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(54) Plant for producing filled containers with drying unit

Anlage zur Herstellung von gefüllten Behältern mit Trocknungseinheit

Installation pour produire des récipients remplis avec une unité de séchage

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Description

[0001] The present invention relates to a conveying line in 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, as for example disclosed in EP 2 319 770 A1, 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] A line for conveying containers according to the preamble of claim 1 is disclosed in GB 1 414 661.

[0005] 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.

[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.

[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;

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 a neck, respectively 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

[0027] the manifold 30 is removed and the air under pressure fed through the nozzles 24 is dispersed in the outer environment.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] The columns 33 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.

[0032] 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.

[0033] 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.

[0034] The mouths 34 can be radially aligned with corresponding mouths 36 or tangentially staggered relative to the mouths 36 themselves.

[0035] 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.

[0036] 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.

[0037] 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 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 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) in unison to one another; and being **characterised in that** 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).
2. A conveying line according to claim 1, 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.
 3. A conveying line according to any of the preceding claims and comprising, furthermore, a suction manifold (30), 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.
 4. A conveying line according to any of the preceding claims, 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.
 5. A conveying line according to claim 4, 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).
 6. A conveying line according to claim 5, 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).
 7. A conveying line according to claim 6, 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).
 8. A conveying line according to claim 5 or 6, 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.
 9. A conveying line according to any of the preceding claims, 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).
 10. A conveying line according to claim 9, 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.
 11. A conveying line according to claim 10, 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).
 12. A conveying line according to claim 10 or 11, 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).
 13. A conveying line according to claim 12, 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).
 14. A conveying line according to claim 12, 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).

Patentansprüche

1. Anlage zum Befördern von Behältern (2), insbesondere Flaschen, wobei jeder Behälter (2) einen Hauptkörper (3) und einen Endhals (4), der von einer zugehörigen Kappe (8) verschlossen wird, umfasst, wobei die Förderanlage eine Vielzahl von Taschenfördevorrichtungen (12), die in Reihe zueinander angeordnet sind, um die Behälter (2) entlang eines Wegs (P) zu befördern, und jede eine entsprechende Vielzahl von Taschen (16) aufweist, die jeweils dafür ausgelegt sind, einen zugehörigen Behälter (2) aufzunehmen und festzuhalten; und eine Trocknungseinheit (20) umfasst, die entlang des Wegs (P) angeordnet ist, um die Behälter (2) zu trocknen, und

