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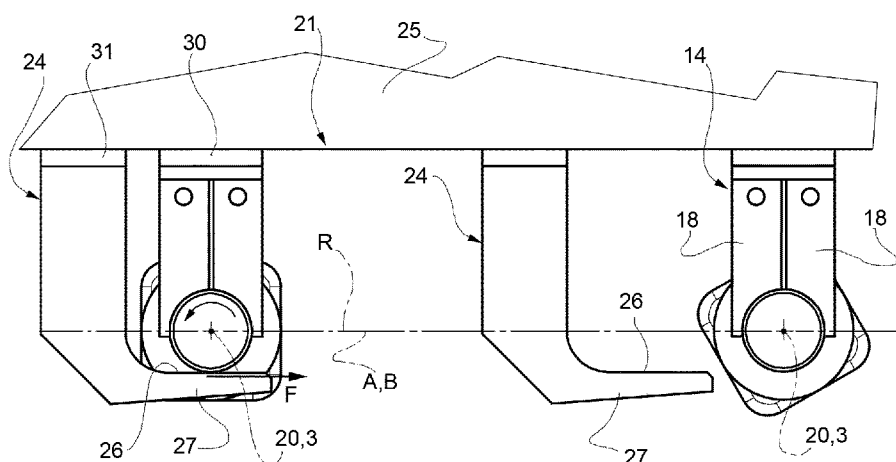
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FIG. 3



(57) Abstract: A transfer and orientation assembly is provided with a plurality of supporting members (14), which are adapted to support respective containers and define respective turning axes (20) about which the supported containers are free to turn; the assembly has drive elements (24), which are adapted to come into contact with the containers and exert friction forces (F), tangential with respect to the turning axes (20), during transfer, in order to be able to orient the containers about the respective turning axes; at least one conveyor (25) transfers the supporting members along a first path and the drive elements (24) along at least a second path (B), which is ring-shaped; transfer of the drive elements (24) is independent of the supporting members (14) so that each drive element (24) can exert a friction force (F) as a result of a relative velocity with respect to a corresponding container during contact with said corresponding container.

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"ASSEMBLY AND METHOD FOR TRANSFERRING AND ORIENTING CONTAINERS"

The present invention relates to an assembly for transferring and orienting containers, each having a top opening defined by a neck portion of the container itself. For instance, such containers are defined by bottles or jars. The assembly forming the subject of the present invention may advantageously be integrated in a plant for filling and/or labelling containers.

In fact, in the bottling field, there is generally felt the need to orient the bottles about their vertical axes so as to obtain a pre-defined orientation, for example to be able to screw a cap on the neck portion in an effective and fast way, so as to close the top opening of the bottle, or to be able to apply a label on the side surface of the bottle body in a desired position. This need is particularly felt when the bottle body has a rectangular or square cross section.

For this type of bottles, in the prior art, guide elements are commonly used. Such guide elements are arranged in fixed positions and co-operate by friction with the side surface of the bottle body while the bottles are being conveyed by a conveyor, for example by a carousel conveyor.

These solutions are not altogether satisfactory in so far as the bottles can bang or stick against the fixed

guide elements while they are being conveyed.

Moreover, in the cases where recycled material is used to form the bottles, the bottle body can get scratched or damaged after co-operating by friction with the aforesaid guide elements, therefore the aesthetic appearance of the end product is jeopardised, with consequent damage of image for the producer.

More in general, then, the guide elements of the known type do not enable control of the rotation angle, especially in the cases where the bottles have a bottle body with circular cross section.

The aim of the present invention is to provide an assembly for transferring and orienting containers that will make it possible to solve in a simple and economically advantageous way the problems set forth above, and in particular will enable orientation of the containers in a flexible way, irrespective of the shape of the bottle body, to avoid the need for making possible adjustments in the presence of so-called "format changes".

According to the present invention, an assembly for transferring and orienting containers is provided, as defined in Claim 1.

According to the present invention, a method for transferring and orienting containers is moreover provided, as defined in Claim 11.

The invention will now be described with reference to the annexed drawings, which illustrate a non-limiting example of embodiment thereof and in which:

- Figure 1 is a perspective view from above that shows, in a partial and schematic way, a first preferred embodiment of the assembly for transferring and orienting containers according to the present invention;
- Figure 2 is a front perspective view that schematically represents, at an enlarged scale, a detail of the assembly of Figure 1;
- Figure 3 is a top plan view of the detail of Figure 2;
- Figure 4 schematically represents, at an enlarged scale, a detail of Figure 2;
- Figure 5 illustrates, in schematic side view, the detail of Figure 4;
- Figure 6 is a perspective view at an enlarged scale of a further detail of Figure 1;
- Figure 7 is similar to Figure 2 and shows a variant embodiment of the assembly of Figure 1;
- Figure 8 is a perspective view from above that shows, in a schematic and partial way, a second preferred embodiment of the assembly for transferring and orienting containers according to the present invention;
- Figure 9 is a schematic perspective view, at an enlarged scale and with parts removed for clarity, of a detail of

Figure 8;

- Figure 10 shows the detail of Figure 9, in side view and at a further enlarged scale;
- Figure 11 is a three-quarter perspective view that shows, in a schematic and partial way, a third preferred embodiment of the assembly for transferring and orienting containers according to the present invention; and
- Figure 12 is a side view that shows, at an enlarged scale, a detail of the assembly of Figure 11.

In Figure 1, the reference number 1 designates an assembly (illustrated partially and schematically) for transferring and orienting containers 2, which are defined, for example, by bottles and are preferably made of glass or plastic. Alternatively, the containers 2 may be defined by jars, once again made of glass or plastic. With reference to Figure 2, each container 2 extends along an axis 3, which in use is vertical, and comprises a body or containment portion 4 and a neck portion 5, which has a restricted cross section, is joined to the portion 4, for example via a frustoconical portion 6, and has a rim 7 defining an opening 8, used for filling the container 2. The opening 8 is adapted to be closed by a cap (not illustrated), for example by a crown cap that can be coupled to an outer projection (not illustrated) provided

on the rim 7 or else by a cap provided with an internal thread, that can be coupled to a corresponding external thread (not illustrated) provided on the neck portion 5.

With reference to Figures 4 and 5, the neck portion 5 comprises a tubular wall 9, which has a circular cross section and is preferably cylindrical. The neck portion 5 moreover comprises two projections 10 and 11, which project outwards from an outer surface 12 of the wall 9 in axially spaced positions so as to define, between them, a circular seat 13 having a substantially constant height along its own perimeter. The seat 13 is adapted to be engaged, in use, by a corresponding supporting member 14 (illustrated schematically and partially) that vertically supports the wall 9 of the neck portion 5. The projection 10 is the one set higher up and has a bottom face 16 that defines a shoulder that rests on the supporting member 14, whereas the projection 11 prevents any possible movement upwards and possible vibrations of the container 2. According to variants (not illustrated), the neck portion 5 is without the projection 11.

In particular, the supporting member 14 is defined by a gripper comprising two jaws 18, which are movable horizontally between a closed gripping configuration, in which they grip the wall 9 between them and engage the seat 13 so as to support and/or hold the neck portion 5, and an

open configuration of release, in which the container 2 is uncoupled from the supporting member 14. Movement of the jaws 18 is obtained in a way known and not illustrated.

In the closed, gripping, configuration the jaws 18 define a seat 19 (Figure 3), which is complementary to the outer circular shape of the wall 9 and is configured so as to be engaged by the wall 9 in a rotatable way about a vertical rotation or turning axis, designated by the reference number 20. In optimal working conditions, the axis 20 coincides with the axis 3 of the container 2 that is gripped and transferred by the supporting member 14. According to variants (not illustrated), a supporting system could be provided different from the jaws 18, but once again adapted to guarantee a free rotation (but for possible friction forces) of each container 2 about a corresponding axis 20.

With reference to Figure 1, the containers 2 are conveyed along a path A, which lies at least in part in a plane orthogonal to the axes 20 (i.e., in a horizontal plane), and during this transfer through an orienting station 21, where they can be rotated by the assembly 1 about the respective axes 3 via friction forces F (Figure 3) that are tangential to said axes 3. In particular, the assembly 1 and the station 21 are arranged, along the path A, between a carousel conveyor 22 (illustrated

schematically), which forms part of a filling section, and a carousel conveyor 23 (illustrated only schematically), which forms part of a capping section.

