

(19)



(11)

EP 2 927 140 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.10.2015 Bulletin 2015/41

(51) Int Cl.:
B65C 9/00 (2006.01) **B65C 9/06** (2006.01)
F26B 15/04 (2006.01)

(21) Application number: **14163277.8**

(22) Date of filing: **02.04.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(72) Inventors:
• **Carmichael, James**
43100 PARMA (IT)
• **Ferri, Marco**
43100 PARMA (IT)

(71) Applicant: **Sidel S.p.a. Con Socio Unico**
Parma (IT)

(74) Representative: **Manconi, Stefano et al**
Studio Torta S.p.A.
Via Viotti, 9
10121 Torino (IT)

(54) **Plant for producing filled containers with drying unit**

(57) A plant for producing filled containers (2), in particular bottles, comprises a blowing unit (5) to blow the containers (2) starting from relative preforms; a filling unit (6) to feed a product into the containers (2); a capping unit (7) to close the containers (2) with respective caps

(8); a labelling unit (9) to label the containers (2); and a drying unit (20), which is mounted between the capping unit (7) and the labelling unit (9) so as to dry the containers (2).

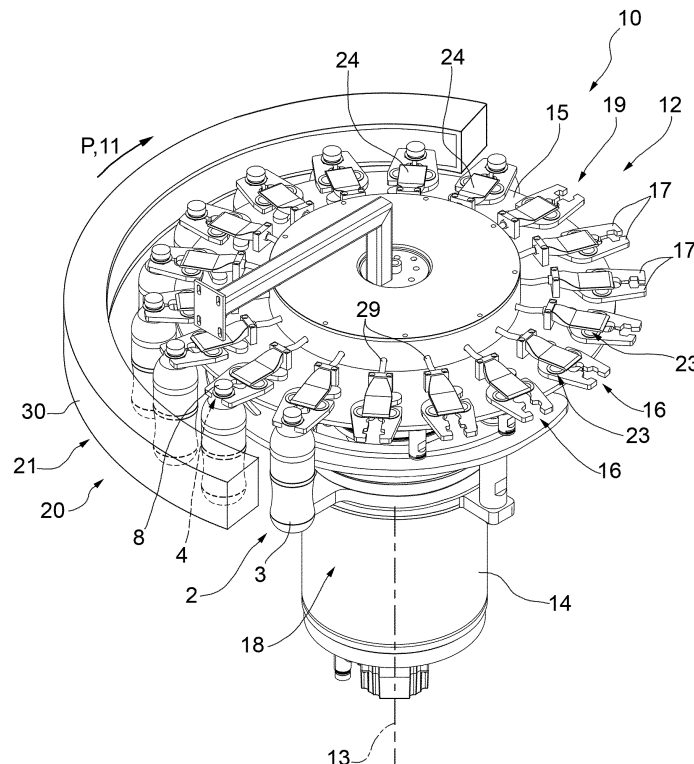


FIG.2

EP 2 927 140 A1

Description

[0001] The present invention relates to a plant for producing filled containers, in particular bottles.

[0002] In the bottling technical field, it is known to manufacture a plant 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 respective caps; and a labelling unit to label the containers.

[0003] Known bottling plants of the type described above have some drawbacks, which are mainly due to the fact that, during filling and capping, the outer surface of the containers can get wet and/or dirty, thus jeopardizing the correct application of the labels.

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

[0005] According to the present invention, a plant for producing filled containers, in particular bottles, is provided according to claims 1-3.

[0006] Furthermore, it is an object of the present invention to provide a line for conveying containers, in particular bottles, through a bottling plant, which is able to ensure an efficient drying of the containers before their labelling.

[0007] According to the present invention, a line for conveying containers, in particular bottles, is provided according to the claims from 4 to 18 and from 19 to 28.

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

figure 1 schematically shows the layout 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 first detail of the bottling plant of figure 1;

figure 3 shows a schematic plan view, with parts in section and parts removed for greater clarity, of the detail of figure 2; and

figures 4 and 5 show two schematic perspective views, with parts removed for greater clarity, of a second detail of the bottling plant of figure 1.

[0009] With reference to figures 1 and 2, number 1 indicates, as a whole, a plant for producing filled containers defined, in this particular case, by bottles 2, each of which is made of a PET plastic material and comprises a main body 3 and an end neck 4, which is threaded on the outside.

[0010] The plant 1 comprises, in sequence and in this order, a blowing unit 5 of the known type to blow the bottles 2 starting from relative preforms (not shown); a filling unit 6 to feed a product into the bottles 2; a capping

unit 7 to close each bottle 2 with a relative cap 8, which is threaded so as to be screwed onto the relative neck 4; and a labelling unit 9 to label the bottles 2.

[0011] The plant 1 comprises, furthermore, a conveying line 10 to transfer the bottles 2 from the capping unit 7 to the labelling unit 9 along a given path P and in a given feeding direction 11.