- für jede Tasche (16) wenigstens einer ersten Taschenfördervorrichtung (12) eine entsprechende Trocknungsvorrichtung (23) umfasst; wobei jede Trocknungsvorrichtung (23) und die zugehörige Tasche (16) in Gleichlauf miteinander entlang des Wegs (P) beweglich sind; und **dadurch gekennzeichnet sind, dass** jede Tasche (16) ein Greif- und Platzierelement (17) umfasst, das dafür gestaltet ist, den zugehörigen Behälter (2) dem Endhals (4) unter der Kappe (8) entsprechend festzuhalten; wobei jede Trocknungsvorrichtung (23) über dem entsprechenden Greif- und Platzierelement (17) angeordnet ist, um den zugehörigen Behälter (2) der Kappe (8) und dem Endhals (4) entsprechend zu trocknen.
2. Förderanlage gemäß Anspruch 1, wobei jede Trocknungsvorrichtung (23) eine pneumatische Düse (24) zum Trocknen wenigstens eines Teils des zugehörigen Behälters (2) mit einem Strom von druckbeaufschlagtem Gas umfasst.
 3. Förderanlage gemäß einem der vorstehenden Ansprüche, ferner umfassend einen Ansaugverteiler (30), der entlang des Wegs (P) zwischen einem Einlass (18) zum Einlassen der Behälter (2) in die erste Taschenfördervorrichtung (12) und einem Auslass (19) zum Auslassen der Behälter (2) aus der ersten Taschenfördervorrichtung (12) angebracht ist, angeordnet an der gegenüberliegenden Seite der Trocknungsvorrichtungen (23) bezogen auf die Taschen (16) und verbunden mit einer pneumatischen Ansaugvorrichtung.
 4. Förderanlage gemäß einem der vorstehenden Ansprüche, wobei jede Taschenfördervorrichtung (12) eine Zuführtrommel umfasst, die zum Drehen um eine im Wesentlichen senkrechte Drehachse (13) angebracht ist und ihrerseits eine Vielzahl von Greif- und Platzierelementen (17) für die Behälter (2) umfasst, die entlang eines Umfangsrandes der Zuführtrommel selbst angeordnet sind.
 5. Förderanlage gemäß Anspruch 4, wobei die Trocknungseinheit (20) für jedes Greif- und Platzierelement (17) der ersten Taschenfördervorrichtung (12) eine entsprechende pneumatische Düse (24) umfasst, die an der zugehörigen Zuführtrommel befestigt ist, um den zugehörigen Behälter (2) der Kappe (8) und dem Endhals (4) entsprechend zu trocknen.
 6. Förderanlage gemäß Anspruch 5, wobei die Trocknungseinheit (20) ferner einen feststehenden pneumatischen Verteiler (26) umfasst, der um die Drehachse (13) zwischen einem Einlass (18) zum Einlassen der Behälter (2) in die erste Taschenfördervorrichtung (12) und einem Auslass (19) zum Auslassen der Behälter (2) aus der ersten Taschenfördervorrichtung (12) verläuft und mit einer Vorrichtung zum Zuführen von druckbeaufschlagtem Gas verbunden ist; wobei jede pneumatische Düse (24) nach der Bewegung der Zuführtrommel der ersten Taschenfördervorrichtung (12) um die Drehachse (13) mit dem feststehenden pneumatischen Verteiler (26) verbunden ist.
 7. Förderanlage gemäß Anspruch 6, wobei die Trocknungseinheit (20) ferner eine Ventilvorrichtung zum selektiven Steuern des Zuführens von druckbeaufschlagtem Gas unter Druck durch den feststehenden pneumatischen Verteiler (26) umfasst.
 8. Förderanlage gemäß Anspruch 5 oder 6, wobei die Trocknungseinheit (20) für jede pneumatische Düse (24) ein entsprechendes Magnetventil zum selektiven Steuern des Zuführens von druckbeaufschlagtem Gas durch die pneumatische Düse (24) selbst umfasst.
 9. Förderanlage gemäß einem der vorstehenden Ansprüche, wobei die Trocknungseinheit (20) ferner für wenigstens eine zweite Taschenfördervorrichtung (12) eine Trocknungsbaugruppe (22) umfasst, die zum Trocknen des Hauptkörpers (3) der Behälter (2) gestaltet ist.
 10. Förderanlage gemäß Anspruch 9, wobei die Trocknungsbaugruppe (22) wenigstens einen pneumatischen Verteiler (31, 32) umfasst, der entlang des Wegs (P) entsprechend der zweiten Taschenfördervorrichtung (12) verläuft, mit einer Vorrichtung zum Zuführen von druckbeaufschlagtem Gas verbunden ist und eine Vielzahl von Auslässen (34, 36) aufweist, die in Höhen über dem Boden angeordnet sind, die voneinander verschieden sind.
 11. Förderanlage gemäß Anspruch 10, wobei die Höhe über dem Boden der Auslässe (34, 36) in einer Zuführrichtung (11) abnimmt, in der die Behälter (2) entlang des Wegs (P) befördert werden.
 12. Förderanlage gemäß Anspruch 10 oder 11, wobei die Trocknungsbaugruppe (22) zwei pneumatische Verteiler (31, 32) umfasst, die mit entsprechenden Auslässen (34, 36) versehen sind, die an gegenüberliegenden Seiten des Wegs (P) angebracht sind.
 13. Förderanlage gemäß Anspruch 12, wobei jeder Auslass (34, 36) eines der pneumatischen Verteiler (31, 32) im Wesentlichen einem entsprechenden Auslass (34, 36) des anderen pneumatischen Verteilers (31, 32) zugewandt ist.
 14. Förderanlage gemäß Anspruch 12, wobei die Auslässe (34) eines der pneumatischen Verteiler (31, 32) bezogen auf die Auslässe (36) des anderen pneumatischen Verteilers (31, 32) tangential ver-

setzt sind.