The assembly 1 comprises a plurality of drive elements 24 (Figures 2 and 3), which are operated so as to come into contact with a cylindrical side surface of the containers 2, when the latter crosses the station 21, so that the friction forces F can then be imposed thereon. According to the present invention, the drive elements 24 are conveyed along at least one annular path B through the station 21 in a way independent of the movement of the supporting members 14 and hence of the containers 2, i.e., so that the drive elements 24 can have a velocity with a magnitude different from that of the containers 2 when they are in contact with the side surface of the containers 2 in the station 21. Preferably, the velocity of the drive elements 24 in the station 21 can be adjusted to determine whether actually to impose a friction force F and so as to determine the degree of difference in velocity (or relative velocity) with respect to the containers 2. More preferably, the assembly 1 comprises a control unit (not illustrated) configured so as to adjust the velocity of each drive element 24 as it is passing through the station 21 in a way independent of that of the other drive elements 24, in particular to control the rotation imparted on each container 2 separately from

control of orientation of the other containers 2.

In the embodiment of Figure 1, the assembly 1 comprises a single conveyor 25 (illustrated schematically), which conveys the supporting members 14 and the drive elements 24 along the path B. The supporting members 14 pick up respective containers 2 from the conveyor 22 and then release them onto the conveyor 23, in a way known and not described in detail. Consequently, a part of the path A of the containers 2 coincides with a part of the path B of the drive elements 21. This part of path in common is designated by the reference letter P in Figure 1 and comprises at least one rectilinear branch R and at least one convex curved branch C set downstream of the branch R.

With reference to Figures 3 and 4, each of the containers 2 is driven in rotation about its axis 3 via a respective drive element 24. Each of the drive elements 24 has an edge 26 that is rectilinear, lies in a plane orthogonal to the axes 20, is parallel or tangential to the path B (i.e., parallel to the branch R and tangential to the branch C), is arranged in a position such as to come into contact with the side surface of the corresponding container 2 in the station 21 while the container 2 is being conveyed, and, during contact, is oriented tangentially to the axis 20 of the supporting member 14 that grips and transfers such container 2.

The friction coefficient between the edge 26 and the side surface of the container 2 is sufficient to get the container 2 to rotate, without slipping, if a difference of velocity is present between the edge 26 and the container 2, i.e., in the case of relative displacement, during contact. To increase the friction coefficient, the edge 26 can be defined by a purposely provided surface coating, for example made of rubber or other similar material.

The edges 26 delimit respective fingers 27 of the drive elements 24. Each finger 27 is rigid to bending in the case of strains or forces acting on the edge 26 in a plane orthogonal to the axes 20, 3. In the specific case, the fingers 27 are elongated in a direction parallel or tangential to the path B and project in cantilever fashion and in fixed positions from respective supporting arms 28, which form part of the drive elements 24. The arms 28 are transverse to the path B and, in each operating condition, are kept at a distance from the containers 2, even if they approach (or they move away from) the containers 2 when the edges 26 impart the friction force F.

Preferably, with reference to Figure 5, the edges 26 are located in an axial position such as to come into contact with the neck portions 5 of the containers 2. In particular, in the station 21, each edge 26 is located substantially in the same axial position where the jaws 18

are located so that it touches the surface 12 of the wall 9 in a position diametrically opposite to and at the same height as the corresponding supporting member 14. Consequently, the forces transmitted by the supporting member 14 and by the drive element 24 on the container 2 lie in one and the same plane orthogonal to the axis 20 and therefore do not generate any overturning torque. Consequently, the axis 3 remains vertical and coinciding with the axis 20, notwithstanding the contact between the container 2 and the edge 26.

With reference to what is schematically illustrated in Figure 4, the supporting members 14 and the drive elements 24 are brought into fixed positions by respective carriages or slides 30 and 31, which are coupled to one or more guides 32 of the conveyor 25. In particular, the slides 30 and 31 engage one and the same guide 32 and are alternated with one another along such guide 32. The slides 30 and 31, the guide 32, and their coupling are illustrated in a schematic and/or simplified way in so far as they can be built according to various modalities different from one another.

Preferably, the conveyor 25 is of the linear-electric-motor type, so that the slides 30 and 31 are driven along the path B under the action of electromagnetic forces. For instance, the slides 30 and 31 are provided with respective

permanent magnets (not illustrated). Preferably, the conveyor 25 comprises a single electromagnetic path 33 for operating all the slides 30, 31 independently of one another. Alternatively, two mutually parallel electromagnetic paths could be provided, one for operating the slides 30 and the other for operating the slides 31.

With reference to Figure 3, after the supporting members 14 have picked up the respective containers 2 from the conveyor 22, in the station 21 each slide 31 can be moved closer to the adjacent slide 30, or vice versa, when they are both travelling along the branch R, so as to bring the edge 26 into contact with the corresponding container 2. The free end of the finger 27 is rounded so as to perform a function of lead-in for the edge 27 when the latter comes into contact with the side surface of the container 2. Once in contact, the approach between the slides 30 and 31 is continued so as to get the edge 26 to slide on said side surface in order to exert the friction force F and hence impart a desired rotation angle on the container 2 (for example, according to specific needs of the capping section that is arranged downstream). In the case illustrated, the rotation angle is defined by the diameter of the surface 12 and by the relative displacement between the edge 26 and the neck portion 5 while the container 2 is being conveyed along the branch R. Once the

desired orientation has been achieved, the two adjacent slides 30 and 31 are conveyed at the same velocity (possibly accelerating together with respect to the other slides 30 and 31 arranged upstream, to obtain a minimum distance between the containers 2 along the path A) until the branch C is reached. As illustrated in Figure 6, the edge 26 is arranged radially further out than the corresponding container 2, with respect to the centre of curvature of the branch C. Consequently, on account of this curvature, the edge 26 autonomously moves away from the side surface of the container 2. At this point, it is sufficient to move the slides 30 and 31 farther away from one another along the branch C, before synchronising the slide 30 with the conveyor 23 in order to release the container 2 that has just been oriented in the station 21.

Figure 7 illustrates a variant embodiment that enables reduction of the number of drive elements 24 on the conveyor 25. In fact, each drive element 24 is arranged along the path B between two corresponding supporting members 14a and 14b and comprises two fingers 27a and 27b that project in opposite directions from the arm 28 and are able to orient respective containers 2a and 2b. Similarly to what has been described above, when the supporting members 14a and 14b pick up the respective containers 2a and 2b from the conveyor 22, the drive element 24 is

uncoupled from both of the containers 2a and 2b. While the container 2 is being conveyed along the branch R, for example, the velocity of the slide 31 is increased so as to bring it closer to the slide 30a that supports the supporting member 14a. The finger 27a is then brought into contact and made to slide on the container 2a that is arranged downstream to obtain the desired orientation about the axis 3a. At the same time or subsequently, the slide 30b that supports the supporting member 14b is accelerated so as to bring it closer to the slide 30 and get the finger 27b and the container 2b to co-operate by friction with each other in order to obtain the rotation about the axis 3b. Obviously, the accelerations and the relative movements of the slides 30a, 31 and 30b could be different from what is described in this example so as to obtain the required sliding of the fingers 27a and 27b.

Figure 8 relates to a further embodiment, the constituent parts of which are designated by reference numbers that, where possible, are the same as those of Figures 1-6 to which the value 100 has been added.

As compared to the assembly 1, instead of having a single conveyor, the assembly 101 comprises: two conveyors 125a and 125b, which are the same as each other and convey respective series of drive elements 124a and 124b, along respective ring-shaped paths B; and one conveyor 125c,

which conveys the supporting members 114 for transferring the containers 102 along the path A and, in particular, is defined by a star or carousel conveyor. The conveyors 125a and 125b are arranged on opposite sides of the path A and, preferably, are of a linear-electric-motor type, like the conveyor 25.