[0012] According to the figures from 2 to 5, the line 10 comprises a plurality of feeding drums 12 (only two of them are shown in the figures from 2 to 5), which are mounted so as to continuously rotate around respective substantially vertical rotation axes 13 and are connected to one another in correspondence to relative transfer stations (not shown).

[0013] Each drum 12 comprises a vertical upright 14, which is mounted so as to rotate around the relative axis 13 and supports an upper disc 15, which is coupled to the upright 14 in an angularly fixed manner and is provided with a plurality of pockets 16, which are uniformly distributed around the axis 13 so as to each receive and hold a relative bottle 2.

[0014] Each pocket 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 configured to hold the bottle 2 itself in correspondence to the neck 4 under the cap 8.

[0015] Each pocket 16 is fed by the relative drum 12 along a portion of the path P and through an inlet station 18 to let the bottles 2 into the drum 12 and an outlet station 19 to let the bottles 2 out of the drum 12 itself.

[0016] The plant 1 comprises, furthermore, a drying unit 20, which is arranged along the path P between the capping unit 7 and the labelling unit 9 so as to dry the bottles 2.

[0017] The unit 20 comprises, in sequence and in this order, a first drying assembly 21 to dry the bottles 2 in correspondence to the relative necks 4 and caps 8 (figures 2 and 3) and a second drying assembly 22 to dry the bottles 2 in correspondence to the relative bodies 3 (figures 4 and 5).

[0018] With reference to figures 2 and 3, the assembly 21 is associated, in particular, with one single drum 12 and comprises, for each pocket 16 of the drum 12 taken into account, a respective drying device 23, which is fixed to the relative disc 15 and is fed around the relative axis 13 and along the path P with the same law of motion as the drum 12 and, therefore, as the pocket 16 itself.

[0019] Each device 23 comprises a pneumatic nozzle 24, which is fixed to the disc 15 above the jaws 17 of the relative pocket 16, substantially has the shape of a duck foot, and is provided with an outlet section that is substantially rectangular and faces the neck 4 and the cap 8 of the relative bottle 2.

[0020] During the movement from the inlet station 18 to the outlet station 19, the nozzles 24 are connected to a pneumatic feeding device 25 comprising a pneumatic distributor 26 with a cylindrical shape, which is fixed to a support frame of the drum 12 taken into account, is

mounted inside the relative upright 14 coaxial to the relative axis 13, and is engaged in a rotatory manner by the upright 14 itself.

[0021] The distributor 26 has a manifold 27, which is obtained on an outer surface of the distributor 26, radially faces the upright 14, and extends around the axis 13 from the station 18 to the station 19 in the direction 11.

[0022] The manifold 27 is connected to a source of gas under pressure, in particular air under pressure, by means of a feeding duct 28 coaxial to the axis 13, and is engaged in sequence by a plurality of feeding ducts 29, which are radially obtained through the upright 14 and are each connected to a relative nozzle 24.

[0023] With reference to what described above, it should be pointed out that the feeding of air under pressure to the nozzles 24 can be selectively controlled by means of a valve device (not shown), which is mounted in the distributor 26, or by means of a plurality of solenoid valves (not shown), which are each mounted in a respective duct 29.

[0024] The assembly 21 comprises, furthermore, a suction manifold 30, which extends around the axis 13 from the station 18 to the station 19 in the direction 11, is mounted on the opposite side of the nozzles 24 relative to the path P of the bottles 2, and is connected to a known pneumatic sucking device, which is not shown.

[0025] By combining the action of the nozzles 24 with the action of the manifold 30, the neck 4 and the cap 8 of each bottle 2 are dried by a substantially laminar flow of air under pressure, which is fed through the relative nozzle 24 and sucked by the manifold 30.

[0026] According to some embodiments that are not shown:

the nozzles 24 are removed and replaced with one or more pneumatic nozzles, which are fixed to the support frame of the drum 12 taken into account above the disc 15; and

the manifold 30 is removed and the air under pressure fed through the nozzles 24 is dispersed in the outer environment.

[0027] According to figures 4 and 5, the assembly 22 is associated, in particular, with at least two drums 12 (only one of them is shown in figures 4 and 5) and comprises, for each drum 12, two respective pneumatic manifolds 31, 32, which are mounted on opposite sides of the path P of the bottles 2 and extend around the relative axis 13 from the station 18 to the station 19 in the direction 11.

[0028] The manifolds 31, 32 of each drum 12 extend in respective containing planes that are parallel to one another and perpendicular to the relative axis 13, and are connected to a source of gas under pressure, in particular air under pressure.

[0029] Each manifold 31 is external to the path P, is mounted above the relative manifold 32, and cooperates with a plurality of substantially vertical columns 33, which

project downwards from the manifold 31 and have a length that is measured parallel to the axis 13 and increases in the direction 11.

[0030] The columns 32 have respective outlet mouths 34, which are oriented towards the body 3 of the bottles 2 and are arranged at a height from the ground that decreases in the direction 11.

