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(54) **FILLING PLANT**

ABFÜLLANLAGE

INSTALLATION DE REMPLISSAGE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a filling plant for filling receptacles with a pourable product, in particular a pourable food product.

[0002] Advantageously, the present invention also relates to a star wheel for the advancement of receptacles.

BACKGROUND ART

[0003] Filling plants for the filling of receptacles such as bottles with a pourable product, in particular a pourable food product, are known.

[0004] A typical filling plant comprises at least a filling apparatus configured to fill the receptacles and having a plurality of star wheels configured to advance the empty receptacles to and the filled receptacles from the filling apparatus.

[0005] Some filling plants also comprise a molding apparatus configured to blow or compression mold preforms so as to obtain the receptacles. Some of the star wheels being arranged such to advance the empty receptacles from the molding apparatus to the filling apparatus.

[0006] Typically, the filling apparatus, the star wheels and the molding apparatus are at least partially arranged within an isolation chamber so that the receptacles are advanced within a controlled atmosphere, which is necessary in order to maintain the sterility of at least the inner of the receptacles to be filled with the pourable product.

[0007] WO2014026732 discloses a transport star for conveying bottles, or like containers, on a container transport section connecting container handling machines or assemblies, comprising a rotor-like transport element that can be rotationally driven around a vertical machine axis, and comprising a plurality of transport positions on the transport element, each provided with a container carrier for holding a container. In order to form a laminar flow system above the container carriers, and thus above the trajectory of the containers arranged at the transport positions, a plurality of discharge openings for a sterile vaporous and/or gaseous medium or fluid is provided, that is, for forming a fluid stream from the top down along a container outer surface.

[0008] Even though, the known filling plants work satisfyingly well, it is the desire to further improve the filling plants and their operation.

[0009] In particular, it is a desire to reduce as much as possible the risk that contaminations may enter into the bottles during the advancement of the bottles.

DISCLOSURE OF INVENTION

[0010] It is therefore an object of the present invention to provide in a straightforward and low-cost manner an improved filling plant for filling receptacles with a pourable product.

ble product.

[0011] According to the present invention, there is provided a filling plant according to the independent claim 1.

[0012] Further advantageous embodiments of the filling plant are specified in the claims being directly or indirectly dependent on claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic top-view of a filling plant according to the present invention, with parts removed for clarity;

Figure 2 shows a schematic side-view of details of the filling plant of Figure 1, with parts removed for clarity.

BEST MODES FOR CARRYING OUT THE INVENTION

[0014] Referral number 1 indicates as a whole a filling plant for at least filling receptacles, such as bottles 2, in particular plastic bottles, with a pourable product, even more particular a pourable food product such as carbonated liquids (e.g. sparkling water, soft drinks and beer) or non-carbonated liquids (e.g. still water, juices, teas, sport drinks, liquid cleaners, wine, emulsions, suspensions, high viscosity liquids and beverages containing pulps).

[0015] The following description will refer without any limitative scope to the receptacles being bottles 2 being made from a polymer such as polytetrafluoroethylene (PET), glass, aluminum, steel or composites.

[0016] With particular reference to Figures 1 and 2, each bottle 2 extends along a longitudinal axis A and comprises a pouring/inlet opening 3 allowing for the introduction and the outpouring of the pourable product respectively into and out of bottle 2. In particular, each bottle 2 also comprises a hollow main body 4 having a bottom portion 5 and a top portion 6 opposite to bottom portion 5 and carrying pouring/inlet opening 3.

[0017] According to a preferred non-limiting embodiment, hollow main body 4 is bounded by a bottom wall 7, sidewalls 8 extending from bottom wall 7 and along axis A and by a top neck 9 delimiting pouring/inlet opening 3 and being arranged opposite to bottom wall 5.

[0018] Preferentially but not necessarily, bottom portion 5 comprises bottom wall 7 and top portion 6 comprises top neck 9.

[0019] According to a preferred non-limiting embodiment, filling plant 1 is also configured to produce bottles 2 from preforms 10.

[0020] With particular reference to Figure 1, filling plant 1 comprises at least:

- an isolation chamber 14 for separating an inner

space 15 (of isolation chamber 14 itself) from an outer environment 16;

- a conditioning device configured to provide for a defined and/or controlled (sterile) gas atmosphere, in particular a sterile air atmosphere, within inner space 15;
- a filling apparatus 18 configured to fill bottles 2 with the pourable product and being at least partially arranged within isolation chamber 14 so that, in use, the filling of bottles occurs and/or is executed within inner space 15 (i.e. under a controlled gas atmosphere); and
- a conveying device 19, in particular at least partially arranged within isolation chamber 14 and, being configured to advance bottles 2 along an advancement path P, in particular within inner space 15, to and/or away from filling apparatus 18.

[0021] According to a preferred non-limiting embodiment, with the term "a defined and/or controlled (sterile) gas atmosphere" is intended to express that the gas atmosphere presents a reduced load of contaminants (such as microbes, bacteria, viruses and others), in particular for allowing a treating and/or processing of preforms 10 and/or bottles 2 in a sterile environment. Preferentially but not necessarily, the term "a defined and/or controlled (sterile) gas atmosphere" also expresses that the temperature and/or humidity of the gas atmosphere is controlled.

[0022] According to a preferred non-limiting embodiment, filling plant 1 also comprises a molding apparatus 20 configured to form and/or mold bottles 2 from preforms 10 and being at least partially arranged within isolation chamber 14 so that bottles 2 are formed and/or molded from preforms 10 within inner space 15. In particular, molding apparatus 20 is arranged upstream from filling apparatus 18 along advancement path P and conveying device 19 is configured to advance bottles 2, in particular along a first portion P1 of advancement path P, from molding apparatus 20 to filling apparatus 18.

[0023] According to a preferred non-limiting embodiment, filling plant 1 also comprises a conveying assembly 21 (only partially shown) configured to advance preforms 10 along an advancement path Q and to molding apparatus 20. In particular, conveying assembly 21 is interposed between filling plant 1 and molding apparatus 20.

