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(54) **Bottling plant and line for conveying containers**

(57) A bottling plant has a filling unit (3) to feed a product into the containers (2); a capping unit (4) to close the containers (2) with respective caps (5); a labelling unit (6) to label the containers (2); a plurality of starwheels (13) connected to one another so as to feed the contain-

ers (2), in sequence, from the capping unit (4) to the labelling unit (6) along a path (P); and at least a control and discard unit (18a, 18b), which is mounted along the path (P) so as to control the containers (2) after capping and discard defective containers (2).

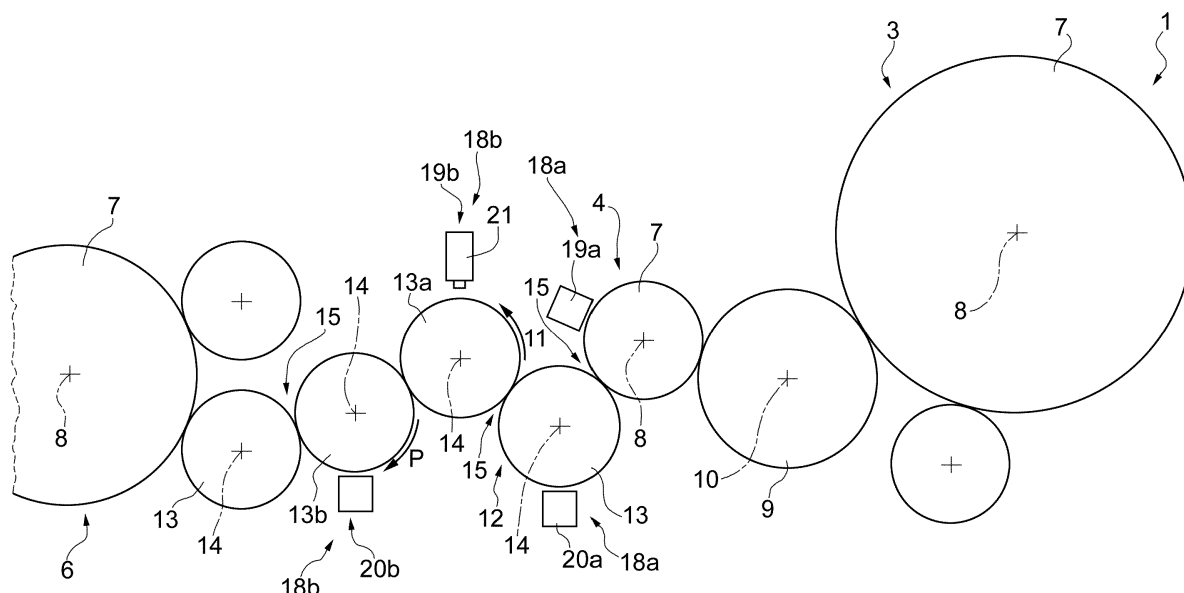


FIG.1

Description

[0001] The present invention relates to a bottling plant.

[0002] In particular, the present invention relates to a bottling plant of the type comprising a blowing unit to blow the containers starting from relative preforms; a filling unit to feed a product into the containers; a capping unit to close the containers with relative caps; and a labelling unit to label the containers with relative labels.

[0003] Since caps that are not correctly mounted on the relative containers cause a pressure drop in the containers themselves during labelling and, thus, jeopardize the correct application of the relative labels, known bottling plants of the type described above are affected by some drawbacks that are mainly due to the fact that the defective containers are discharged downstream of the labelling unit with a consequent waste of the relative labels and loss of machine efficiency.

[0004] It is an object of the present invention to provide a bottling plant, which is designed to eliminate the aforementioned drawbacks in a straightforward, relatively low-cost manner.

[0005] According to the present invention, there is provided a bottling plant according to the claims from 1 to 8.