[0031] Each manifold 32 is internal to the path P and cooperates with a plurality of substantially vertical columns 35, which project upwards from the manifold 32 and have a length that is measured parallel to the axis 13 and decreases in the direction 11.

[0032] The columns 35 have respective outlet mouths 36, which are oriented towards the body 3 of the bottles 2 and are arranged at a height from the ground that decreases in the direction 11.

[0033] The mouths 34 can be radially aligned with corresponding mouths 36 or tangentially staggered relative to the mouths 36 themselves.

[0034] By combining the action of the mouths 34 with the action of the mouths 36, the body 3 of each bottle 2 is dried from the top to the bottom, thus causing product remains lying on the outer surface of the body 3 itself to progressively slide downwards.

[0035] The plant 1 leads to advantages that are mainly due to the fact that the introduction of the drying unit 20 between the capping unit 7 and the labelling unit 9 allows the bottles 2 to be dried before they get into the labelling unit 9, thus ensuring a correct labelling of the bottles 2 themselves.

[0036] Furthermore, the configuration of the drying assemblies 21, 22 allows the bottles 2 to be dried while they are being fed on the drums 12 and to be transferred from the capping unit 7 to the labelling unit 9 in a relatively quick fashion and along a relatively short path. Moreover, in this way, possible intermediate storage tanks to store the bottles 2 can be eliminated.

Claims

1. A plant for producing filled containers (2), in particular bottles, the plant comprising a blowing unit (5) to blow the containers (2) starting from relative pre-forms; a filling unit (6) to feed a product into the containers (2); a capping unit (7) to close the containers (2) with respective caps (8); and a labelling unit (9) to label the containers (2); and being **characterised in that** it comprises, furthermore, a drying unit (20), which is mounted between the capping unit (7) and the labelling unit (9) so as to dry the containers (2).
2. A plant according to claim 1, wherein each container (2) comprises a main body (3) and an end neck (4); the drying unit (20) comprising a first drying assembly (21) to dry the containers (2) in correspondence to the relative end necks (4) and to the relative caps (8) and a second drying assembly (22) to dry the

containers (2) in correspondence to the relative main bodies (3).

3. A plant according to claim 1 or 2 and comprising, furthermore, a plurality of feeding drums (12), which are arranged in sequence so as to transfer the containers (2) from the capping unit (7) to the labelling unit (9) along a path (P); the drying unit (20) being mounted along the path (P) itself.
4. A line for conveying containers (2), in particular bottles, each container (2) comprising a main body (3) and an end neck (4) that is closed by a relative cap (8), the conveying line comprising a plurality of pocket conveying devices (12), which are arranged in series relative to one another so as to feed the containers (2) along a path (P) and each have a respective plurality of pockets (16), which are each adapted to receive and hold a relative container (2); and a drying unit (20), which is mounted along the path (P) so as to dry the containers (2); and being **characterised in that** the drying unit (20) comprises, for each pocket (16) of at least one first pocket conveying device (12), a respective drying device (23); each drying device (23) and the relative pocket (16) being mobile along the path (P) with respective laws of motion that are substantially identical to one another.
5. A conveying line according to claim 4, wherein each drying device (23) comprises a pneumatic nozzle (24) to dry at least part of the relative container (2) with a flow of gas under pressure.
6. A conveying line according to claim 4 or 5, wherein each pocket (16) comprises a pick and place member (17), which is configured to hold the relative container (2) in correspondence to the end neck (4) under the cap (8); each drying device (23) being mounted above the relative pick and place member (17) so as to dry the relative container (2) in correspondence to the cap (8) and the end neck (4).
7. A conveying line according to any of the claims from 4 to 6 and comprising, furthermore, a suction manifold (27), which is mounted along the path (P) between an inlet (18) to let the containers (2) into said first pocket conveying device (12) and an outlet (19) to let the containers (2) out of said first pocket conveying device (12), is arranged on the opposite side of the drying devices (23) relative to the pockets (16), and is connected to a pneumatic sucking device.
8. A conveying line according to any of the claims from 4 to 7, wherein each pocket conveying device (12) comprises a feeding drum, which is mounted so as to rotate around a substantially vertical rotation axis (13) and comprises, in turn, a plurality of pick and place members (17) for the containers (2), which are

distributed along a peripheral edge of the feeding drum itself.