[0024] According to a preferred non-limiting embodiment, filling plant 1 also comprises a capping apparatus 22 configured to apply at least one closure onto each (filled) bottle 2 and being arranged downstream from filling apparatus 18 along advancement path P.

[0025] According to a preferred non-limiting embodiment, conveyor device 19 is configured to advance (the filled) bottles 2 (filled with the pourable product) along a second portion P2 of advancement path P from filling apparatus 18 to capping apparatus 22.

[0026] According to a preferred non-limiting embodiment, filling plant 1 also comprises a preform sterilization

apparatus 24 being at least partially arranged within isolation chamber 14 and being configured to sterilize at least the inner portion of preforms 10. In particular, sterilization apparatus 24 is configured to introduce a sterilization agent into preforms 10 so as to sterilize at least the inner portion of preforms 10 (and in consequence of bottles 2).

[0027] According to a preferred non-limiting embodiment, sterilization apparatus 24 is arranged upstream of molding apparatus 20 along advancement path Q and conveying assembly 21 is configured to advance preforms 10 within inner space 15 from sterilization apparatus 24 to molding apparatus 20.

[0028] With particular reference to Figure 1, filling apparatus 18 comprises a conveying carousel 28 rotatable around a rotation axis B, in particular having a vertical orientation, for advancing bottles 2 along a filling path and a plurality of filling units (not shown and known as such) arranged on conveying carousel 28 and configured to retain and fill one respective bottle 2 during advancement of bottles 2 along the filling path. In particular, conveying carousel 28 and the filling units are arranged within inner space 15.

[0029] Preferentially but not necessarily, the filling units are peripherally arranged on the conveying carousel 28 and equally spaced around rotation axis B.

[0030] According to a preferred non-limiting embodiment, molding apparatus 20 comprises:

- a conveying carousel 29 rotatable around a rotation axis C, in particular having a vertical orientation, for advancing preforms 10 prior to their formation into bottles 2 and bottles 2 after their formation along respectively a final preform advancement path and an initial bottle advancement path; and
- a plurality of molding units 30 arranged on conveying carousel 29 and configured to retain preforms 10, to mold preforms 10 into bottles 2 during advancement of preforms 10 along the final preform advancement path and to retain the formed bottles 2 along the initial bottle advancement path.

[0031] According to a preferred non-limiting embodiment, conveying carousel 29 and molding units 30 are arranged within inner space 15.

[0032] Preferentially but not necessarily, molding units 31 are peripherally arranged on conveying carousel 29 and equally spaced around rotation axis C.

[0033] According to a preferred non-limiting embodiment, capping apparatus 22 comprises:

- a conveying carousel 31 rotatable around a rotation axis E, in particular having a vertical orientation, for advancing (filled) bottles 2 along a capping path; and
- a plurality of capping units (not shown) arranged on conveying carousel 31 and each one configured to retain one respective (filled) bottle 2 and to apply one respective closure onto the respective (filled) bottle

2 during its advancement along the capping path.

[0034] According to a preferred non-limiting embodiment, conveying carousel 31 and the capping units are arranged within inner space 15.

[0035] Preferentially but not necessarily, the capping units are peripherally arranged on conveying carousel 31 and equally spaced around rotation axis E.

[0036] With particular reference to Figures 1 and 2, isolation chamber 14 is configured to be arranged on a (substantially horizontal) surface (e.g. a floor of a production site) and comprises at least an upper wall 33 distanced from the surface and a plurality of lateral walls 34 connected to upper wall 33 so as to enclose and/or delimit inner space 15. In particular, lateral walls 34 protrude from upper wall 33 towards the surface.

[0037] It should be noted that upper wall 33 is not necessarily parallel to the surface and upper wall 33 may comprise varying portions some being arranged on a higher elevation level than others (with respect to the surface). It should also be noted that lateral walls 34 (see e.g. Figure 2) can extend from e.g. a first portion of upper wall 33 to a second portion of upper wall 33 being below the first portion.

[0038] Advantageously, isolation chamber 2 comprises at least a first isolation channel 35 extending within inner space 15 and at least downstream from filling apparatus 18 along advancement path P. In particular, isolation channel 35 is configured to receive at least a portion, in particular the respective top portions 6, of bottles 2 during advancement of bottles 2 along at least a portion of advancement path P. In other words, in use, during advancement of (empty) bottles 2 (i.e. bottles 2 not being filled with the pourable product) along advancement path P, the respective top portions 6 advance within isolation channel 35.

[0039] According to a preferred non-limiting embodiment, isolation channel 35 is interposed between filling apparatus 18 and molding apparatus 20.

[0040] According to a preferred non-limiting embodiment, isolation chamber 14 also comprises a second isolation channel 36 similar to isolation channel 35 and extending within inner space 15 and at least upstream from filling apparatus 18 along advancement path P. In particular, isolation channel 36 is configured to receive at least a portion, in particular the respective top portions 6, of (filled) bottles 2 (i.e. bottles 2 filled with the pourable product) during advancement of bottles 2 along advancement path P.

[0041] According to a preferred non-limiting embodiment, isolation channel 36 is interposed between filling apparatus 18 and capping apparatus 22.

[0042] Preferentially but not necessarily, isolation channel 35 is arranged within an upper section 37 of inner space 15. In particular upper section 37 being adjacent to, even more particular being at, upper wall 33. In particular, inner space 15 also comprises a lower section 38 opposed to upper section 37, in particular lower section

38 being positioned adjacent to, in particular at, the surface.

[0043] According to a preferred non-limiting embodiment, isolation channel 35 comprises a first lateral wall 42 and a second lateral wall 43 spaced apart from one another and laterally delimiting an advancement space 44 of isolation channel 35 and for receiving at least portion 6 of bottles 2 (i.e. in use, during advancement of (empty) bottles 2 along advancement path P, the respective top portions 6 advance within advancement space 44).

[0044] Preferentially but not necessarily, lateral walls 42 and 43 extend from upper wall 33 into inner space 15 and, in particular are arranged within upper section 37. In more detail, lateral walls 42 and 43 are connected to upper wall 33 and protrude towards lower section 38, in particular towards the surface.