[0006] A further object of the present invention is to provide a line for conveying containers, in particular bottles, to feed the containers through the bottling plant.

[0007] According to the present invention, there is provided a line for conveying containers, in particular bottles, according to the claims from 9 to 16.

[0008] The present invention will now be described with reference to the accompanying drawings, which show a nonlimiting embodiment, wherein:

figure 1 shows a schematic plan view, with parts removed for greater clarity, of a preferred embodiment of the bottling plant according to the present invention;

figure 2 shows a schematic perspective view, with parts removed for greater clarity, of a detail of the bottling plant of figure 1; and

figure 3 shows a schematic perspective view, with parts removed for greater clarity, of a variant of the detail of figure 2.

[0009] With reference to figure 1, number 1 indicates, as a whole, a bottling plant for bottling products, in particular, in PET bottles 2.

[0010] The plant 1 comprises, in sequence and in this order, a blowing unit of the known type (not shown) to blow the bottles 2 starting from relative preforms (not shown); a filling unit 3 to feed a product into the bottles 2; a capping unit 4 to close each bottle 2 with a relative cap 5; and a labelling unit 2 to label the bottles 2 with relative labels (not shown).

[0011] Each unit 3, 4, 6 comprises a starwheel 7, which is mounted so as to continuously rotate around a rotation axis 8 that is substantially vertical and perpendicular to

the plane of the sheet of figure 1.

[0012] The starwheels 7 of units 3 and 4 are connected to one another by a starwheel 9, which is mounted so as to continuously rotate around a rotation axis 10 that is parallel to the axes 8.

[0013] The bottles 2 are transferred from the unit 4 to the unit 6 along a path P and in a feeding direction 11 by means of a conveying line 12.

[0014] The line 12 comprises a plurality of starwheels 13 (in particular, four starwheels 13), which are mounted so as to continuously rotate around respective rotation axes 14, which are substantially vertical and parallel to the axes 8, 10, and are connected to one another in correspondence to relative transfer stations 15.

[0015] Each starwheel 13 is provided with a plurality of grippers 16, which are uniformly distributed around the relative axis 14 and are configured to each receive and hold a relative bottle 2.

[0016] Each gripper 16 comprises two jaws 17, which are mobile between a clamping position and a release position, in which they clamp and release, respectively, a relative bottle 2, and are moved to - as well as kept in - their clamping position by a spring (not shown).

[0017] The plant 1 comprises, furthermore, two control and discard units 18a, 18b, which are mounted along the path P so as to control the correct application of the caps 5 on the relative bottles 2 and discard defective bottles 2.

[0018] The first unit 18a comprises a first control device 19a, which is mounted in correspondence to the capping unit 4 immediately upstream of the transfer station 15 between the capping unit 4 and the following starwheel 13.

[0019] The control device 19a is configured so as to control the presence of the caps 5 on the relative bottles 2.

[0020] The first unit 18a further comprises a first discard device 20a, which is mounted in correspondence to the starwheel 13 that follows the capping unit 4 so as to discard bottles 2 without caps 5 in response to a signal of the device 19a itself.

[0021] The second unit 18b comprises a second control device 19b, which is mounted in correspondence to a first starwheel 13 (hereinafter referred to as starwheel 13a) so as to control the correct application of the caps 5 on the relative bottles 2, and a second discard device 20b, which is mounted in correspondence to a second starwheel 13 (hereinafter referred to as drum 13b) so as to discard defective bottles 2 in response to a signal of the device 19b itself.

[0022] Obviously, the starwheel 13b is mounted downstream of the starwheel 13a in the direction 11.

[0023] The first control device 19a preferably comprises a fibre optic sensor for detecting the presence of the caps 5 on the relative bottles 2 in the capping unit 4.

[0024] The second control device 19b preferably comprises a video camera 21, which is mounted in a position facing the path P and is arranged so as to control the correct application of the caps 5 on the relative bottles 2.