9. A conveying line according to claim 8, wherein the drying unit (20) comprises, for each pick and place member (17) of said first pocket conveying device (12), a respective pneumatic nozzle (24), which is fixed to the relative feeding drum so as to dry the relative container (2) in correspondence to the cap (8) and the end neck (4).
10. A conveying line according to claim 9, wherein the drying unit (20) comprises, furthermore, a fixed pneumatic distributor (26), which extends around said rotation axis (13) between an inlet (18) to let the containers (2) into the first pocket conveying device (12) and an outlet (19) to let the containers (2) out of the first pocket conveying device (12) and is connected to a device for feeding gas under pressure; each pneumatic nozzle (24) connecting to the fixed pneumatic distributor (26) after the movement of the feeding drum of the first pocket conveying device (12) around said rotation axis (13).
11. A conveying line according to claim 10, wherein the drying unit (20) comprises, furthermore, a valve device to selectively control the feeding of gas under pressure through the fixed pneumatic distributor (26).
12. A conveying line according to claim 9 or 10, wherein the drying unit (20) comprises, for each pneumatic nozzle (24), a respective solenoid valve to selectively control the feeding of gas under pressure through the pneumatic nozzle (24) itself.
13. A conveying line according to any of the claims from 4 to 12, wherein the drying unit (20) comprises, furthermore, for at least one second pocket conveying device (12), a drying assembly (22), which is configured to dry the main body (3) of the containers (2).
14. A conveying line according to claim 13, wherein the drying assembly (22) comprises at least one pneumatic manifold (31, 32), which extends along the path (P) in correspondence to the second pocket conveying device (12), is connected to a device for feeding gas under pressure, and has a plurality of outlets (34, 36), which are arranged at heights from the ground that are different from one another.
15. A conveying line according to claim 14, wherein the height from the ground of the outlets (34, 36) decreases in a feeding direction (11), in which the containers (2) are fed along the path (P).
16. A conveying line according to claim 14 or 15, wherein the drying assembly (22) comprises two pneumatic

manifolds (31, 32), which are provided with respective outlets (34, 36) mounted on opposite sides of the path (P).

17. A conveying line according to claim 16, wherein each outlet (34, 36) of one of the pneumatic manifolds (31, 32) substantially faces a corresponding outlet (34, 36) of the other pneumatic manifold (31, 32). 5
18. A conveying line according to claim 16, wherein the outlets (34) of one of the pneumatic manifolds (31, 32) are tangentially staggered relative to the outlets (36) of the other pneumatic manifold (31, 32). 10
19. A line for conveying containers (2), in particular bottles, each container (2) comprising a main body (3) and an end neck (4) that is closed by a relative cap (8), the conveying line comprising a plurality of pocket conveying devices (12), which are arranged in series relative to one another so as to feed the containers (2) along a path (P) and each have a respective plurality of pockets (16), which are each suited to receive and hold a relative container (2); and a drying unit (20), which is mounted along the path (P) and comprises, for at least one first pocket conveying device (12), a drying assembly (22), which is configured to dry the main body (3) of the containers (2); and being **characterised in that** the drying assembly (22) comprises at least one pneumatic manifold (31, 32), which extends along the path (P) in correspondence to the first pocket conveying device (12), is connected to a device for feeding gas under pressure, and has a plurality of outlets (34, 36), which are arranged at heights from the ground that are different from one another. 15 20 25 30 35
20. A conveying line according to claim 19, wherein the height from the ground of the outlets (34, 36) decreases in a feeding direction (11), in which the containers (2) are fed along the path (P). 40
21. A conveying line according to claim 19 or 20, wherein the drying assembly (22) comprises two pneumatic manifolds (31, 32), which are provided with respective outlets (34, 36) mounted on opposite sides of the path (P). 45
22. A conveying line according to claim 21, wherein each outlet (34, 36) of one of the pneumatic manifolds (31, 32) substantially faces a corresponding outlet (34, 36) of the other pneumatic manifold (31, 32). 50
23. A conveying line according to claim 21, wherein the outlets (34) of one of the pneumatic manifolds (31, 32) are tangentially staggered relative to the outlets (36) of the other pneumatic manifold (31, 32). 55
24. A conveying line according to any of the claims from

19 to 23, wherein the drying unit (20) comprises, furthermore, for each pocket (16) of at least one second pocket conveying device (12), a respective drying device (23); each drying device (23) and the relative pocket (16) being mobile along the path (P) with respective laws of motion that are substantially identical to one another.

25. A conveying line according to claim 24, wherein each drying device (23) comprises a pneumatic nozzle (24) to dry at least part of the relative container (2) with a flow of gas under pressure.
26. A conveying line according to claim 24 or 25, wherein each pocket (16) comprises a pick and place member (17), which is configured to hold the relative container (2) in correspondence to the end neck (4) under the cap (8); each drying device (23) being mounted above the relative pick and place member (17) so as to dry the relative container (2) in correspondence to the cap (8) and the end neck (4).
27. A conveying line according to any of the claims from 24 to 26 and comprising, furthermore, a suction manifold (27), which is mounted along the path (P) between an inlet (18) to let the containers (2) into the second pocket conveying device (12) and an outlet (19) to let the containers (2) out of the second pocket conveying device (12), is arranged on the opposite side of the drying devices (23) relative to the pockets (16), and is connected to a pneumatic sucking device.
28. A conveying line according to any of the claims from 19 to 27, wherein each pocket conveying device (12) comprises a feeding drum, which is mounted so as to rotate around a substantially vertical rotation axis (13) and comprises, in turn, a plurality of pick and place members (17) for the containers (2), which are distributed along a peripheral edge of the feeding drum itself.