[0045] According to the non-limiting embodiment shown, each one of lateral walls 42 and 43 also defines at least a respective portion of one respective lateral wall 34.

[0046] According to a preferred non-limiting embodiment shown, advancement space 44 comprises an upper portion 45 and a lower portion 46 opposed to upper portion 45. In particular, upper portion 45 being positioned adjacent to, even more particular at, upper wall 33. In use, the respective top portions 6 are positioned within lower portion 46 and advance within lower portion 46.

[0047] As isolation channel 36 is similar to isolation channel 35 regarding the details of isolation channel 36 we refer to the description with respect to isolation channel 35 using the same references for similar or equivalent parts.

[0048] In particular, isolation channel 36 differs from isolation channel 35 in that isolation channel 36 receives, in use, filled bottles 2, i.e. bottles 2 being filled with the pourable product.

[0049] Advantageously, the conditioning device is configured to control and/or determine and/or create a flow of (sterile) gas within isolation channel 35, and preferentially but not necessarily also in isolation channel 36. In particular, the conditioning device is configured to control the flow of gas from the respective upper portion 45 to the respective lower portion 46. In particular, in this manner, in use, the flow of gas is directed onto the respective top portions 6 and from top portions 6 to the respective bottom portions 5. In this manner, it is ensured that contaminations present on outer surfaces of bottles 2 are kept away from pouring/inlet opening 3.

[0050] According to a preferred non-limiting embodiment, the conditioning unit is configured to control the flow of gas such that the flow of gas is substantially a laminar (top-bottom) flow.

[0051] Preferentially but not necessarily, the conditioning unit is also configured to control a gas pressure within isolation chamber 14 such that the gas pressure at least in the section housing filling apparatus 20 and, in particular the ones housing isolation chamber 35 and/or iso-

lation chamber 36 and/or capping apparatus 22, is above the ambient pressure.

[0052] Preferentially but not necessarily, the conditioning unit is also configured to control the gas pressure within isolation chamber 14 such that the gas pressure equals the ambient pressure within the section(s) housing molding apparatus 20 and/or sterilization apparatus 24.

[0053] According to a preferred non-limiting embodiment, the conditioning unit is configured to control a flow of (sterile) gas within inner space 15, in particular for obtaining a (substantially laminar) flow of gas from upper section 37 to lower section 38, in this section of isolation chamber 14 housing filling apparatus 18, and in particular molding apparatus 20.

[0054] According to a preferred non-limiting embodiment, the conditioning unit comprises one or more filter elements (e.g. HEPA or ULPA filters) for filtering the gas to be introduced into isolation chamber 14.

[0055] With particular reference to Figures 1 and 2, conveying device 19 is configured to at least advance the empty bottles 2 along a first portion P1 of advancement path P, in particular from molding apparatus 20 to filling apparatus 18. Preferentially but not necessarily, conveying device 19 is also configured to advance the filled bottles 2 along a second portion P2 of advancement path P, in particular from filling apparatus 18 to capping apparatus 22. In particular, the filling path is interposed between portions P1 and P2.

[0056] In particular, conveying device 19 comprises a plurality of conveyors, in particular a plurality of star wheels 50, configured to advance bottles 2 within inner space 15 and along a respective portion of advancement path P (i.e. along a respective portion of portion P1 or a respective portion of P2).

[0057] In more detail, each star wheel 50 is rotatable around a respective rotation axis F, in particular having a vertical orientation, and each being configured to advance bottles 2 along the respective portion of advancement path P and, in particular each one being at least partially arranged within isolation chamber 14 so that bottles 2 advance within inner space 15 (i.e. within a controlled gas atmosphere).

[0058] According to an alternative embodiment not shown, the conveyors could be of the linear-conveying type (i.e. bottles 2 advance along a linear path when being advanced by a conveyor of the linear-conveying type).

[0059] According to another alternative embodiment, conveying device 19 comprises a plurality of star wheels 50 and a plurality of conveyors of the linear-conveying type.

[0060] Advantageously, each conveyor, in particular each star wheel 50, comprises a plurality of gripping assemblies 51, each one configured to retain one respective bottle 2 during advancement of the respective bottle 2 along the respective portion of advancement path P.

[0061] According to a preferred non-limiting, each star

wheel 50 further comprises:

- a drive shaft 52 rotatable around the respective rotation axis F;
- an actuator configured to actuate rotation of drive shaft 52 around the respective rotation axis F; and
- a support structure 53 fixed to drive shaft 52 and carrying gripping assemblies 51.

[0062] According to a preferred non-limiting embodiment, the respective gripping assemblies 51 are arranged along and on a peripheral portion 54 of support structure 53 and, in particular are angularly spaced apart from one another around the respective rotation axis F.

[0063] In particular, each peripheral portion 54 extends within a respective first plane H1 transversal, in particular perpendicular, to the respective rotation axis F.

[0064] According to a preferred non-limiting embodiment, each support structure 53 comprises a disc 55, in particular an annular disc, carrying the respective peripheral portion 54. In particular, the respective disc 55 extends within the respective first plane H1.

[0065] Advantageously, each gripping assembly 51 is configured to arrange the respective bottle 2 during advancement along the respective portion of advancement path P such that at least a portion, in particular the respective top portion 6, of the respective bottle 2 is arranged and/or advances within isolation channel 35 or isolation channel 36, in particular so that at least top portion 6 advances, in use, within the respective advancement space 44. In particular, when advancing, in use, along portion P1 the respective top portions 6 are arranged and/or advance within isolation channel 35, and even more particular when advancing, in use, along portion P2 the respective top portions 6 are arranged and/or advance within isolation channel 36.

[0066] In this way, it is guaranteed that the flow of gas determined by the conditioning unit "hits" the top portions 6 in the desired manner without that the, in use, varying rotating parts of filling plant 1 influence the flow of gas within isolation channel 35 in a significant manner. In particular, the laminar flow of the gas can be substantially maintained without the generation of significant turbulences.

