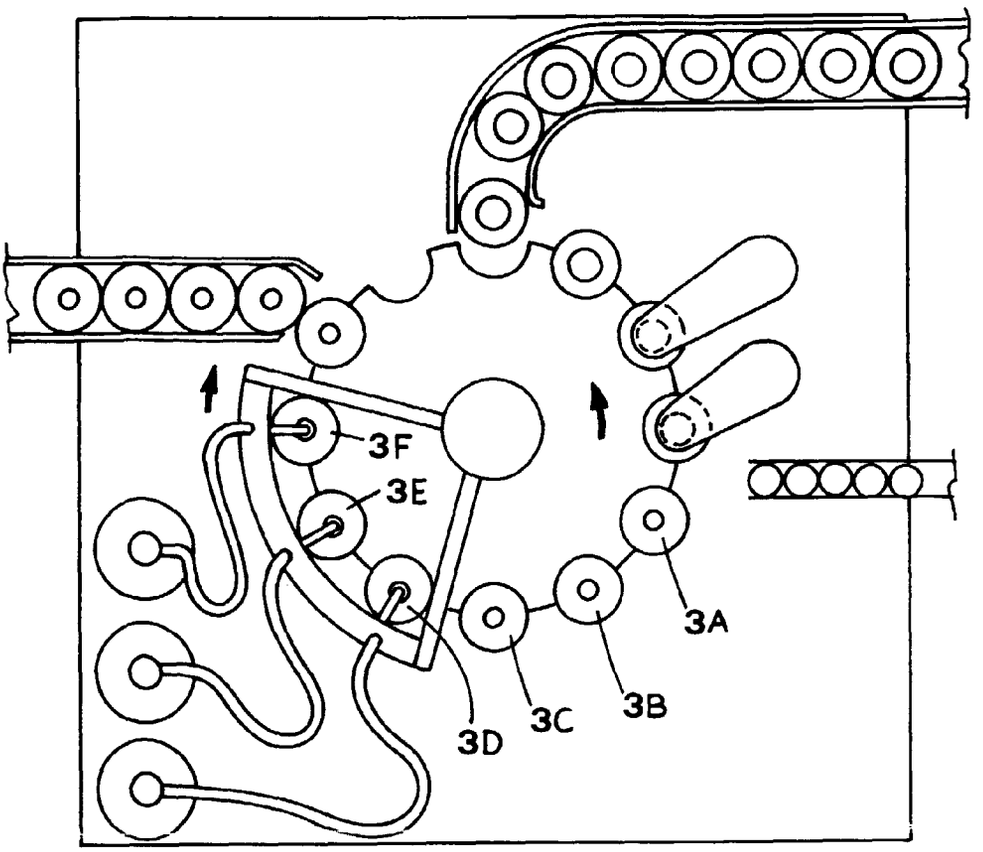


FIG.4

FIG.6a

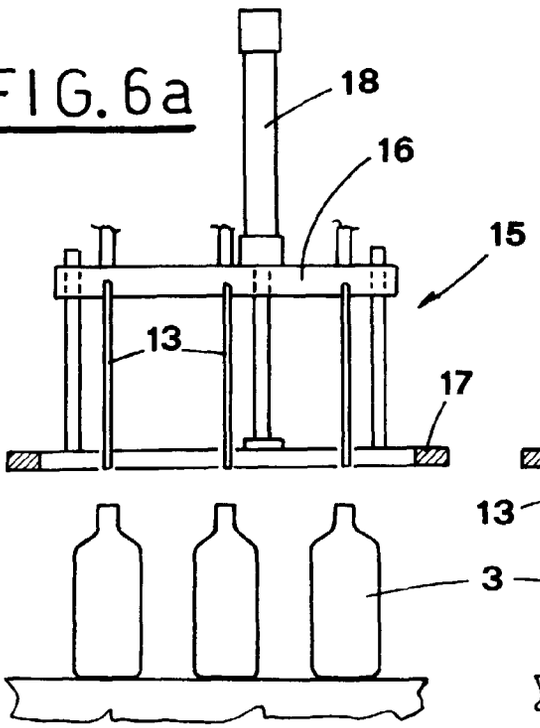
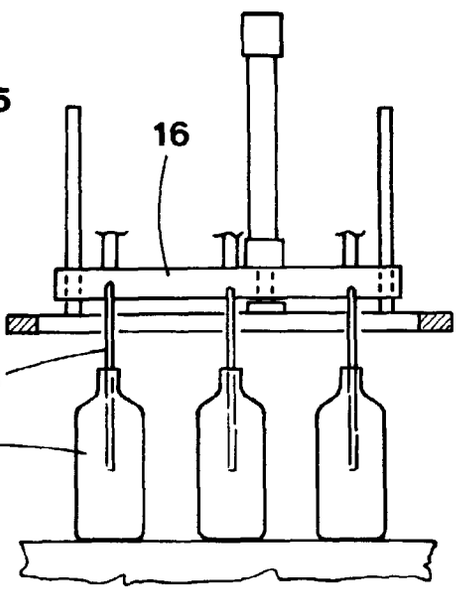


FIG.6b



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EUROPEAN SEARCH REPORT

Application Number
EP 97 83 0147

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.6)
X	US 4 159 608 A (S. MASUDA ET AL.) * column 2, line 41 - column 3, line 56 * * figures 1,2 *	1-4	B67C7/00
X	DE 37 40 128 A (K. QUETSCH) * the whole document *	1-4	
A	DE 37 40 942 A (K. QUETSCH) * column 2, line 25 - column 3, line 13 * * figure 1 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 June 1997	Smolders, R

CATEGORY OF CITED DOCUMENTS

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