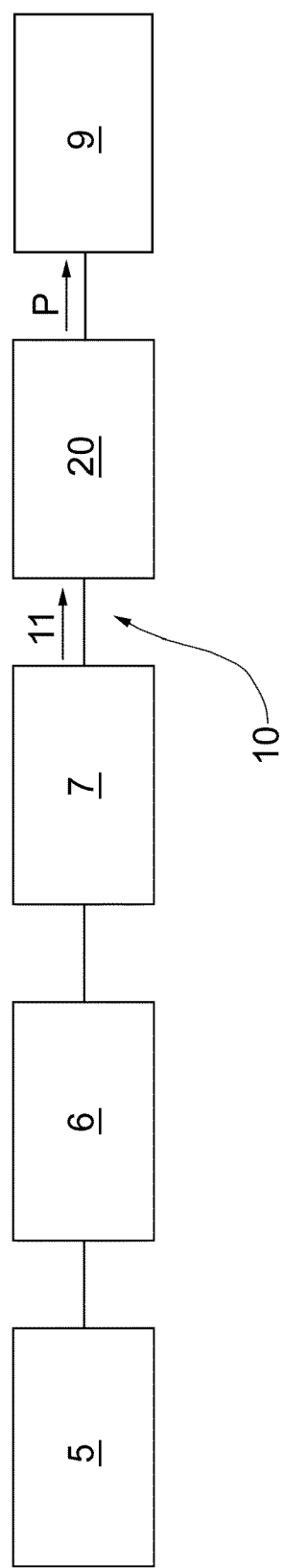


FIG.1

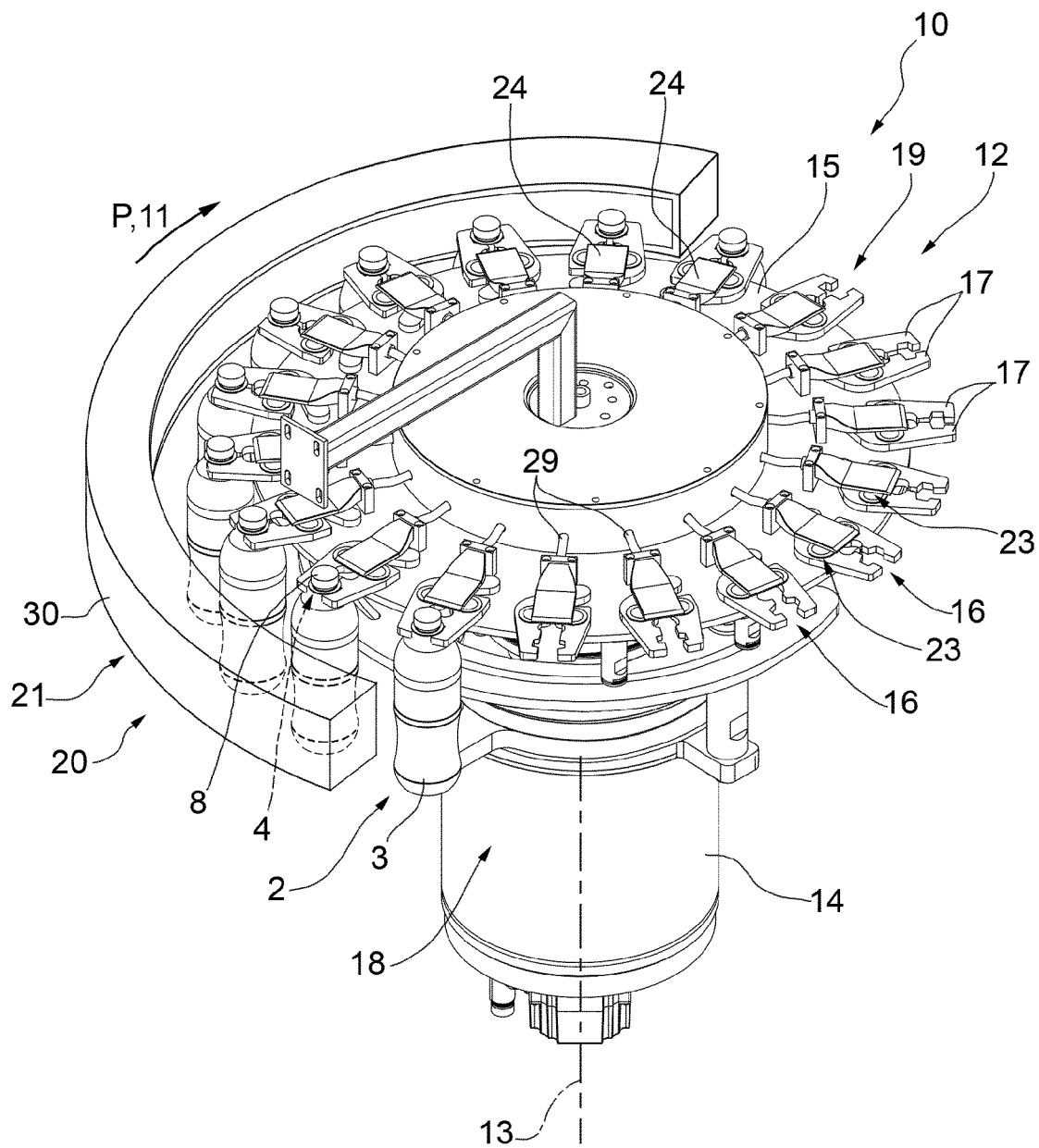


FIG.2

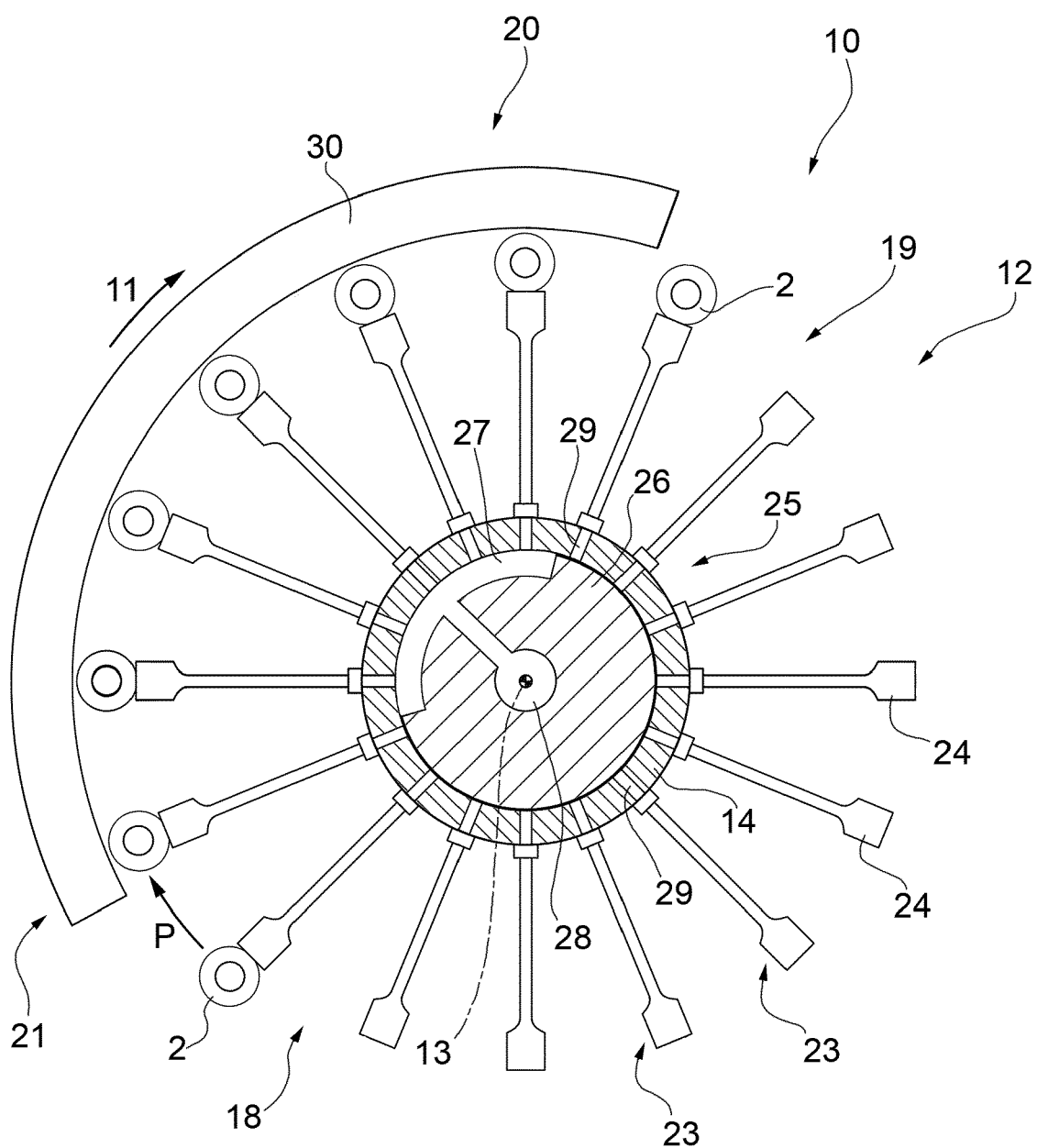


FIG.3

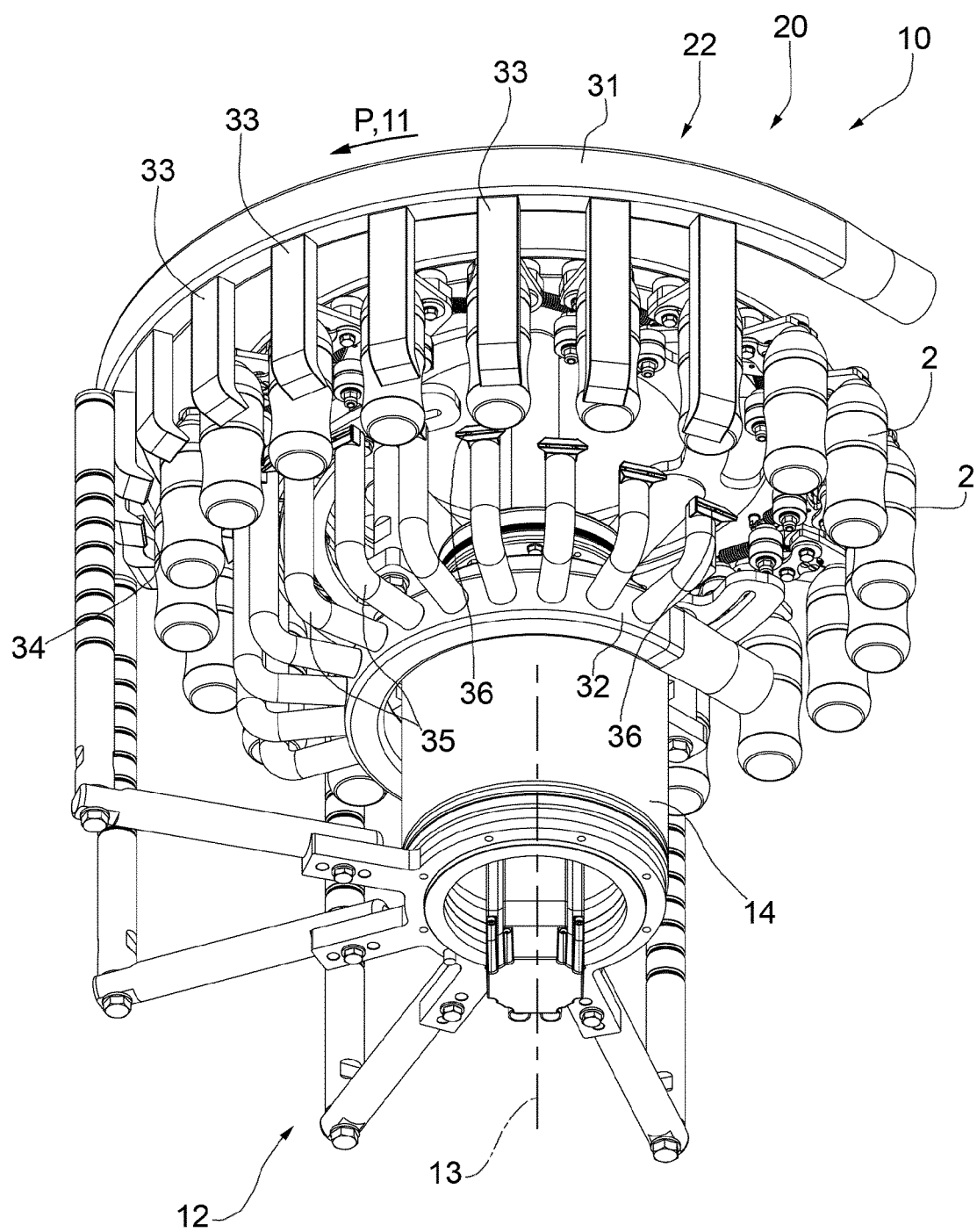


FIG.4

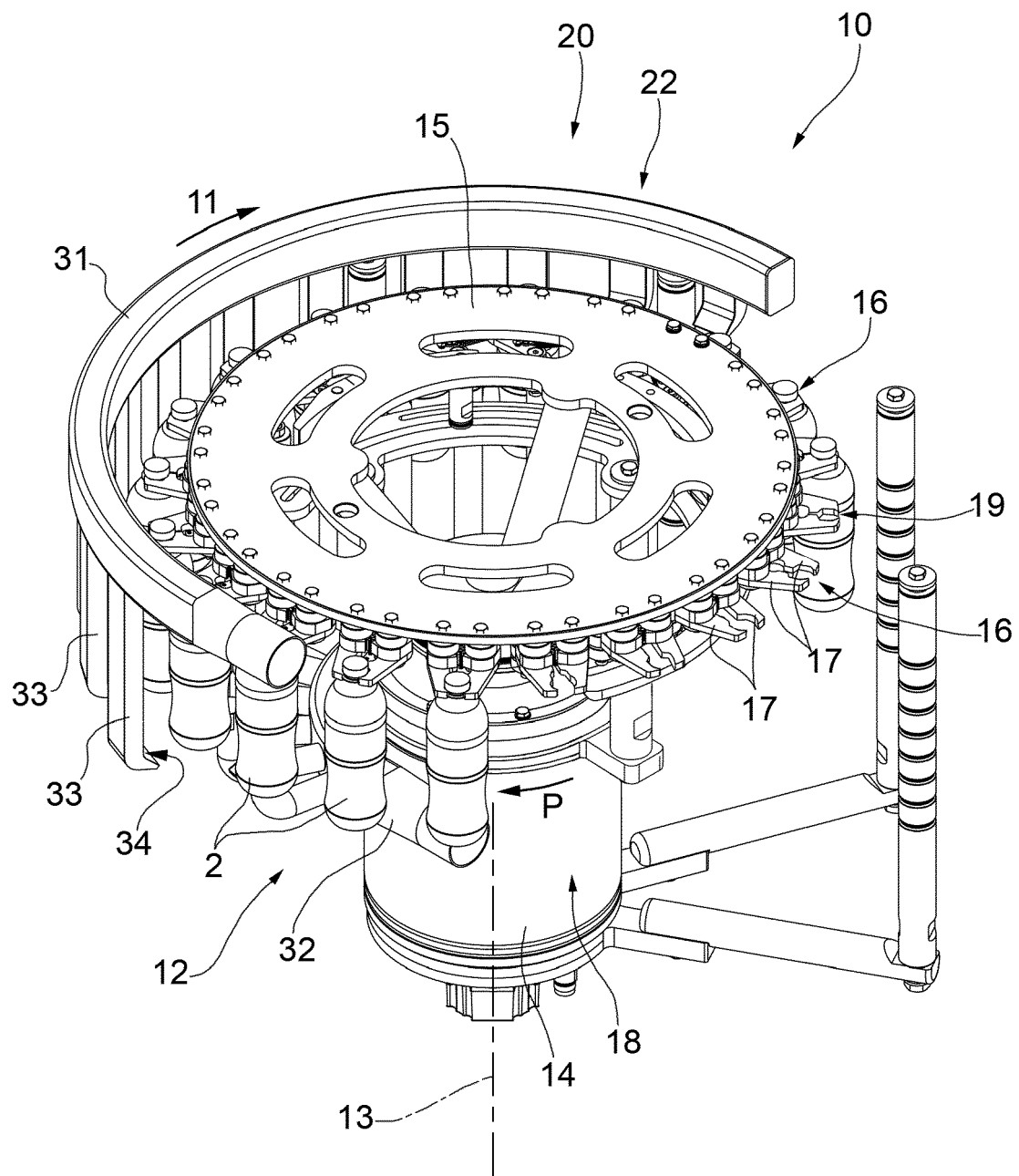


FIG.5



EUROPEAN SEARCH REPORT

 Application Number
EP 14 16 3277

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 319 770 A1 (KRONES AG [DE]) 11 May 2011 (2011-05-11) * paragraph [0038] - paragraph [0045]; figure 1 *	1-3	INV. B65C9/00 B65C9/06 F26B15/04
X	DE 10 25 791 B (JAGENBERG WERKE AG) 6 March 1958 (1958-03-06) * column 3, line 6 - column 4, line 13; figures 1, 3 *	4,5,8-12	