[0067] According to a preferred non-limiting embodiment, each gripping assembly 51 further comprises:

- a gripper 56 configured to retain the respective bottle 2 during advancement along the respective portion of the advancement path P; and
- a support frame 57 carrying the respective gripper 56 and being connected and/or mounted to the respective peripheral portion 54.

[0068] In particular, each gripper 56 extends within a second plane H2 transversal, in particular perpendicular, to the respective rotation axis F.

[0069] In particular, each support frame 57 is designed

such that the respective gripper 56 is arranged or is arrangeable at a position so that the respective second plane H2 is spaced apart, in particular is arranged above, from first plane H1.

[0070] In particular, each plane H2 is interposed between isolation channel 35 and plane H1 and/or plane H1 is interposed between the surface and each plane H2.

[0071] In particular, in use (i.e. during advancement of the respective bottle 2 along advancement path P), each gripper 56 is positioned such that the respective second plane H2 is spaced apart, in particular is arranged above, plane H1.

[0072] According to a preferred non-limiting embodiment, each support frame 57 transversally, in particular perpendicularly, extends from the respective peripheral portion 54.

[0073] According to an embodiment not shown, each gripping assembly 51 could comprise an adjustment unit configured to adjust and/or control the position of the respective plane H2 (i.e. the distance between plane H1 and the respective plane H2).

[0074] In use, filling plant 1 at least fills bottles 2 with the pourable product.

[0075] Operation of filling plant 1 comprises at least the first step of

- advancing empty bottles 2 within inner space 15, along advancement path P, in particular portion P1, and to filling apparatus 18; and
- filling bottles 2 by means of filling apparatus 18 with the pourable product.

[0076] Preferentially but not necessarily, operation of filling plant 1 also comprises the steps of:

- advancing preforms 10 within inner space 15, along advancement path Q and to molding apparatus 20; and
- forming bottles 2 from preforms 10 within molding apparatus 20.

[0077] Preferentially but not necessarily, operation of filling plant 1 also comprises the steps of:

- advancing filled bottles 2 within inner space 15, along advancement path P, in particular along portion P2, and to capping apparatus 22; and
- applying closures onto bottles 2 by means of capping apparatus 22.

[0078] According to a preferred non-limiting embodiment, operation of filling plant 1 also comprises the step of conditioning inner space 15.

[0079] In more detail, during the step of advancing empty bottles 2 at least the respective top portions 6 advance within isolation channel 35, in particular within the respective advancement space 44, and in particular from molding apparatus 20 to filling apparatus 18.

[0080] In even more detail, during the step of advancing empty bottles 2, each bottle 2 is retained by one respective gripping assembly 51, in particular the respective gripper 56. During advancement of bottles 2 along advancement path P, in particular portion P1, the respective grippers 56 extend within the respective plane H2 being spaced apart, in particular being above, plane H1.

[0081] In more detail, during the step of advancing filled bottles 2 at least top portions 6 advance within isolation channel 36, in particular the respective advancement space 44, and in particular from filling apparatus 18 to capping apparatus 20.

[0082] In even more detail, during the step of advancing filled bottles 2, each bottle 2 is retained by one respective gripping assembly 51, in particular the respective gripper 56. During advancement of bottles 2 along portion P2, the respective grippers 56 extend within the respective plane H2 being spaced apart, in particular being above, plane H1.

[0083] According to a preferred non-limiting embodiment, during the step of conditioning, the conditioning device controls and/or determines and/or creates the flow of gas within isolation channel 35, in particular also within isolation channel 36. In particular, the flow of gas is controlled such that the flow of gas is from the respective upper portion 45 towards the respective lower portion 46.

[0084] The advantages of filling plant 1 according to the present invention will be clear from the foregoing description.

[0085] In particular, filling plant 1 comes along with a reduced risk of contaminations entering into bottles 2 during advancement of bottles 2 to filling apparatus 18 and/or from filling apparatus 18 to capping apparatus 22. This is possible by providing for isolation channel 35 and/or isolation channel 36 and having gripping assemblies 51, which arrange bottles 2 such that top portions 6 advance within respectively isolation channel 35 and/or isolation channel 36. The presence of isolation channels 35 and/or 36 suppresses the formation of possible turbulences within the respective advancement spaces 44, which otherwise may in some rare instances lead to contaminations to enter bottles 2. Thus, filling plant 1 comes along with an overall improved sterile performance.

[0086] Clearly, changes may be made to filling plant 1 as described herein without, however, departing from the scope of protection as defined in the accompanying claims.

Claims

1. Filling plant (1) for the filling of receptacles (2) with a pourable product comprising at least:

- an isolation chamber (14) having an inner space (15), the isolation chamber (14) being configured to be arranged on a surface and com-

prising at least an upper wall (33) distanced from the surface and a plurality of lateral walls (34) connected to upper wall (33) so as to enclose and/or delimit inner space (15);

- a conditioning device configured to provide for a defined and/or controlled gas atmosphere within the inner space (15);
- a filling apparatus (18) configured to fill the receptacles (2) with the pourable product and being at least partially arranged within the isolation chamber (14) so that, in use, the receptacles (2) are filled within the inner space (15); and
- a conveying device (19) configured to advance the receptacles (2) along an advancement path (P) to and/or away from the filling apparatus (18);

wherein the isolation chamber (14) comprises at least one isolation channel (35; 36) extending within the inner space (15) and being arranged downstream or upstream from the filling apparatus (18) along the advancement path (P);

wherein the conditioning unit is configured to control a flow of a gas within the isolation channel (35; 36);

wherein the conveying device (19) comprises at least one conveyor (50) being configured to advance the receptacles (2) along at least a portion of the advancement path (P) and through at least a portion of the isolation channel (35; 36);

wherein the conveyor (50) comprises a plurality of gripping assemblies (51), each gripping assembly (51) being configured to retain one respective receptacle (2) during advancement of the respective receptacle (2) along the portion of the advancement path (P);

wherein each gripping assembly (51) is configured to arrange the respective receptacle (2) such that at least a top portion (6) of the respective receptacle (2) is arranged within the isolation channel (35; 36);

wherein the conveyor is a star wheel (50);

wherein the star wheel (50) further comprises:

- a drive shaft (52) rotatable around a rotation axis (F);
- an actuator configured to actuate rotation of the drive shaft (52) around the rotation axis (F); and
- a support structure (53) fixed to the drive shaft (52) and having a peripheral portion (54);

wherein the plurality of gripping assemblies (51) is arranged along and on the peripheral portion (54) and angularly spaced apart from one another around the rotation axis (F);

wherein the peripheral portion (54) extends with-

in a first plane (H1) transversal;

wherein each gripping assembly (51) further comprises a gripper (56) configured to retain the respective receptacle (2) and a support frame (57) carrying the respective gripper (56) and being connected to the peripheral portion (54); wherein each support frame (57) is designed such that the respective gripper (56) is arranged or is arrangeable at a position so that the respective gripper (56) extends within a respective second plane (H2) being transversal to the rotation axis (F) and such that the second plane (H2) is spaced apart from the first plane (H1); wherein the isolation channel (35; 36) comprises a first lateral wall (42) and a second lateral wall (43) spaced apart from one another and laterally delimiting an advancement space (44) for said portion (6) of the receptacles (2);

wherein each gripping assembly (51) is configured to arrange the respective receptacle (2) such that said portion (6) of the receptacle (2) is arranged within a lower portion (46) of an advancement space (44) of the isolation channel (35; 36);

wherein the conditioning device is configured to direct the gas from an upper portion (45) of the advancement space (44) to the lower portion (46);

characterized in that:

each second plane (H2) is interposed between the isolation channel (35; 36) and the first plane (H1).

the rotation axis (F) has a vertical orientation and each second plane (H2) is arranged above the first plane (H1);

- lateral walls (42) and (43) of the isolation channel (35; 36) extend from upper wall (33) into inner space (15);

- each one of lateral walls (42) and (43) of the isolation channel (35) also defines at least a respective portion of one respective lateral wall (34) of the isolation chamber (14).

2. Filling plant according to claim 1, wherein the support structure (53) comprises a disc (55), in particular an annular disc, carrying the peripheral portion (54); wherein the disc (55) extends within the first plane (H1).
3. Filling plant according to claim 1 or 2, wherein the support frame (57) transversally, in particular perpendicularly, extends from the peripheral portion (54).
4. Filling plant according to any one of the preceding claims, wherein the isolation channel (35; 36) is ar-

ranged within an upper section (37) of the inner space (15).

5. Filling plant according to any one of the preceding claims, further comprising a molding apparatus (20) configured to form and/or mold the receptacles (2) from preforms (10);

wherein the molding apparatus (20) is at least partially arranged within the isolation chamber (14) so that, in use, the receptacles (2) are formed from the preforms (10) within the inner space (15);

wherein the molding apparatus (20) is arranged upstream from the filling apparatus (18) along the first advancement path (P); and wherein the isolation channel (35) is interposed between the filling apparatus (18) and the molding apparatus (20) .

Patentansprüche

1. Abfüllanlage (1) zum Füllen von Gefäßen (2) mit einem fließfähigen Produkt, die zumindest Folgendes umfasst:

- eine Isolationskammer (14) mit einem Innenraum (15), wobei die Isolationskammer (14) dazu ausgelegt ist, an einer Oberfläche angeordnet zu werden, und umfassend zumindest eine von der Oberfläche beabstandete obere Wand (33) und mehrere mit der oberen Wand (33) verbundene laterale Wände (34), um den Innenraum (15) einzuschließen und/oder zu begrenzen;
- eine Konditionierungsvorrichtung, ausgelegt zum Bereitstellen einer definierten und/oder kontrollierten Gasatmosphäre innerhalb des Innenraums (15);
- eine Abfülleinrichtung (18), ausgelegt zum Füllen der Gefäße (2) mit dem fließfähigen Produkt und zumindest teilweise innerhalb der Isolationskammer (14) angeordnet, sodass, bei Verwendung, die Gefäße (2) innerhalb des Innenraums (15) gefüllt werden; und
- eine Fördervorrichtung (19), ausgelegt zum Weiterbewegen der Gefäße (2) entlang eines Weiterbewegungspfad (P) zu und/oder weg von der Abfülleinrichtung (18);

wobei die Isolationskammer (14) zumindest einen Isolationskanal (35; 36) umfasst, der sich innerhalb des Innenraums (15) erstreckt und nachgelagert oder vorgelagert der Abfülleinrichtung (18) entlang des Weiterbewegungspfad (P) angeordnet ist;

wobei die Konditionierungseinheit ausgelegt ist

zum Steuern eines Stroms eines Gases innerhalb des Isolationskanals (35; 36);

wobei die Fördervorrichtung (19) zumindest einen Förderer (50) umfasst, der ausgelegt ist zum Weiterbewegen der Gefäße (2) entlang zumindest eines Teils des Weiterbewegungspfad (P) und durch zumindest einen Teil des Isolationskanals (35; 36);

wobei der Förderer (50) mehrere Greifanordnungen (51) umfasst, wobei jede Greifanordnung (51) ausgelegt ist zum Halten eines entsprechenden Gefäßes (2) während der Weiterbewegung des entsprechenden Gefäßes (2) entlang des Teils des Weiterbewegungspfad (P);

wobei jede Greifanordnung (51) ausgelegt ist zum Anordnen des entsprechenden Gefäßes (2), sodass zumindest ein oberer Teil (6) des entsprechenden Gefäßes (2) innerhalb des Isolationskanals (35; 36) angeordnet ist;

wobei der Förderer ein Sternrad (50) ist;

wobei das Sternrad (50) ferner Folgendes umfasst:

- eine Antriebswelle (52), drehbar um eine Drehachse (F);
- einen Aktuator, ausgelegt zum Bewirken von Drehung der Antriebswelle (52) um die Drehachse (F); und
- eine Stützstruktur (53), befestigt an der Antriebswelle (52) und einen peripheren Teil (54) aufweisend;

wobei die mehreren Greifanordnungen (51) entlang des peripheren Teils (54) und an diesem angeordnet und um die Drehachse (F) voneinander winkelbeabstandet sind;

wobei sich der periphere Teil (54) quer innerhalb der ersten Ebene (H1) erstreckt;

wobei jede Greifanordnung (51) ferner einen Greifer (56), der ausgelegt ist zum Halten des entsprechenden Gefäßes (2), und einen Stützrahmen (57), der den entsprechenden Greifer (56) trägt und mit dem peripheren Teil (54) verbunden ist, umfasst;

wobei jeder Stützrahmen (57) so ausgestaltet ist, dass der entsprechende Greifer (56) an einer Position angeordnet oder anordenbar ist, sodass sich der entsprechende Greifer (56) innerhalb einer entsprechenden zweiten Ebene (H2) erstreckt, die quer zur Drehachse (F) ist, und sodass die zweite Ebene (H2) von der ersten Ebene (H1) beabstandet ist;

wobei der Isolationskanal (35; 36) eine erste laterale Wand (42) und eine zweite laterale Wand (43) umfasst, die voneinander beabstandet sind und einen Weiterbewegungsraum (44) für den Teil (6) der Gefäße (2) lateral begrenzen;

wobei jede Greifanordnung (51) ausgelegt ist zum Anordnen des entsprechenden Gefäßes (2), sodass der Teil (6) des Gefäßes (2) innerhalb eines unteren Teils (46) eines Weiterbewegungsraums (44) des Isolationskanals (35; 36) angeordnet ist;

wobei die Konditionierungsvorrichtung ausgelegt ist zum Leiten des Gases von einem oberen Teil (45) des Weiterbewegungsraums (44) zum unteren Teil (46); **dadurch gekennzeichnet, dass:**

jede zweite Ebene (H2) zwischen dem Isolationskanal (35; 36) und der ersten Ebene (H1) positioniert ist, die Drehachse (F) eine vertikale Ausrichtung aufweist und jede zweite Ebene (H2) über der ersten Ebene (H1) angeordnet ist;

- sich laterale Wände (42) und (43) des Isolationskanals (35, 36) von der oberen Wand (33) in den Innenraum (15) erstrecken;

- jede der lateralen Wände (42) und (43) des Isolationskanals (35) auch zumindest einen entsprechenden Teil einer entsprechenden lateralen Wand (34) der Isolationskammer (14) definiert.

2. Abfüllanlage nach Anspruch 1, wobei die Stützstruktur (53) eine Scheibe (55), insbesondere eine ringförmige Scheibe, umfasst, die den peripheren Teil (54) trägt; wobei sich die Scheibe (55) innerhalb der ersten Ebene (H1) erstreckt.

3. Abfüllanlage nach Anspruch 1 oder 2, wobei sich der Stützrahmen (57) quer, insbesondere senkrecht, vom peripheren Teil (54) erstreckt.

4. Abfüllanlage nach einem der vorhergehenden Ansprüche, wobei der Isolationskanal (35; 36) innerhalb eines oberen Abschnitts (37) des Innenraums (15) angeordnet ist.

5. Abfüllanlage nach einem der vorhergehenden Ansprüche, ferner umfassend eine Formungseinrichtung (20), ausgelegt zum Bilden und/oder Formen der Gefäße (2) aus Vorformen (10);

wobei die Formungseinrichtung (20) zumindest teilweise innerhalb der Isolationskammer (14) angeordnet ist, sodass, bei Verwendung, die Gefäße (2) aus den Vorformen (10) innerhalb des Innenraums (15) gebildet werden;

wobei die Formungseinrichtung (20) vorgelagert der Abfülleinrichtung (18) entlang des ersten Weiterbewegungspfad (P) angeordnet ist; und

wobei der Isolationskanal (35) zwischen der Abfülleinrichtung (18) und der Formungseinrichtung (20) positioniert ist.

Revendications

1. Installation de remplissage (1) pour le remplissage de récipients (2) avec un produit versable comprenant au moins :

- une chambre d'isolation (14) comportant un espace intérieur (15), la chambre d'isolation (14) étant conçue pour être disposée sur une surface et comprenant au moins une paroi supérieure (33) située à distance de la surface et une pluralité de parois latérales (34) raccordées à la paroi supérieure (33) de façon à entourer et/ou délimiter l'espace intérieur (15) ;

- un dispositif de conditionnement conçu pour fournir une atmosphère gazeuse définie et/ou régulée à l'intérieur de l'espace intérieur (15) ;

- un appareil de remplissage (18) conçu pour remplir les récipients (2) avec le produit versable et étant au moins partiellement disposé à l'intérieur de la chambre d'isolation (14) de telle sorte que, lors de l'utilisation, les récipients (2) soient remplis à l'intérieur de l'espace intérieur (15) ; et

- un dispositif de transport (19) conçu pour faire avancer les récipients (2) le long d'un trajet d'avancement (P) jusqu'à et/ou depuis l'appareil de remplissage (18) ;

la chambre d'isolation (14) comprenant au moins un canal d'isolation (35 ; 36) s'étendant à l'intérieur de l'espace intérieur (15) et étant disposé en aval ou en amont de l'appareil de remplissage (18) le long du trajet d'avancement (P) ;

l'unité de conditionnement étant conçue pour réguler un écoulement d'un gaz à l'intérieur du canal d'isolation (35 ; 36) ;

le dispositif de transport (19) comprenant au moins un organe de transport (50) étant conçu pour faire avancer les récipients (2) le long d'au moins une partie du trajet d'avancement (P) et à travers au moins une partie du canal d'isolation (35 ; 36) ;

l'organe de transport (50) comprenant une pluralité d'ensembles de préhension (51), chaque ensemble de préhension (51) étant conçu pour retenir un récipient (2) respectif pendant l'avancement du récipient (2) respectif le long de la partie du trajet d'avancement (P) ;

chaque ensemble de préhension (51) étant conçu pour disposer le récipient (2) respectif de telle sorte qu'au moins une partie supérieure (6) du récipient (2) respectif soit disposée à l'intérieur

du canal d'isolation (35 ; 36) ;
l'organe de transport étant une étoile (50) ;
l'étoile (50) comprenant en outre :