Revendications

1. Ligne d'acheminement de récipients (2), en particulier des bouteilles, chaque récipient (2) comportant un corps principal (3) et un goulot (4) d'extrémité qui est fermé par un bouchon (8) associé, la ligne d'acheminement comportant une pluralité de dispositifs (12) d'acheminement à poches, qui sont agencés en série l'un par rapport à l'autre de façon à amener les récipients (2) le long d'un parcours (P) et comprennent chacun une pluralité respective de poches (16), dont chacune est prévue pour recevoir et maintenir un récipient (2) associé ; et une unité (20) de séchage, qui est montée le long du parcours (P) de façon à sécher les récipients (2) et comporte, pour chaque poche (16) d'au moins un premier dispositif (12) d'acheminement à poches, un dispositif respectif (23) de séchage ; chaque dispositif (23) de séchage et la poche (16) associée étant mobiles le long du parcours (P) solidairement l'un de l'autre ; et étant **caractérisés en ce que** chaque poche (16) comporte un organe (17) de transfert, qui est configuré pour maintenir le récipient (2) associé en correspondance avec le goulot (4) d'extrémité sous le bouchon (8) ; chaque dispositif (23) de séchage étant monté au-dessus de l'organe (17) de transfert associé de façon à sécher le récipient (2) associé en correspondance avec le bouchon (8) et le goulot (4) d'extrémité.
2. Ligne d'acheminement selon la revendication 1, chaque dispositif (23) de séchage comportant une buse pneumatique (24) servant à sécher au moins une partie du récipient (2) associé avec un écoulement de gaz sous pression.
3. Ligne d'acheminement selon l'une quelconque des revendications précédentes et comportant, en outre, un collecteur (30) d'aspiration, qui est monté le long du parcours (P) entre une entrée (18) servant à l'entrée des récipients (2) dans ledit premier dispositif (12) d'acheminement à poches et une sortie (19) servant à la sortie des récipients (2) dudit premier dispositif (12) d'acheminement à poches, qui est agencé du côté opposé des dispositifs (23) de séchage par rapport aux poches (16), et est relié à un dispositif pneumatique d'aspiration.
4. Ligne d'acheminement selon l'une quelconque des revendications précédentes, chaque dispositif (12) d'acheminement à poches comportant un tambour d'alimentation, qui est monté de façon à tourner autour d'un axe (13) de rotation sensiblement vertical et comporte lui-même une pluralité d'organes (17) de transfert pour les récipients (2), qui sont ré-

partis le long d'un bord périphérique du tambour d'alimentation proprement dit.