With reference to Figure 9, in the orienting station 121, the two paths B and the path A comprise respective stretches Ta, Tb, and Tc that are coplanar and parallel to one another. With reference to the curvature of the stretch Tc, the stretch Ta is concave and the stretch Tb is convex, with the same curvature. The conveyors 125a and 125b are counter-rotating, so that the direction of advance of the containers 102 and of the drive elements 124a and 124b is parallel and concordant in the stretches Tc, Ta, and Tb. In particular, in the station 121 a single container 102 is oriented at a time via one of the drive elements 124a and one of the drive elements 124b, which are controlled so as to come into contact simultaneously with said container 102 and so as to be synchronised with the advancement velocity of the containers 102 at the start of contact. In other words, at start of contact, the advancement velocity of the drive elements 124a and 124b in the stretches Ta and Tb is controlled so as to be equal to that of the containers 102 in the stretch Tc.

In order to orient the container 102 that is passing through the station 121, during contact, the velocities of the two drive elements 124a and 124b are one increased and the other reduced so as to generate two relative velocities, which are opposite but of equal magnitude, with respect to the container 102, so as to generate a couple of friction forces (F) on the container 102 about its axis 103. Thanks to this solution, it is possible to rotate each container 102 in any one of the two rotation directions: in the example of Figure 9, if it is the drive element 124a that travels faster during contact, then the rotation about the axis 103 is clockwise. Instead, if it is the drive element 124b that travels faster during contact, then the rotation about the axis 103 is counterclockwise. The rotation angle is defined by the outer diameter of the container 102 and by the relative displacement of the drive elements 124a and 124b with respect to the container 102 itself.

At the end of the operation of orientation, in the station 121 the velocities of the two drive elements 124a and 124b are again synchronised with that of the container 102, before detachment at the end of the stretches Ta and Tb occurs.

It is thus possible to adjust the rotation angle of each container 102 in a flexible way. In particular, the

orientation of each of the containers 102 can be controlled in a way independent of rotation of the other containers 102.

Unlike the fingers 27 of the assembly 1, the fingers 127 are elongated and project in directions that are orthogonal to the paths B, but in any case require flexural rigidity in regard to forces acting on the edge 126 in a plane orthogonal to the axes 120 (i.e., in a horizontal plane).

As may be noted in Figure 10, the edges 126 of the two drive elements 124a and 124b are arranged in diametrically opposite positions and in the same axial position so as to prevent couples that will incline the axis 103 with respect to the axis 120. In particular, the edges 126 act by friction on the surface 112 of the neck portion 105, underneath the projection 111.

According to variants (not illustrated), the edges 126 act on an outer cylindrical surface of the containment portion 104, and/or just one of the conveyors 125a and 125b is provided (in this case, the edges 126 preferably touch the neck portion 105 in the same axial position as the supporting members 114, in the same way as for the assembly 1).

Figure 11 relates to a further embodiment, the constituent parts of which are designated by reference

numbers that, where possible, are the same as those of Figures 8-10, to which the value 100 has been added.

Unlike the assembly 101, in the assembly 201 the conveyors that convey the drive elements 124a and 124b are defined by respective transfer wheels 225a and 225b, which turn about respective axes 236a and 236b, which are fixed and parallel to the axes 220 of the supporting members 214 so that the paths B are circular. In particular, each wheel 225a, 225b comprises a plurality of radial arms 235, each of which supports a corresponding drive element 224a, 224b.

The radii of curvature of the paths B are smaller than the radius of curvature of the path A in the station 221. Rotation of the wheels 225a and 225b is obtained by operating respective rotary electric motors 237a and 237b. The velocity and acceleration of the wheels 225a and 225b are adjusted by controlling the motors 237a and 237b in order to obtain the desired relative velocity between the drive elements 224a, 224b and the containers 202 in the station 221. As for the assembly 101, the rotation velocity of the wheels 225a and 225b is controlled so that the edges 226 will have a velocity, in a direction parallel to the path A, equal to that of the containers 202, at start and at end of contact in the station 221, and so that, in the intermediate part of the contact, one of the drive elements 224a, 224b that pass through the station 221 will increase

their own velocity (once again in a direction parallel to the path A) while the other will decelerate by an equal amount, to obtain the desired orientation angle of the container 202 that is interposed in between.

The drive elements 224a and 224b comprise respective fingers 227, which project radially from the wheels 225a and 225b. The drive elements 224a and 224b are carried by the wheels 225a and 225b so as to have a freedom of movement in a radial direction in order to compensate for the fact that the paths B are not parallel to the path A in the station 221. In particular, along their own periphery, the wheels 225a and 225b comprise a plurality of radial seats or guides 239 that are slidably engaged, each by the end of a corresponding drive element 224a, 224b. In particular, the drive elements 224a and 224b are able to slide along the respective guides 239 towards the respective axes 236a, 236b starting from respective resting positions against the action of elastic elements, defined, for example, by springs 240. Consequently, after each drive element 224a and 224b has come into contact with the side surface of a corresponding container 202 at input to the station 221, as said drive element 224a and 224b continues to rotate about the axis 236a, 236b, it partially enters the respective guide 239 starting from its own resting position, against the reaction force of the corresponding

spring 240. Once a dead centre in which the drive elements 224a and 224b in the station 221 are radially aligned with both of the axes 236a and 236b is passed, the drive elements 224a and 224b exit from the guides 239 under the thrust of the respective springs 240 to return into the original resting positions.

The distance between the path A and the axes 236a and 236b, the radii of curvature of the paths B, and the maximum radial travel of the drive elements 224a and 224b in the respective guides 239 are established in the design stage so that the edges 226 of the fingers 227 will be in contact with the outer surface of the containers 202 for a stretch sufficiently long to obtain the desired angles of rotation.

As described above for the assembly 101, by controlling the motors 237a and 237b for each pair of drive elements 224a and 224b that engage the station 221, it is possible to get the corresponding container 202 to rotate in either of the two rotation directions. Moreover, it is possible to vary the rotation velocity of the wheels 225a and 225b for each pair of drive elements 224a and 224b that engage the station 221 in a way independent of the control carried out on the other drive elements 224a and 224b so as to adjust the orientation of each of the containers 202 independently of rotation of the other containers 202.

The advantages of the assembly 1, 101, and 201 emerge clearly from the foregoing description.

In particular, it is evident how the assembly of the present invention enables orientation of the containers through the desired angle in a controlled way and, preferably, differentiation of the rotation angle between the various containers.

Moreover, the assembly of the present invention makes it possible to operate on the neck portions 5, 105, 205 so that it prevents scratches or damage on the outer surface of the containment portion 4, 104, 204, thus ensuring the aesthetic quality even when the material of said containment portion is of a relatively low quality and/or has a relatively low hardness.

The assemblies 1 and 101 use linear motors that enable control of the displacements of the drive elements 24 and 124a,124b in a precise way and make it possible to obtain a relatively high velocity (so that the number of the drive elements 24 and 124a,124b in each conveyor can be relatively low). On the other hand, the assembly 201 is characterized by an extremely simple solution from the constructional standpoint, albeit maintaining the capacity to control the rotation angle of the containers 202.

The solution of the assembly 1 is extremely compact, since it envisages a single conveyor 25 that conveys both

the drive elements 24 and the supporting members 14.

Once again in the assembly 1, transfer and orientation of the containers 2 along the branch R reduces the effects due to backlash; i.e., it reduces the undesired exit of product, which can occur while the containers are being conveyed and oriented along paths where there are, instead, envisaged changes of velocity and/or direction.

Moreover, the conveyor 25 can replace in a relatively simple way the star conveyor that is normally provided in known solutions for transferring the containers 2 between the conveyors 22 and 23, i.e., between the filling section and the capping section.

Finally, from the foregoing it is clear that modifications and variations may be made to the assembly 1, 101, 201 described with reference to the attached figures, without thereby departing from the scope of protection of the present invention, as defined in the annexed claims.

In particular, the conveyors 22, 23, 25, 125a, 125b, 125c, and 225c could be different from what has been indicated above as preferred examples of embodiment, and/or the control unit of the assembly 1, 101, 201 could be configured so as to always impart the same relative velocity on the drive elements 24, 124a, 124b and 224a, 224b with respect to the containers 2, 102, 202, in order to get all the containers 2, 102, 202 to rotate through one and

the same angle, or else could be configured so as to get only some of the containers 2, 102, 202 that are conveyed through the station 21, 121, 221 to rotate.