- un arbre d'entraînement (52) rotatif autour d'un axe de rotation (F) ;
- un actionneur conçu pour déclencher la rotation de l'arbre d'entraînement (52) autour de l'axe de rotation (F) ; et
- une structure de support (53) fixée à l'arbre d'entraînement (52) et comportant une partie périphérique (54) ;

la pluralité d'ensembles de préhension (51) étant disposés le long de et sur la partie périphérique (54) et espacés angulairement les uns des autres autour de l'axe de rotation (F) ;
la partie périphérique (54) s'étendant à l'intérieur d'un premier plan (H1) transversal ;
chaque ensemble de préhension (51) comprenant, en outre, un organe de préhension (56) conçu pour retenir le récipient (2) respectif et un cadre de support (57) portant l'organe de préhension (56) respectif et étant raccordé à la partie périphérique (54) ;
chaque cadre de support (57) étant conçu de telle sorte que l'organe de préhension (56) respectif soit disposé ou puisse être disposé à un certain emplacement de façon à ce que l'organe de préhension (56) s'étende à l'intérieur d'un second plan (H2) respectif qui est transversal à l'axe de rotation (F) et de telle sorte que le second plan (H2) soit espacé du premier plan (H1) ;
le canal d'isolation (35 ; 36) comprenant une première paroi latérale (42) et une seconde paroi latérale (43) espacées l'une de l'autre et délimitant latéralement un espace d'avancement (44) pour ladite partie (6) des récipients (2) ;
chaque ensemble de préhension (51) étant conçu pour disposer le récipient (2) respectif de telle sorte que ladite partie (6) du récipient (2) soit disposée à l'intérieur d'une partie inférieure (46) d'un espace d'avancement (44) du canal d'isolation (35 ; 36) ;
le dispositif de conditionnement étant conçu pour diriger le gaz d'une partie supérieure (45) de l'espace d'avancement (44) à la partie inférieure (46) ;

caractérisée en ce que :

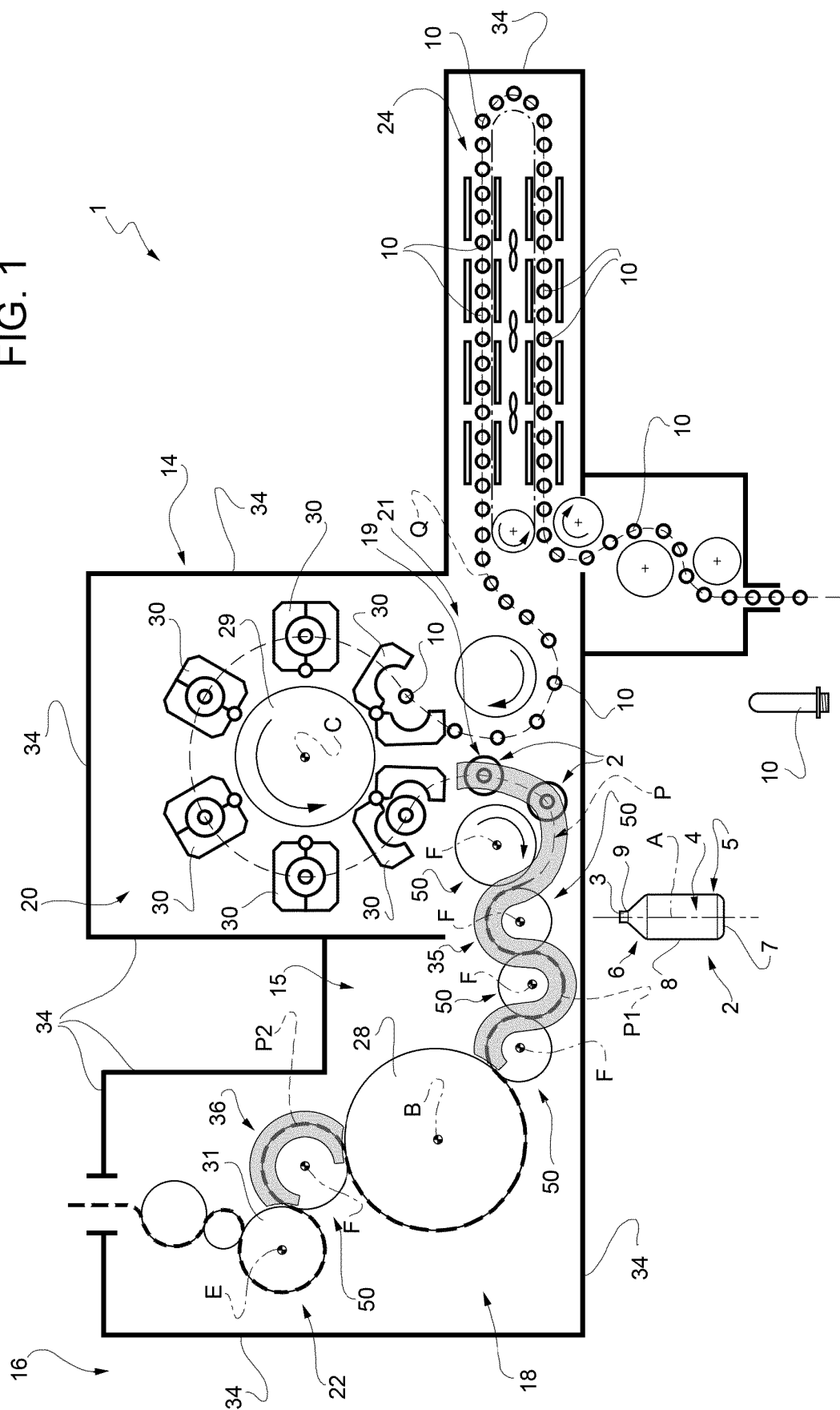
- chaque second plan (H2) est interposé entre le canal d'isolation (35 ; 36) et le premier plan (H1) ;
- l'axe de rotation (F) a une orientation verticale et chaque second plan (H2) est disposé au-dessus du premier plan (H1) ;