5. Ligne d'acheminement selon la revendication 4, l'unité (20) de séchage comportant, pour chaque organe (17) de transfert dudit premier dispositif (12) d'acheminement à poches, une buse pneumatique (24) respective, qui est fixée au tambour d'alimentation associé de façon à sécher le récipient (2) associé en correspondance avec le bouchon (8) et le goulot (4) d'extrémité.
6. Ligne d'acheminement selon la revendication 5, l'unité (20) de séchage comportant, en outre, un répartiteur pneumatique fixe (26), qui s'étend autour dudit axe (13) de rotation entre une entrée (18) servant à l'entrée des récipients (2) dans le premier dispositif (12) d'acheminement à poches et une sortie (19) servant à la sortie des récipients (2) du premier dispositif (12) d'acheminement à poches et est relié à un dispositif servant à amener du gaz sous pression ; chaque buse pneumatique (24) se raccordant au répartiteur pneumatique fixe (26) après le mouvement du tambour d'alimentation du premier dispositif (12) d'acheminement à poches autour dudit axe (13) de rotation.
7. Ligne d'acheminement selon la revendication 6, l'unité (20) de séchage comportant, en outre, un dispositif de vanne servant à commander sélectivement l'amenée de gaz sous pression à travers le répartiteur pneumatique fixe (26).
8. Ligne d'acheminement selon la revendication 5 ou 6, l'unité (20) de séchage comportant, pour chaque buse pneumatique (24), une électrovanne respective servant à commander sélectivement l'amenée de gaz sous pression à travers la buse pneumatique (24) elle-même.
9. Ligne d'acheminement selon l'une quelconque des revendications précédentes, l'unité (20) de séchage comportant, en outre, pour au moins un deuxième dispositif (12) d'acheminement à poches, un ensemble (22) de séchage qui est configuré pour sécher le corps principal (3) des récipients (2).
10. Ligne d'acheminement selon la revendication 9, l'ensemble (22) de séchage comportant au moins un collecteur pneumatique (31, 32), qui s'étend le long du parcours (P) en correspondance avec le deuxième dispositif (12) d'acheminement à poches, est relié à un dispositif d'amenée de gaz sous pression et comprend une pluralité de sorties (34, 36), qui sont agencées à des hauteurs par rapport au sol qui sont différentes les unes des autres.
11. Ligne d'acheminement selon la revendication 10, la

hauteur par rapport au sol des sorties (34, 36) diminuant dans un sens d'avance (11) dans lequel les récipients (2) sont déplacés le long du parcours (P).

12. Ligne d'acheminement selon la revendication 10 ou 11, l'ensemble (22) de séchage comportant deux collecteurs pneumatiques (31, 32), qui sont munis de sorties (34, 36) respectives montées sur des côtés opposés du parcours (P). 5
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13. Ligne d'acheminement selon la revendication 12, chaque sortie (34, 36) de l'un des collecteurs pneumatiques (31, 32) faisant sensiblement face à une sortie (34, 36) correspondante de l'autre collecteur pneumatique (31, 32). 15
14. Ligne d'acheminement selon la revendication 12, les sorties (34) de l'un des collecteurs pneumatiques (31, 32) étant décalées tangentiellement par rapport aux sorties (36) de l'autre collecteur pneumatique (31, 32). 20

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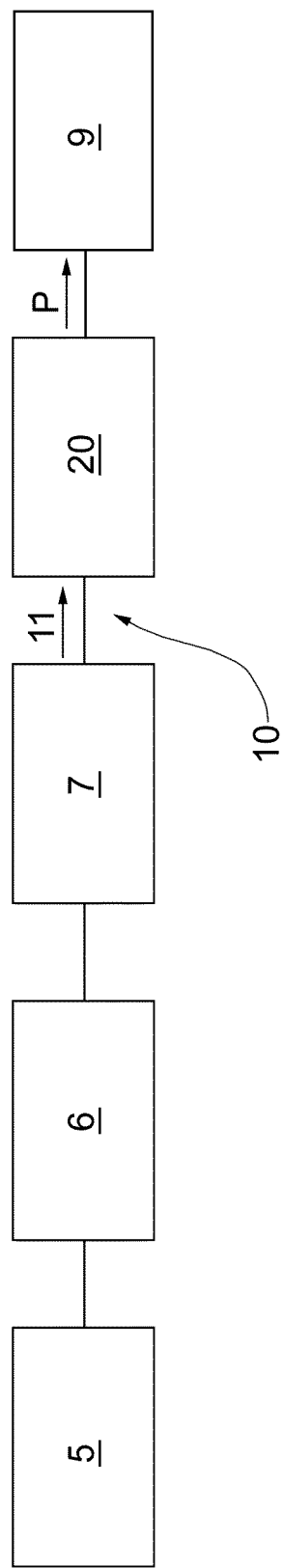