Finally, as mentioned above, the containers 2, 102, 202 could be conveyed with a modality different from the preferred one that has been illustrated herein, where supporting members 14 are provided that grip the neck portion 5, 105, 205: for example, especially in the solutions regarding the assemblies 101 and 201, the containers 102 and 202 could be conveyed in rows while the bottom of their containment portion 104, 204 is arranged, so that the containers rest vertically, on respective portions of a conveying surface (for example, on respective portions of a conveyor belt), with the possibility of rotation about their own axes 103 and 203 on said conveying surface.

CLAIMS

1.- An assembly (1; 101; 201) for transferring and orienting containers (2; 102; 202), each having an axis (3; 103; 203) and comprising:

- a containment portion (4; 104; 204); and
- a neck portion (5; 105; 205) joined to said containment portion and defining an opening;

the assembly comprising:

- supporting portions (14; 114; 214), which are adapted to support respective containers and define respective turning axes (20; 120; 220) about which the supported containers are free to turn;
- conveying means (25; 125a,125b,125c; 225a, 225b, 225c) for transferring said supporting portions (14; 114; 214) along a first path; and
- drive elements (24; 124a,124b; 224a, 224b) arranged in positions such as to come into contact with said containers and exert friction forces (F), tangential with respect to said turning axes (20; 120; 220), on the containers supported by said supporting portions (14; 114; 214) during transfer, to be able to orient the supported containers about the respective turning axes;

the assembly being characterized in that said drive elements (24; 124a,124b; 224a, 224b) are movable, under the action of said conveying means (25; 125a,125b,125c; 225a,

225b, 225c), along at least one second ring-shaped path (B) and in a way independent of said supporting portions (14; 114; 214) so that each said drive element (24; 124a, 124b; 224a, 224b) can exert said friction force (F) as a result of a relative velocity with respect to a corresponding container (2; 102; 202) during contact with said corresponding container (2; 102; 202).

2.- The assembly according to Claim 1, characterized in that said drive elements (24; 124a, 124b; 224a, 224b) comprise respective fingers (27; 127; 227), which are rigid to bending when subjected to forces directed in a plane orthogonal to said turning axes (20; 120; 220).

3.- The assembly according to Claim 1 or Claim 2, characterized in that said conveying means comprise at least one linear-motor conveyor (25; 125a, 125b) that conveys said drive elements (24; 124a, 124b).

4.- The assembly according to Claim 1 or Claim 2, characterized in that said conveying means comprise at least one transfer wheel (225a, 225b), which is able to turn about a rotation axis (236a, 236b) parallel to said turning axes (220); said drive elements (224a, 224b) being supported by said transfer wheel (225a, 225b) so as to be displaceable along respective directions that are radial with respect to said rotation axis (236a, 236b).

5.- The assembly according to any one of Claims 1 to 3,

characterized in that said conveying means comprise a single conveyor (25) that transfers said supporting portions (14) and said drive elements (24) along a common path (P).

6.- The assembly according to Claim 5, characterized in that said common path (P) comprises at least one rectilinear branch (R) and at least one convex curved branch (C); each of said drive elements (24) being arranged in a position adjacent to at least one of said supporting portions (14), along said common path (P), and being driven so as to exert said friction force (F) on the container supported by the adjacent supporting portion, when they both move along said rectilinear branch (R).

7.- The assembly according to any one of Claims 1 to 4, characterized in that said conveying means comprise two conveyors (125a,125b; 225a, 225b) that are arranged on opposite sides of said first path (A) and support said drive elements so as to transfer said drive elements along respective second paths (B) that are ring-shaped.

8.- The assembly according to any one of the preceding claims, characterized in that said drive elements (24; 124a,124b; 224a, 224b) are arranged in axial positions such as to come into contact, in use, with said containers only at said neck portions (5; 105; 205).

9.- The assembly according to Claim 8, characterized in

that said supporting portions (14) are defined by supporting members configured so as to grip said containers (2) at said neck portions (5); said drive elements (24) and said supporting members being arranged in one and the same axial position.

10.- The assembly according to any one of the preceding claims, characterized by comprising control means configured so as to adjust said relative velocity for each of said drive elements (24; 124a,124b; 224a, 224b) in a way independent of that of the other drive elements (24; 124a,124b; 224a, 224b).

11.- A method for transferring and orienting containers, each having an axis and comprising:

- a containment portion; and
- a neck portion joined to said containment portion and defining an opening;

the method comprising the steps of:

- transferring a plurality of containers along a first path (A) so that said containers will be free to turn about respective turning axes (20; 120; 220) during transfer;
- orienting at least some of said containers about the respective turning axes (20; 120; 220), exerting friction forces (F), tangential to said turning axes (20; 120; 220), via drive elements (24; 124a,124b; 224a, 224b) that

come into contact with said containers during transfer; the method being characterized in that, during transfer of said containers, said friction forces are exerted by displacing said drive elements (24; 124a,124b; 224a, 224b), each with a relative velocity with respect to a corresponding container during contact with said corresponding container.

12.- The method according to Claim 11, characterized in that said drive elements (24; 124a,124b; 224a, 224b) come into contact with the containers only at said neck portions.

13.- The method according to Claim 11 or Claim 12, characterized in that the displacement of said drive elements (24; 124a,124b; 224a, 224b) is controlled so as to adjust said relative velocity for each of said drive elements (24; 124a,124b; 224a, 224b) in a way independent of that of the other drive elements (24; 124a,124b; 224a, 224b).