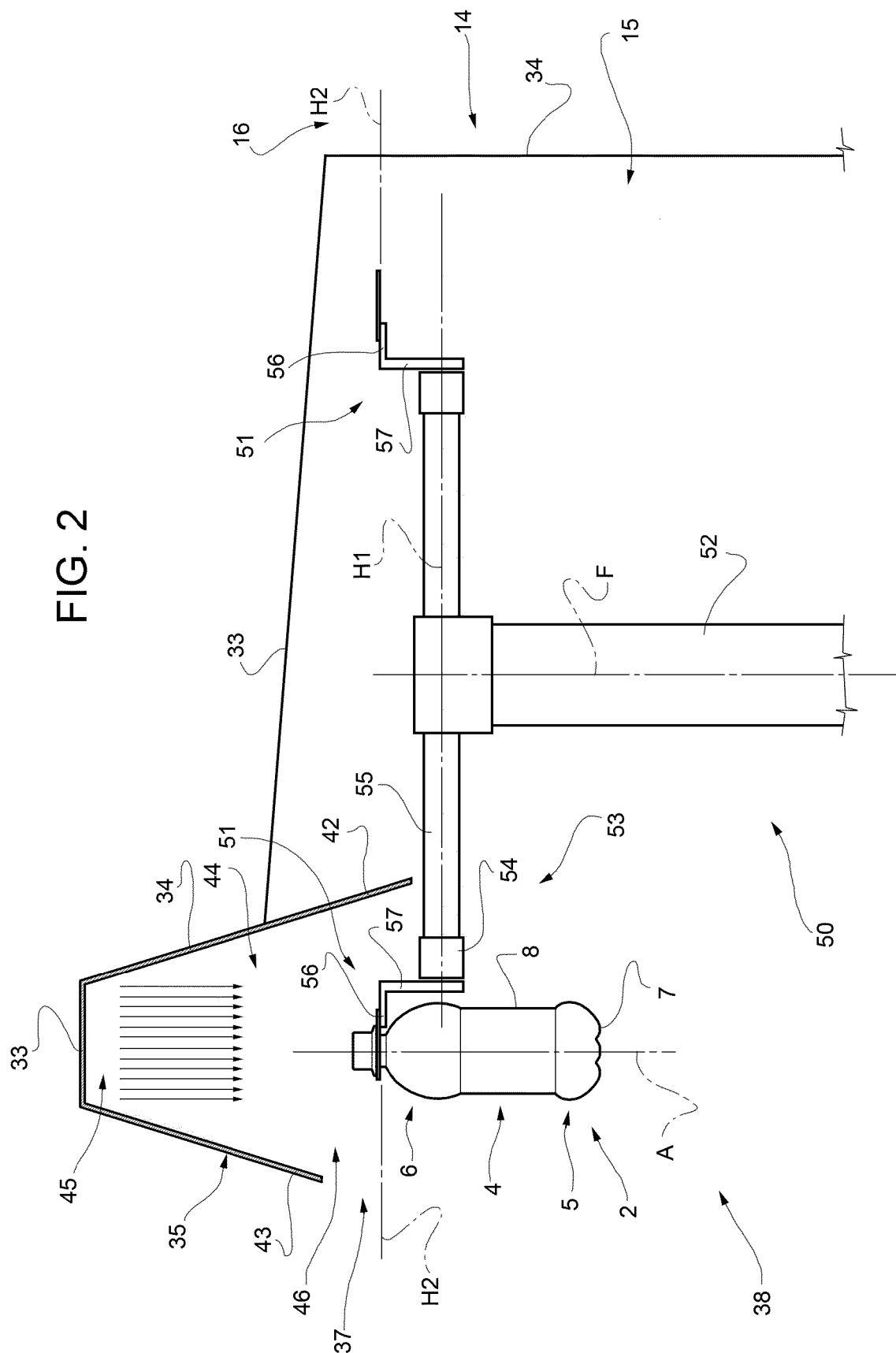
- les parois latérales (42) et (43) du canal d'isolation (35, 36) s'étendent à partir de la paroi supérieure (33) dans l'espace intérieur (15) ;
- chacune des parois latérales (42) et (43) du canal d'isolation (35) définit également au moins une partie respective d'une paroi latérale (34) respective de la chambre d'isolation (14).

2. Installation de remplissage selon la revendication 1, dans laquelle la structure de support (53) comprend un disque (55), en particulier un disque annulaire, portant la partie périphérique (54) ; dans laquelle le disque (55) s'étend à l'intérieur du premier plan (H1).
3. Installation de remplissage selon la revendication 1 ou 2, dans laquelle le cadre de support (57) s'étend transversalement, en particulier perpendiculairement, à partir de la partie périphérique (54).
4. Installation de remplissage selon l'une quelconque des revendications précédentes, dans laquelle le canal d'isolation (35 ; 36) est disposé à l'intérieur d'une section supérieure (37) de l'espace intérieur (15).
5. Installation de remplissage selon l'une quelconque des revendications précédentes, comprenant, en outre, un appareil de moulage (20) conçu pour former et/ou mouler les récipients (2) à partir de préformes (10) ;

dans laquelle l'appareil de moulage (20) est au moins partiellement disposé à l'intérieur de la chambre d'isolation (14) de telle sorte que, lors de l'utilisation, les récipients (2) soient formés à partir des préformes (10) à l'intérieur de l'espace intérieur (15) ;
dans laquelle l'appareil de moulage (20) est disposé en amont de l'appareil de remplissage (18) le long du premier trajet d'avancement (P) ; et dans laquelle le canal d'isolation (35) est interposé entre l'appareil de remplissage (18) et l'appareil de moulage (20).

FIG. 1





REFERENCES CITED IN THE DESCRIPTION

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