[0025] The devices 20a, 20b comprise, for each grip-

per 16, a respective cam follower 22, which is supported by one of the relative jaws 17 and is mounted so as to rotate around a rotation axis 23 that is parallel to the axes 14.

[0026] Each device 20a, 20b comprises, furthermore, a vertical upright 24, which extends upwards in a direction 25 that is parallel to the axes 14 and supports two guide pins 26 that project from the upright 24 in a direction 27 that is substantially horizontal and transverse to the direction 25 itself.

[0027] The two pins 26 are engaged in a sliding manner by a plate 28, which is mounted perpendicular to the direction 27 and is moved in the direction 27 itself by an actuating cylinder 29, which is fixed to the upright 24 and has an output rod 30 connected to the plate 28.

[0028] Each device 20a, 20b comprises, finally, a cam 31, which is fixed to the plate 28 and is moved by the cylinder 29 between a forward operating position, in which the cam 31 projects into the feeding path of the cam followers 22 so as to move the jaws 17 of a given gripper 16 to their release position in which they release the relative bottle 2, and a backward rest position, in which the cam 31 is arranged outside the feeding path of the cam followers 22 so as to allow the grippers 16 to remain in their clamping positions in which they clamp the relative bottles 2.

[0029] The variant shown in figure 3 differs from figure 2 only due to the fact that, therein, each discard device 20a, 20b is removed and replaced with a discard device 32 comprising the cam followers 22 and comprising, furthermore, a support plate 33, which is fixed to a frame (not shown) of the starwheel 13b perpendicular to the direction 25.

[0030] It will be understood that the variants of figures 2 and 3 may be used according to needs.

[0031] The device 32 comprises, furthermore, a cam 34, which is hinged to the plate 33 so as to rotate, relative to the plate 33 itself, around a fulcrum axis 35 that is parallel to the direction 25.

[0032] The cam 34 is moved between its forward operating position and its backward rest position by an actuating cylinder 36, which is mounted on the plate 33 and has an output rod 37 that is coupled to the cam 34 itself in a rotary manner.

[0033] The way in which the control and discard units 18a, 18b operate can easily be deduced from the description above and, therefore, does not require further explanations.

[0034] The first control and discard unit 18a allows bottles 2 that were not capped to be detected and immediately rejected from the bottling plant 1.

[0035] The second control and discard unit 18b allows bottles 2 that have caps 5, but are not capped correctly to be discarded upstream of the labelling unit 6 in the direction 11, thus avoiding the application of labels (not shown) on the bottles 2 to be discarded.

[0036] Furthermore, the configuration of the conveying line 12, defined by a succession of starwheels 13, allows

the bottles 2 to be transferred from the capping unit 4 to the labelling unit 6 in a relatively quick fashion and along a relatively short path P. Moreover, in this way, possible intermediate storage hoppers or baskets to store the bottles 2 can be eliminated.

Claims

1. A bottling plant comprising a filling unit (3) to feed a product into relative containers (2); a capping unit (4) to close the containers (2) with respective caps (5); a labelling unit (6) to label the containers (2); and a conveying line (12) to feed the containers (2), in sequence, from the capping unit (4) to the labelling unit (6) along a path (P); and being **characterised in that** it comprises, furthermore, a control and discard apparatus (18a, 18b) to control the containers (2) after capping and discard defective containers (2); the conveying line (12) comprising a plurality of starwheels (13), which are arranged in sequence so as to transfer the containers (2) from the capping unit (4) to the labelling unit (6) along the path (P).
2. A bottling plant according to claim 1, wherein the control and discard apparatus (18a, 18b) comprises a first control and discard unit (18a) to control the presence of the caps (5) on the relative containers (2) and to discard containers (2) without caps (5) and a second control and discard unit (18b) to control the correct application of the caps (5) on the relative containers (2) and to discard defective containers (2) that are not correctly capped.
3. A bottling plant according to claim 2, wherein the first control and discard unit (18a) comprises a first control device (19a), which is mounted in correspondence to the capping unit (4) to control the presence of the caps (5) on the relative containers (2), and a first discard device (20a), which is mounted in correspondence to a starwheel (13) of the conveying line (12) to discard containers (2) without caps (5) in response to a signal of the first control device (19a).
4. A bottling plant according to claim 3, wherein the first control device (19a) comprises a fibre optic sensor facing the path (P).
5. A bottling plant according to any of the claims from 2 to 4, wherein the second control and discard unit (18b) comprises a second control device (19b), which is mounted in correspondence to a first starwheel (13a) so as to control the correct application of the caps (5) on the relative containers (2), and a second discard device (20b), which is mounted in correspondence to a second starwheel (13b) so as to discard defective containers (2) that are not correctly capped in response to a signal of the second