FIG. 1

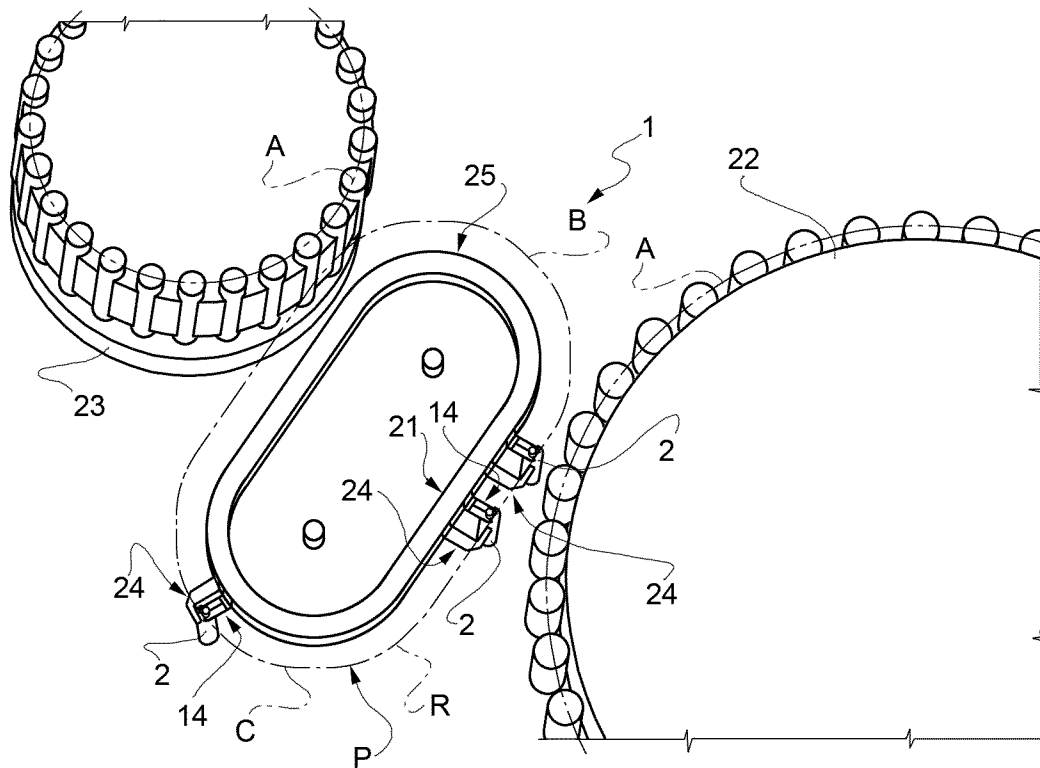


FIG. 2

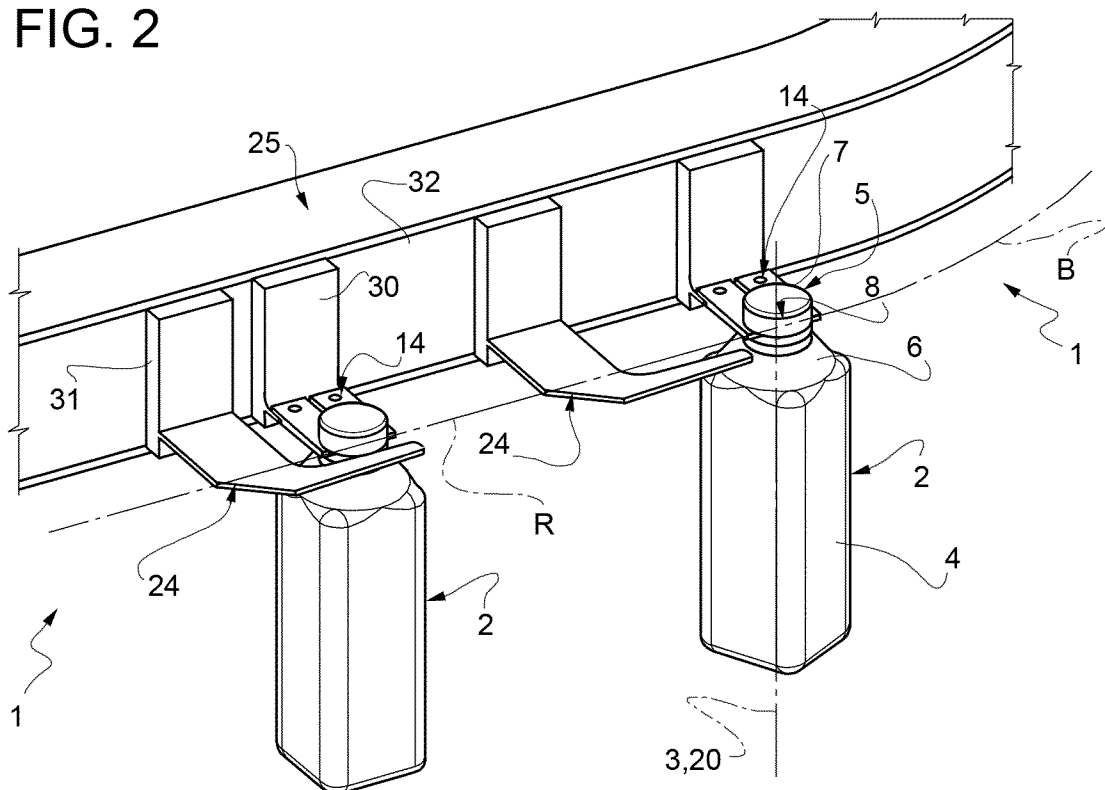


FIG. 3

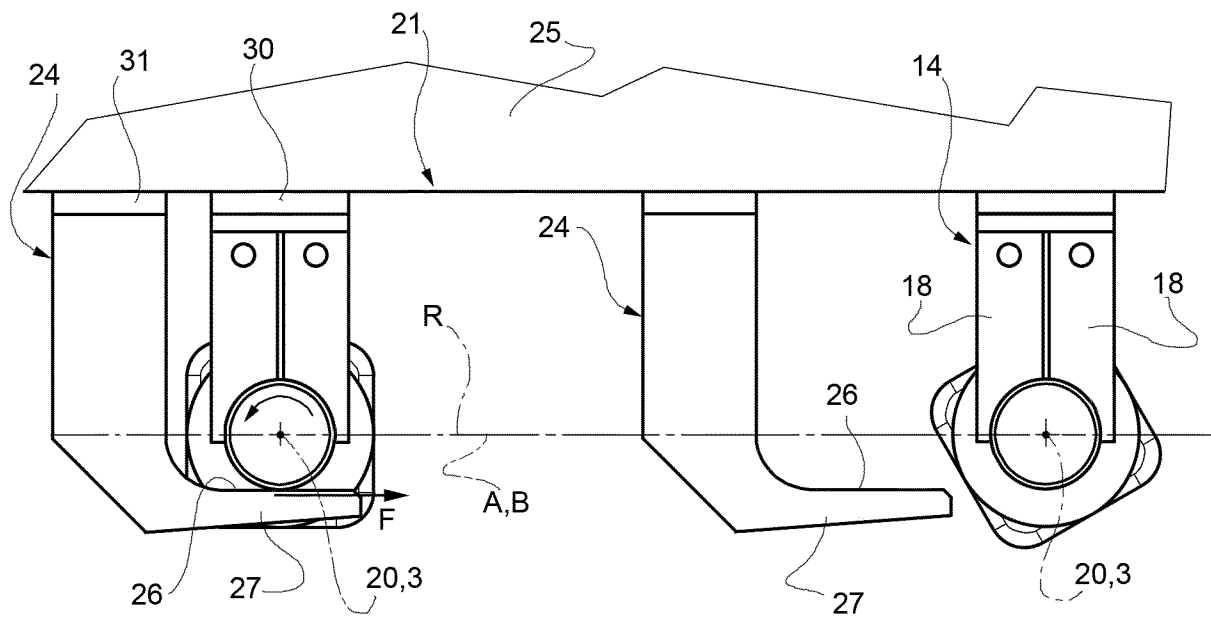


FIG. 4

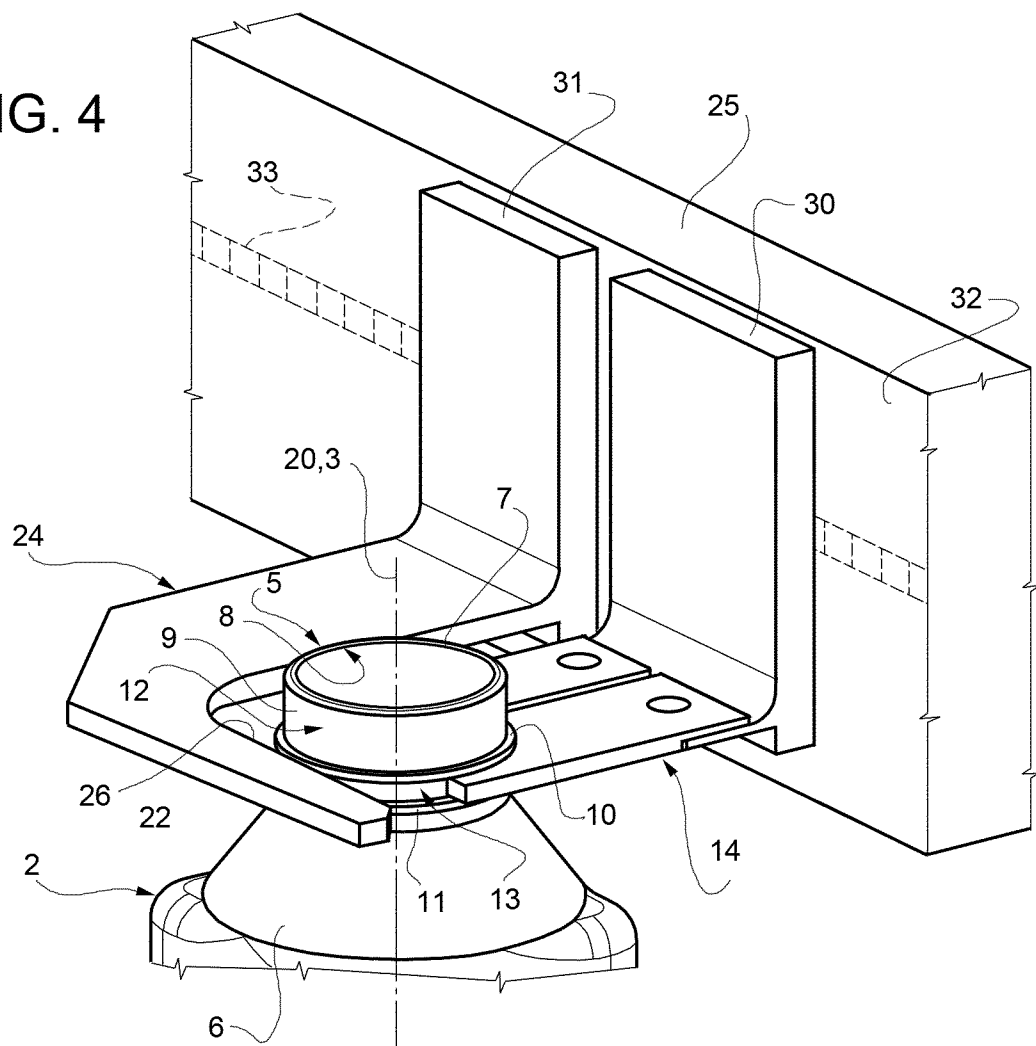


FIG. 5

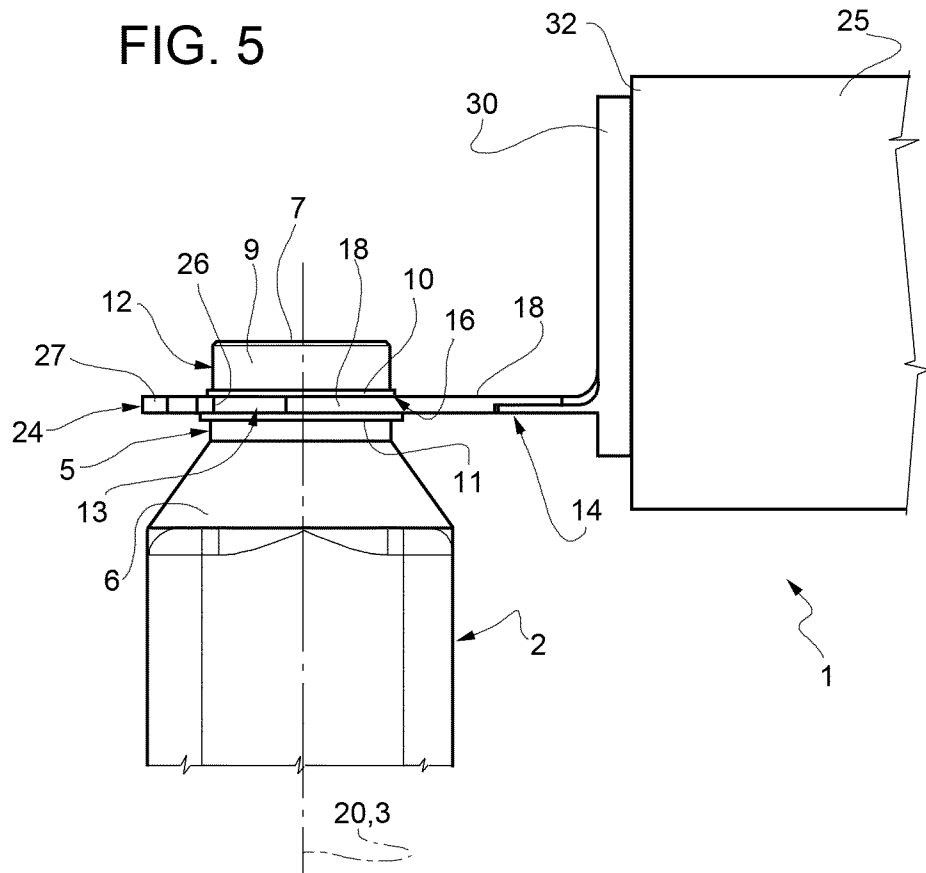


FIG. 6

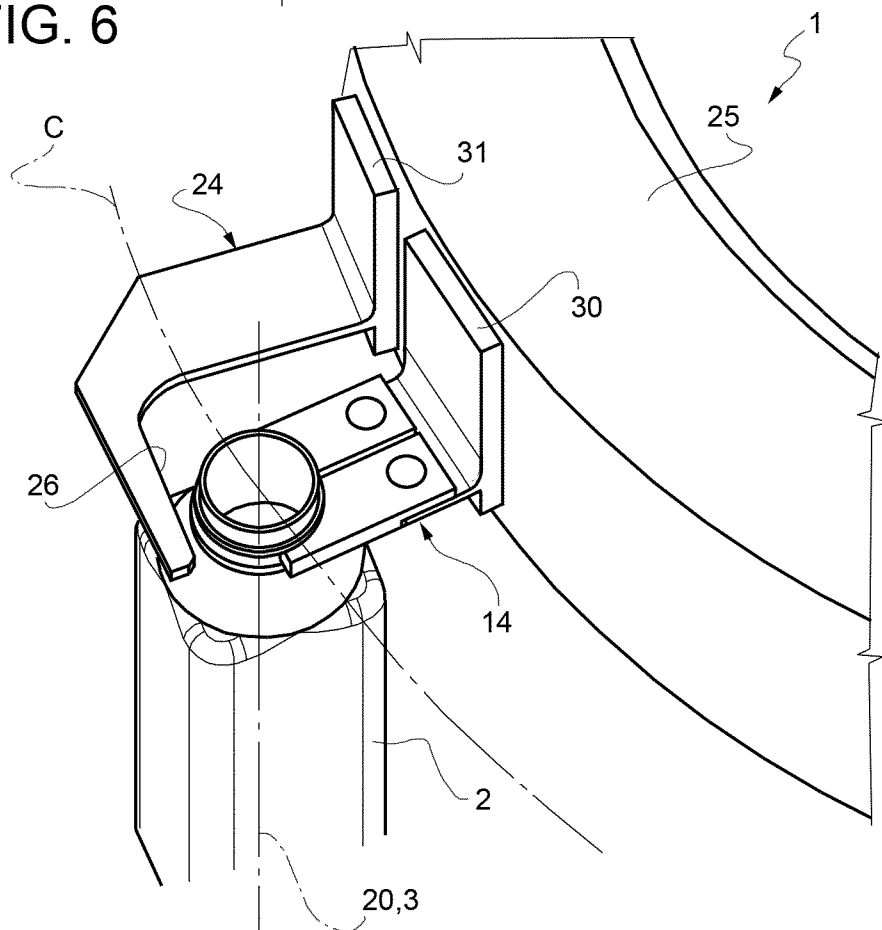


FIG. 7

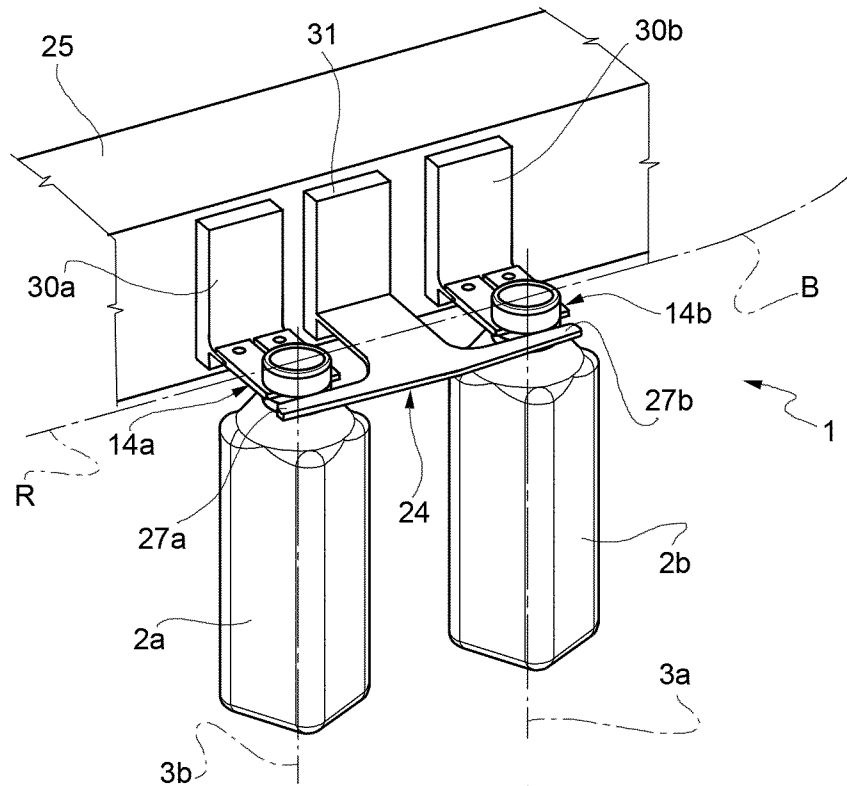