FIG.1

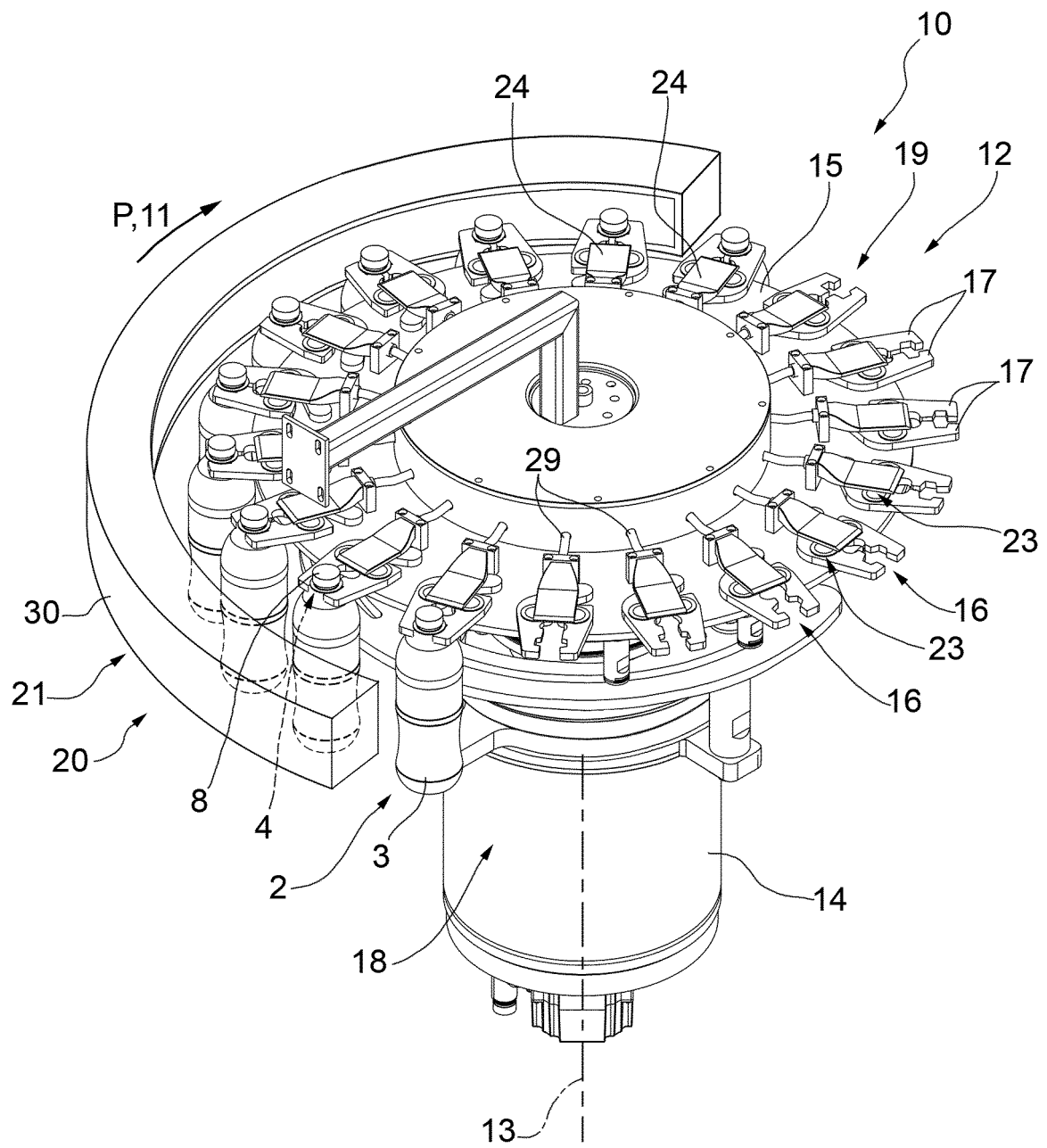


FIG.2