control device (19b).

6. A bottling plant according to claim 5, wherein the second control device (19b) comprises a video camera (21) facing the path (P). 5
7. A bottling plant according to any of the preceding claims, wherein each starwheel (13) comprises a plurality of pockets (16), which are distributed around a rotation axis (14) of the starwheel (13) itself and are configured to each receive and hold a relative container (2). 10
8. A bottling plant according to claim 7, wherein each pocket (16) comprises at least one locking member (17), which is mobile between a locking position and a release position, in which it locks and releases, respectively, the relative container (2); the control and discard apparatus (18a, 18b) comprising at least an operating member (31; 34) to move the locking member (17) from its locking position to its release position. 15
9. A bottling plant according to claim 8, wherein the operating member (31; 34) is mobile between an operating position, in which the operating member (31; 34) engages the locking member (17) so as to move it to its release position, and a rest position. 20
10. A bottling plant according to any of the claims from 7 to 9, wherein each pocket (16) comprises a pair of jaws (17), which are mobile relative to one another between a locking position and a release position in which they lock and release, respectively, the relative container (2), and an elastic thrust device to move the jaws (17) to their locking position and normally keep them there. 25
11. A bottling plant according to claim 10, wherein the control and discard apparatus (18a, 18b) comprises, for each pocket (16), a respective cam follower (22), which is supported by a relative jaw (17), and comprises, furthermore, at least a cam (31; 34), which is selectively mobile between an operating position, in which the cam (31; 34) is engaged by the cam follower (22) so as to move the relative jaws (17) to their release position, and a rest position. 30
12. A line for conveying containers (2), in particular bottles, the conveying line comprising a pocket conveyor (4, 13), which feeds the containers (2) along a path (P) and has a plurality of pockets (16), each of which is suited to receive and hold a relative container (2) and comprises at least one locking member (17), which is mobile between a locking position and a release position, in which it locks and releases, respectively, the container (2) itself; and at least a discard device (20a, 20b; 32), which is mounted along the path (P) so as to discard defective containers (2); and being **characterised in that** the discard device (20a, 20b; 32) comprises an operating member (31; 34) to move the locking member (17) from its locking position to its release position. 35
13. A conveying line according to claim 12, wherein the operating member (31; 34) is mobile between an operating position, in which the operating member (31; 34) engages the locking member (17) so as to move it to its release position, and a rest position. 40
14. A conveying line according to claim 12 or 13, wherein each pocket (16) comprises a pair of jaws (17), which are mobile relative to one another between said locking and release positions, and an elastic thrust device to move the jaws (17) to their locking position and normally keep them there. 45
15. A conveying line according to claim 14, wherein the discard device (20a, 20b; 32) comprises, for each pocket (16), a respective cam follower (22), which is supported by a relative jaw (17), and comprises, furthermore, a cam (31; 34), which is selectively mobile between an operating position, in which the cam (31; 34) is engaged by the cam follower (22) so as to move the relative jaws (17) to their release position, and a rest position. 50
16. A conveying line according to any of the claims from 12 to 15 and comprising at least a control device (19a, 19b), which is mounted along the path (P) so as to control the containers (2); the operating member (31; 34) of the discard device (20a, 20b; 32) being configured to move the locking member (17) from its locking position to its release position in response to a signal of the control device (19a, 19b) itself. 55
17. A conveying line according to claim 16, wherein the control device (19a, 19b) comprises a video camera (21) or a fibre optic sensor facing the path (P).
18. A conveying line according to any of the claims from 12 to 17 and comprising a plurality of starwheels (13), which are arranged in sequence so as to feed the containers (2) along the path (P).
19. A conveying line according to claim 18, when it depends on claim 16 or 17, wherein the control device (19a, 19b) is mounted in correspondence to a first starwheel (13a) so as to control the containers (2) and the discard device (20a, 20b; 32) is mounted in correspondence to a second starwheel (13b) so as to discard defective containers (2) in response to a signal of the control device (19a, 19b) itself.