FIG. 8

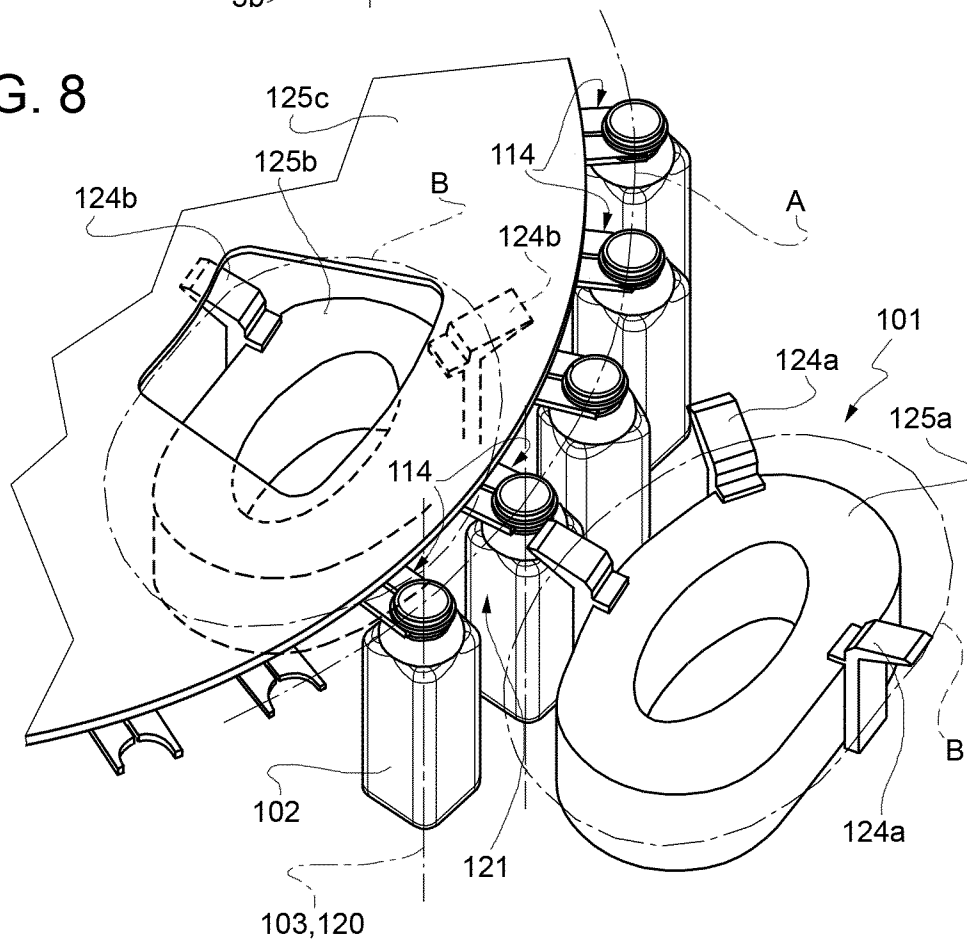


FIG. 9

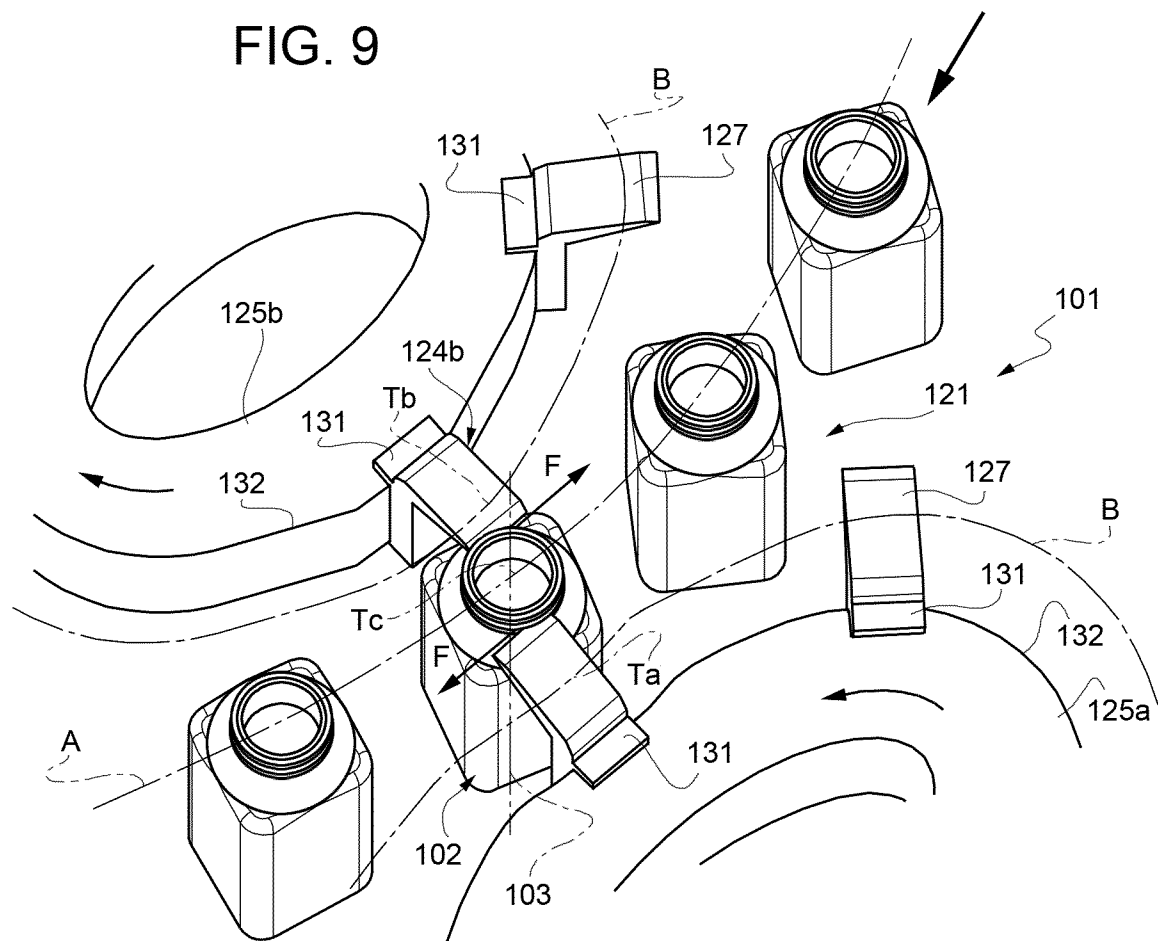


FIG. 10

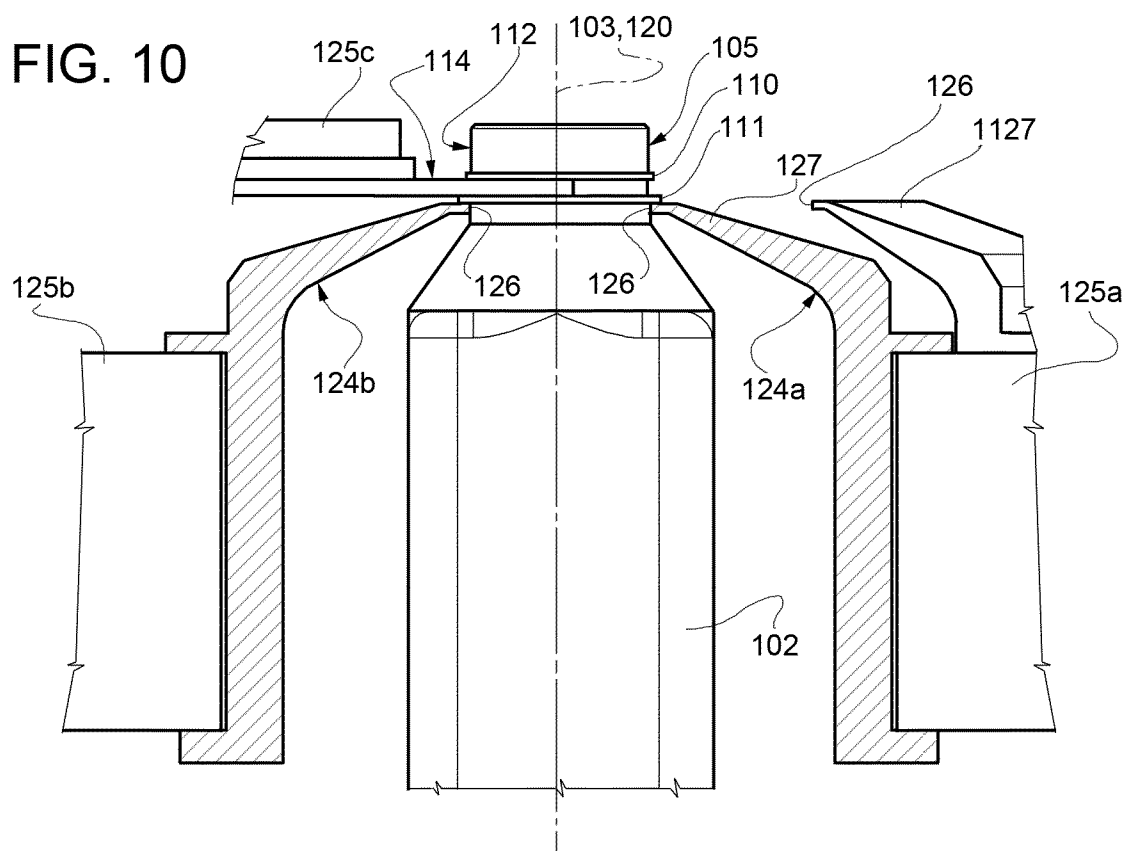


FIG. 11

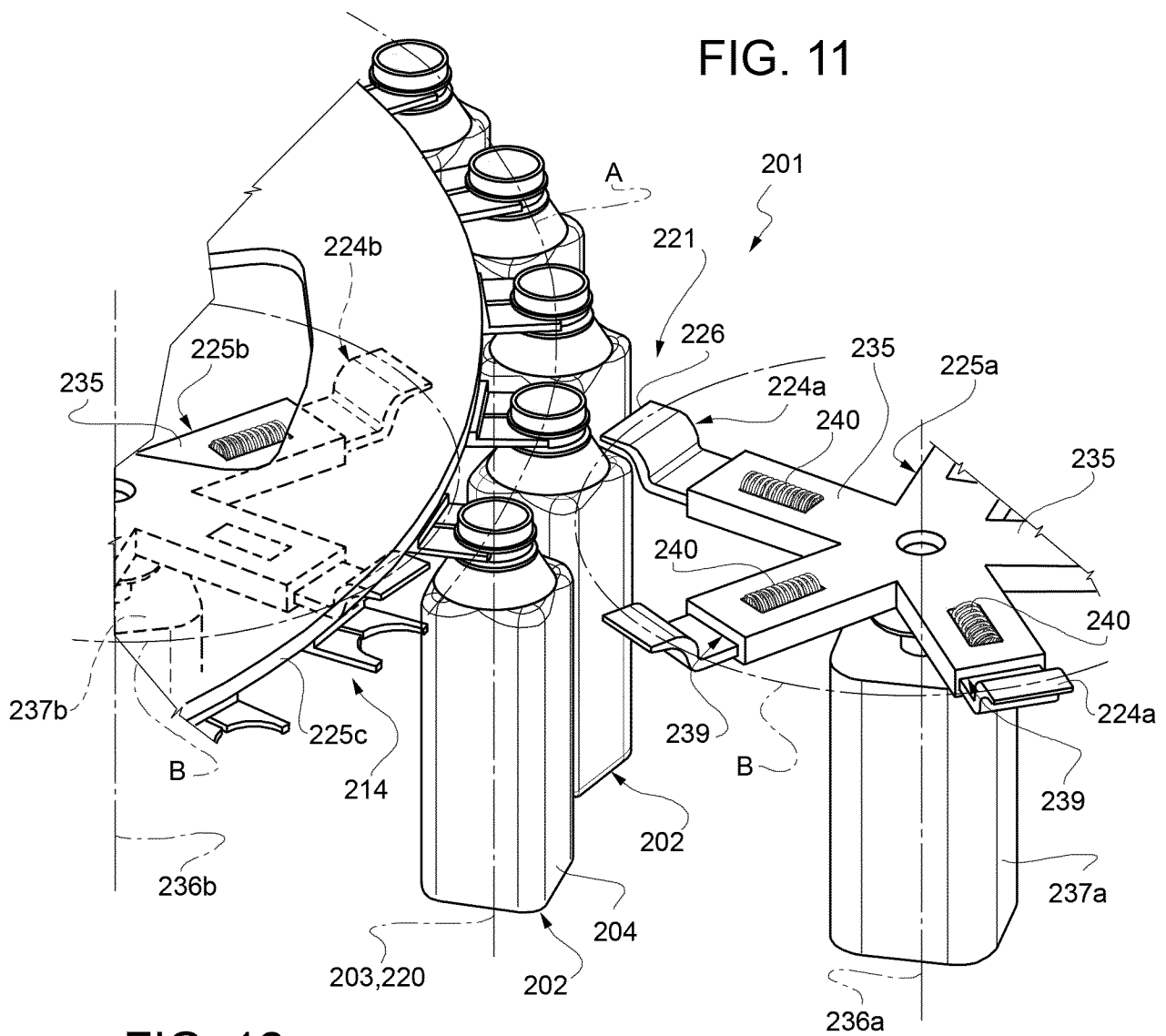
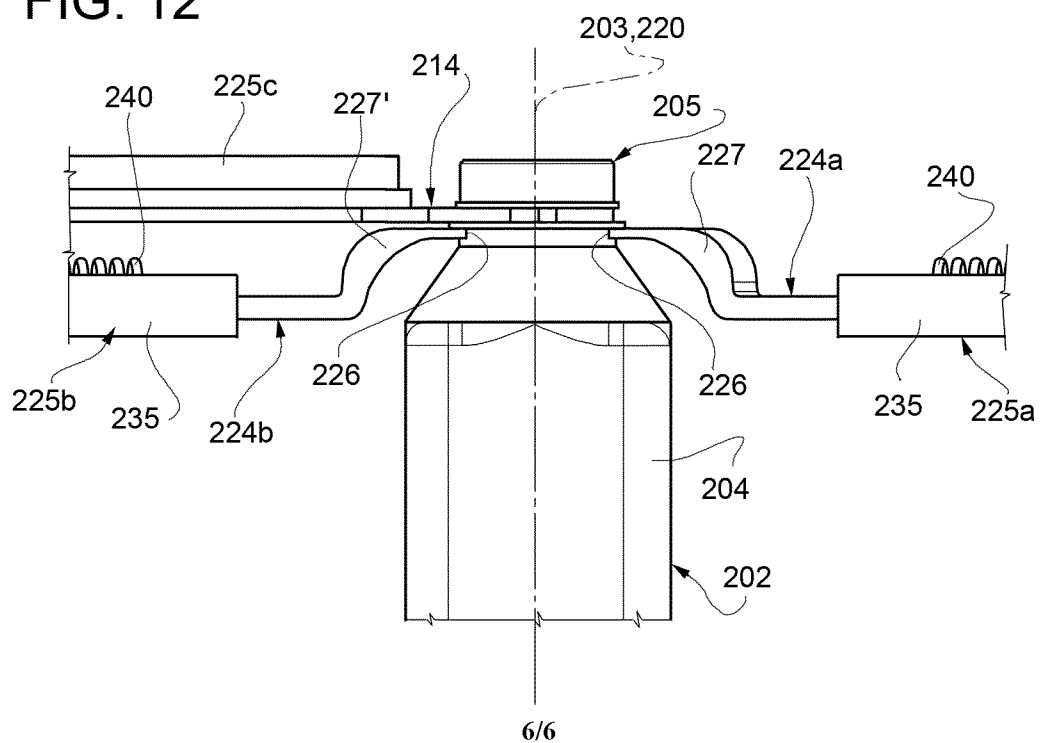


FIG. 12



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/083240

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65G47/244
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65G B67C B65C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2014 226965 A1 (KRONES AG [DE]) 23 June 2016 (2016-06-23) figures 3,9	1-3,7,8, 10-13
A	----- EP 2 842 878 A1 (KRONES AG [DE]) 4 March 2015 (2015-03-04) the whole document -----	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

14 February 2020

Date of mailing of the international search report

21/02/2020

Name and mailing address of the ISA/

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Schneider, Marc

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/083240

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