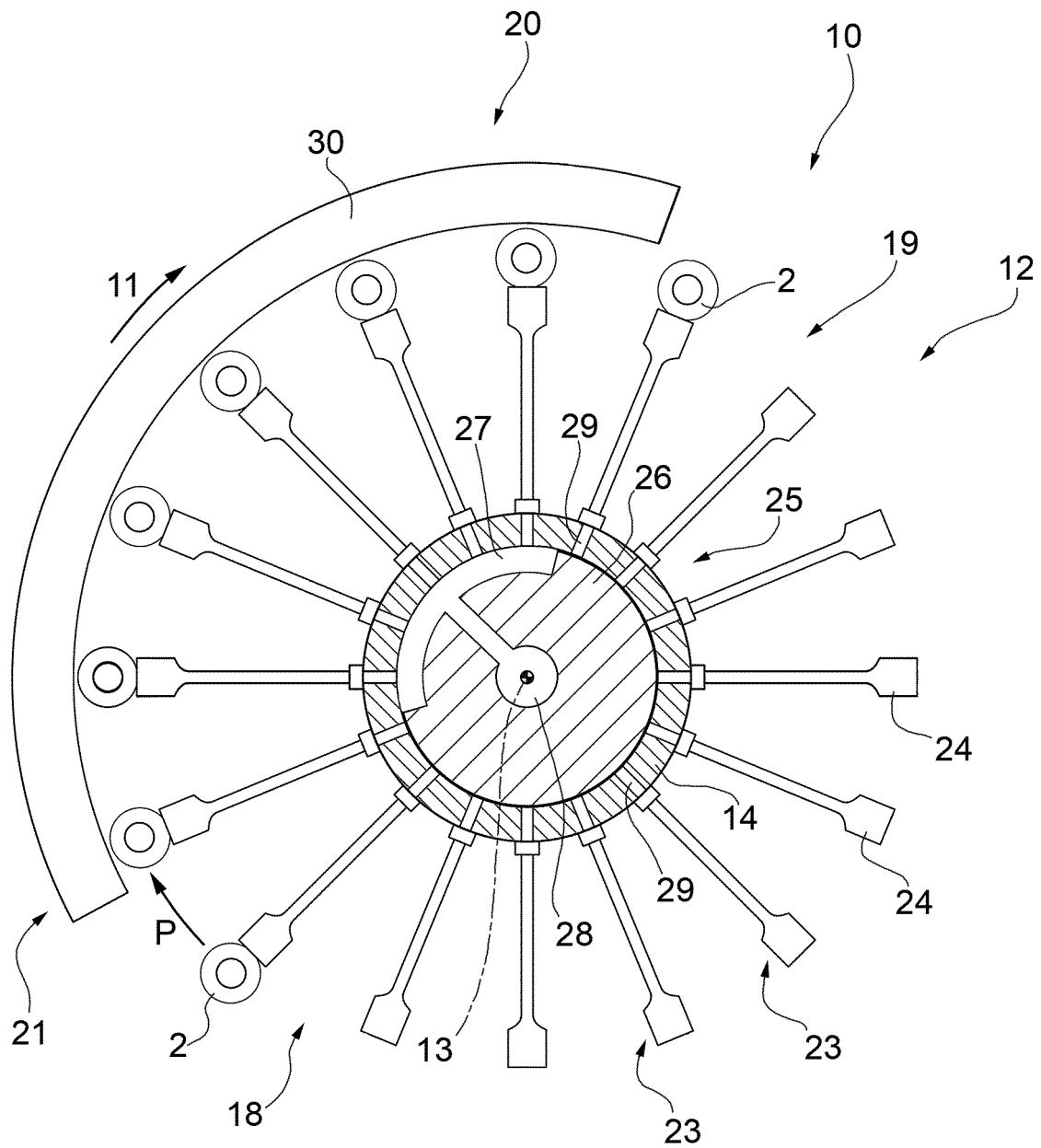


FIG.3

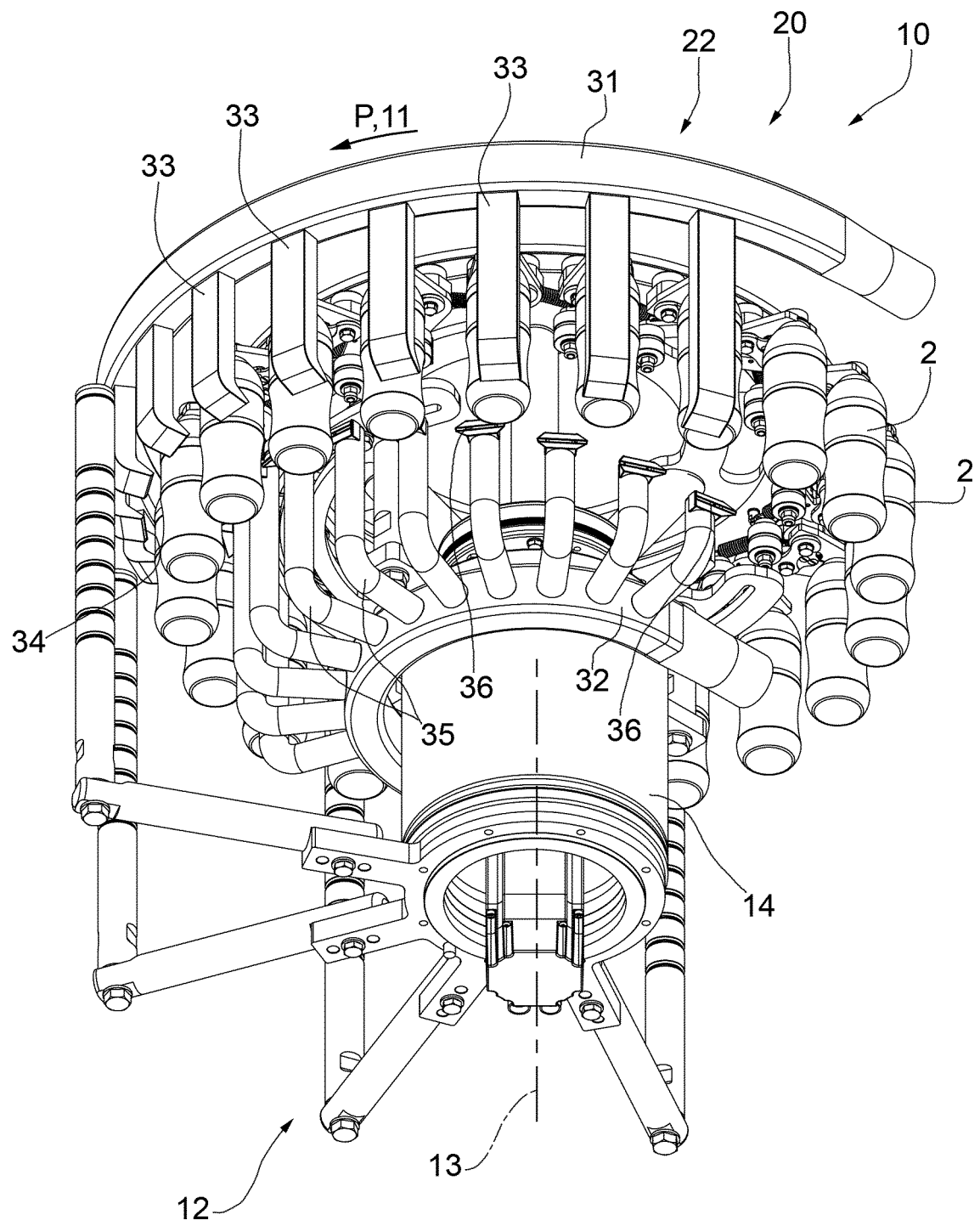