Y		6,7, 13-18, 24,25,28	
X	WO 2013/042543 A1 (KIRIN TECHNO SYSTEM COMPANY LTD [JP]; YABUKI ITARU [JP]; SASAKI SUSUMU) 28 March 2013 (2013-03-28) * abstract; figures 2, 3 *	19	
Y		20-28	
Y	FR 2 272 023 A1 (REMY ETS PIERRE [FR]) 19 December 1975 (1975-12-19) * page 3, line 38 - page 4, line 10; figures 2, 3 *	6,26	
Y	US 5 012 547 A (MARSH RALPH Z [US]) 7 May 1991 (1991-05-07) * column 1, line 29 - line 34; figure 1 *	7,27	TECHNICAL FIELDS SEARCHED (IPC)
Y	EP 1 363 096 A1 (CAMES SNC DI COLLA G & SARDI G [IT]) 19 November 2003 (2003-11-19) * paragraphs [0016], [0019], [0020]; figure 2 *	13-18, 20-23	B65C F26B B08B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		29 August 2014	Luepke, Erik
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 3277

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 3277

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: 1-28

Container drying unit

1.1. claims: 1-3

Plant for producing filled containers with a drying unit.

1.2. claims: 4-18

Line for conveying containers with pockets and a respective drying device for each pocket.

1.3. claims: 19-28

Line for conveying containers with pockets and a drying assembly for the container bodies, said assembly comprising an extended manifold with a plurality of outlets.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

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

EP 14 16 3277

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-08-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2319770 A1	11-05-2011	CN 102050245 A	11-05-2011
		DE 102009052289 A1	12-05-2011
		EP 2319770 A1	11-05-2011
		EP 2361835 A1	31-08-2011
		US 2011108156 A1	12-05-2011

DE 1025791 B	06-03-1958	NONE	

WO 2013042543 A1	28-03-2013	JP 2013063795 A	11-04-2013
		WO 2013042543 A1	28-03-2013

FR 2272023 A1	19-12-1975	NONE	

US 5012547 A	07-05-1991	NONE	

EP 1363096 A1	19-11-2003	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82