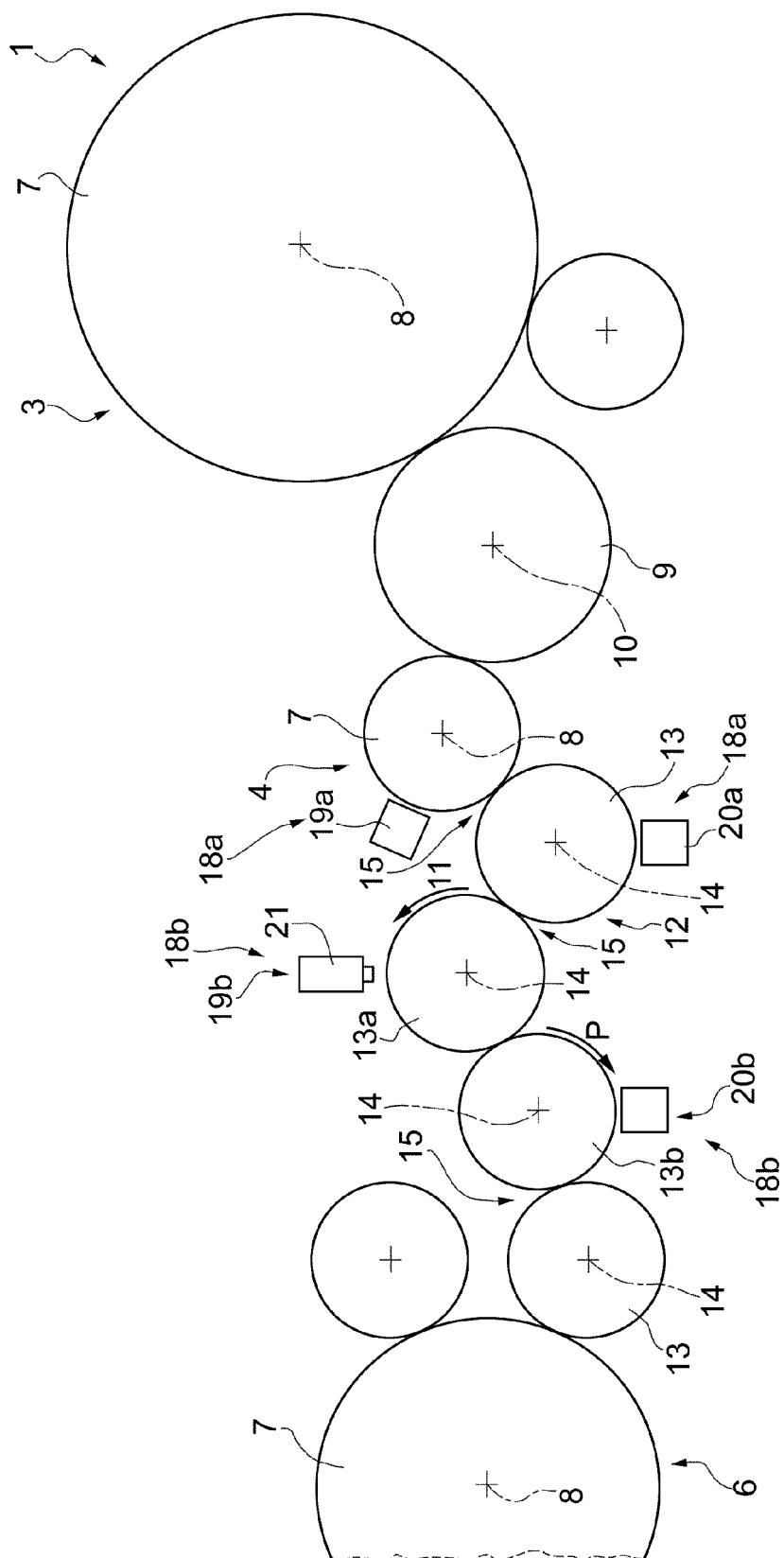


FIG. 1

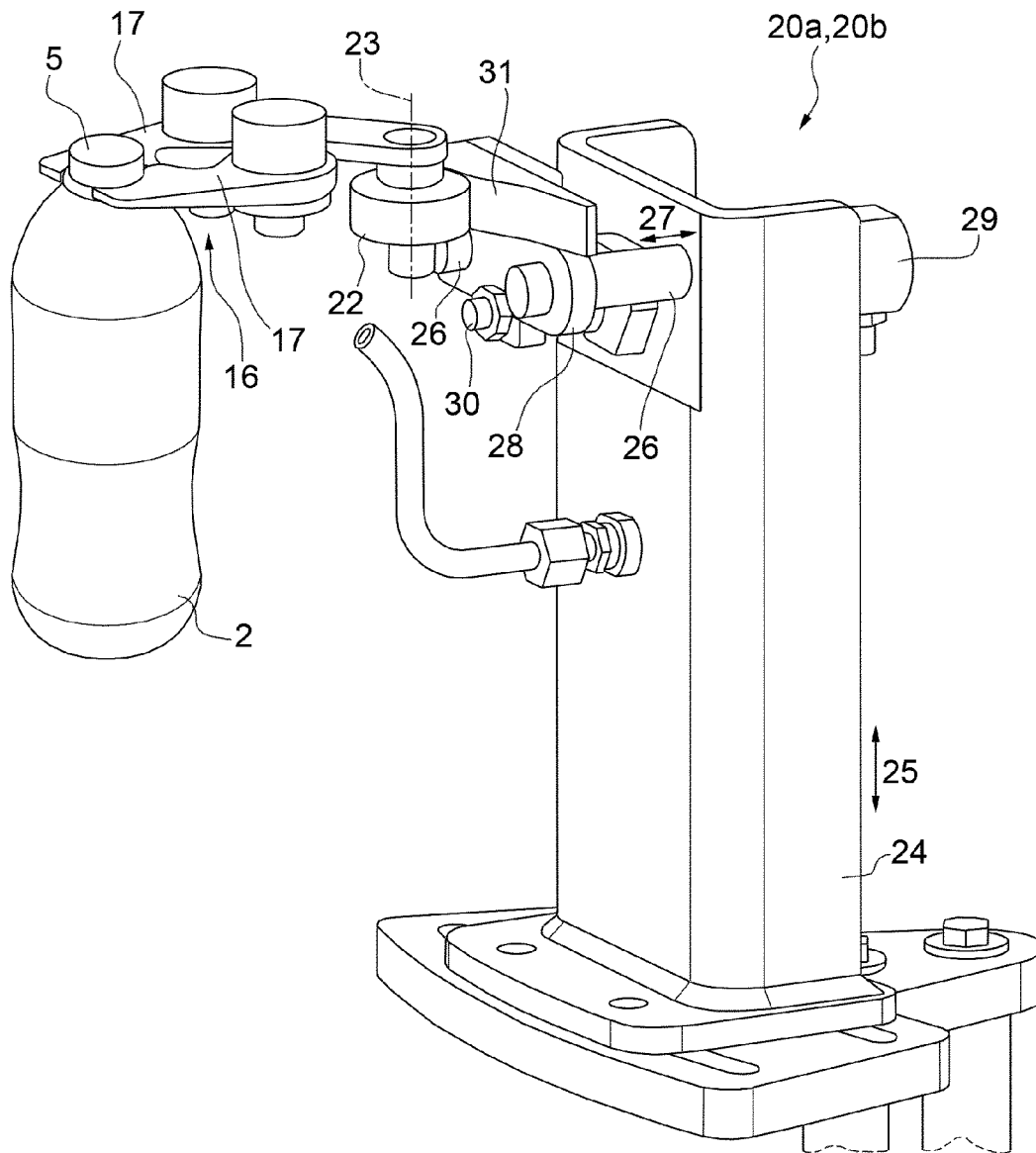


FIG.2

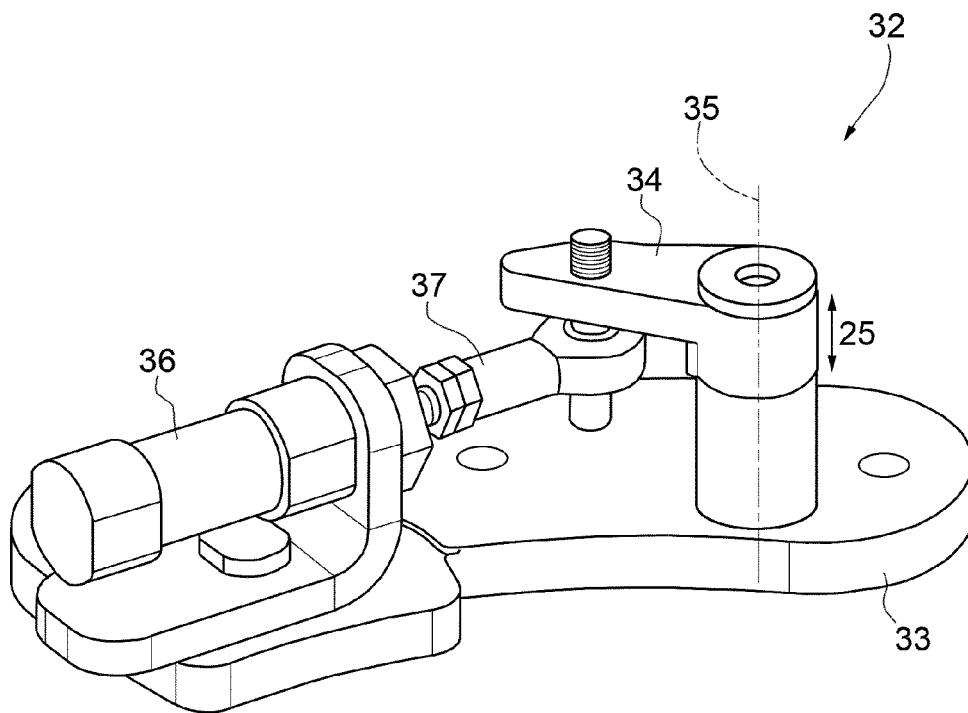


FIG.3



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 January 2015	Examiner Pardo Torre, Ignacio
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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EUROPEAN SEARCH REPORT

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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			

EPO FORM 1503 03.82 (P04C01)



Application Number

EP 14 16 7076

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 14 16 7076

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7

Bottling plant comprising a control and discard apparatus with a first and a second unit.

2. claims: 8-19

Conveying line comprising a locking member with a locking and a release position.

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

EP 14 16 7076

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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