FIG.4

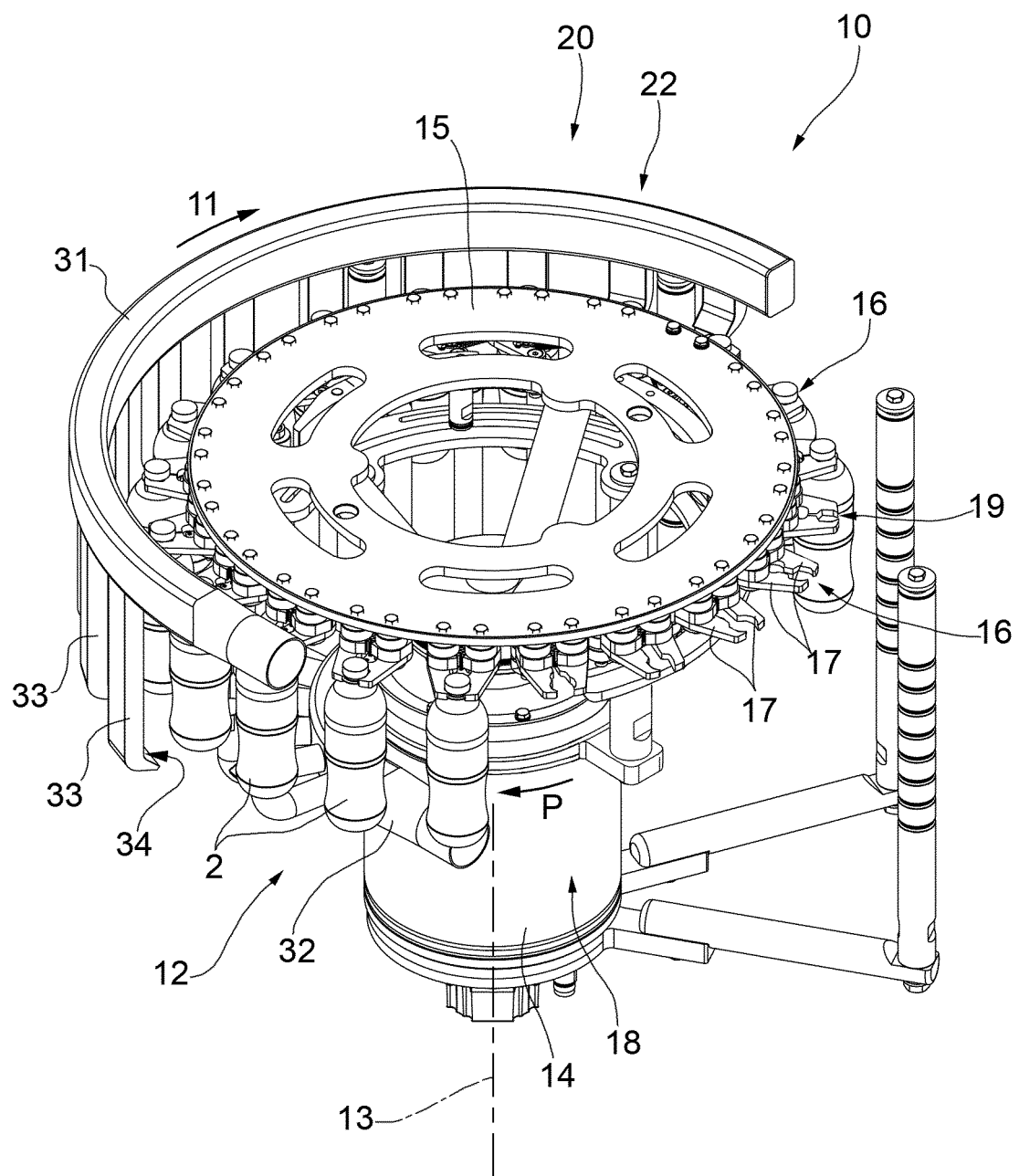


FIG.5

REFERENCES CITED IN THE DESCRIPTION

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