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(54) CARROUSEL APPARATUS FOR MOVING CONTAINERS

KARUSSELLVORRICHTUNG ZUM BEWEGEN VON BEHÄLTERN

APPAREIL CARROUSEL POUR DÉPLACER DES RÉCIPIENTS

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Description

[0001] This invention relates to a carrousel apparatus for moving containers, in particular a carrousel apparatus to be used in rotary labelling machines. Since the main application of the carrousel apparatus is that in the context of rotary labelling machines, hereinafter reference will be made to that application, without thereby limiting the scope of the invention. Indeed, the carrousel apparatus according to this invention may be used in any machine or plant for which it may be useful.

[0002] As is known, rotary labelling machines constitute the most widely used solution for labelling various types of containers, such as wine bottles.

[0003] Such machines comprise a carrousel apparatus around which one or more labelling units are positioned. The carrousel apparatus is peripherally equipped with a plurality of plates, on each of which a container is loaded at a loading station. The carrousel then rotates on itself and bring the container first in front of each labelling unit present (one or more depending on the applications) and then to a releasing station. During the rotation the plates rotate on themselves to orient the container in the best way relative to the labelling units.

[0004] In order to ensure that each container remains very stable on the plate and can follow it in the rotations on itself, above each plate the carrousel apparatus comprises a retaining head. The retaining head comprises an operating portion which is movable between a raised position, in which it does not interfere with the container, and a lowered position, at which it presses on the upper part of the container to push it against the plate. The operating portion can also rotate idly about the axis of rotation of the plate. As already indicated, this type of labelling machine is widely used in the sector of labelling containers such as bottles, large bottles, small bottles, etc. Despite that, there are types of containers for which it is not currently possible to use carrousel labelling machines, despite this being highly desirable for correct management of the labelling step.

[0005] A first type of containers for which it is not possible, is that of containers equipped with a pump dosing cap, or the like. Indeed, the very presence of the dosing cap prevents the use of a retaining head for applying an axial pressure on the container to keep it locked on the plate.

[0006] A similar problem is encountered if at the top of the containers there are irregular caps which (radially) exceed the dimensions of the container below, as well as for containers which have shapes or dimensions such that it is necessary to load the containers on the plate with a fixed oriented position, but where that pre-orientation operation is not feasible.

[0007] Furthermore, traditional carrousel apparatuses are also not suitable for managing many types of containers intended for example for the cosmetics and luxury goods sector. Indeed these and other sectors often involve the use of containers with paint or other surface

finishes which make them very delicate and which prevent the use of upper retaining heads (which might ruin them).

[0008] DE 3823471 A1 discloses a carrousel apparatus for moving containers according to the preamble of claim 1 and a labelling machine for labels engaging continuously over a side face and the cover of a container, as in honey jars, with individually driven turntables which rotate about a common axis of the machine and carry the containers. Above each turntable a vertically movable holding-down device is arranged, engaging on the container cover on at least two points of the cover edge so as to leave a middle region of the cover free for lateral engagement. At each engaging point, the movable holding-down device is provided with a finger on which both a sliding block for lateral containment and a roller with horizontal axis for downwardly pressing the container, are provided.

[0009] In this context, the technical purpose which forms the basis of this invention is to provide a carrousel apparatus for moving containers which overcomes at least some of the above-mentioned disadvantages.

[0010] In particular, the technical purpose of this invention is to provide a carrousel apparatus for moving containers which allows the management of at least some types of containers which currently cannot be managed with the carrousel apparatuses which use retaining heads.

[0011] The technical purpose specified and the aims indicated are substantially achieved by a carrousel apparatus for moving containers as described in the appended claims.

[0012] Further features and the advantages of this invention will be more apparent in the detailed description, with reference to the accompanying drawings which illustrate a preferred, non-limiting embodiment of a carrousel apparatus for moving containers, in which:

- Figure 1 shows, in a schematic plan view, a carrousel apparatus to which this invention can be applied;
- Figure 2 shows, in an axonometric view, a retaining head of a carrousel apparatus made according to this invention, coupled to a container with dosing cap;
- Figures 3 shows, in a plan view, a detail of the retaining head of Figure 2; and
- Figure 4 shows, in an enlarged front view, another detail of the retaining head of Figure 2.

[0013] With reference to the above-mentioned figures the numeral 1 denotes a carrousel apparatus for moving containers 2, which can be made according to this invention.

[0014] As will be clearer from the detailed description which follows, the carrousel apparatus 1 according to this invention can be used only with containers 2 which, at least at a contact portion 3 of them intended to make contact with a retaining head 4 of the apparatus 1, have

a cylindrical symmetry relative to the axis of rotation of the container 2 (that is to say, the axis of rotation which in use coincides with that of the plate 5 of the apparatus 1).

[0015] In particular, in most applications, the carousel apparatus 1 is configured to move a type of containers 2 which comprise a lower containment body 6 which contains the product, closed by an upper cap 7. In more detail, in the containment body 6 it is possible to identify a lateral wall 8, a bottom wall 9 connected to the bottom of the lateral wall 8, and a top wall 10 connected to the top of the lateral wall 8, in which an opening is made (not visible in the accompanying figures) with which the cap 7 is associated; the opening is usually defined by a projecting nozzle defined by the top wall 10 (in many cases threaded for screwing on the cap 7). Furthermore, the contact portion 3 is advantageously constituted by a perimetric zone 11 of the top wall 10, or a connecting zone 12 which connects the top wall 10 and the lateral wall 8, which have a cylindrical axial symmetry relative to a vertical central axis of the container 2; in some applications the contact portion 3 may in any case also be positioned at other heights along the lateral wall. As explained in more detail below, the apparatus 1 is preferably configured to act on that perimetric zone 11 or on that connecting zone 12 (the latter is the case illustrated in the accompanying figures) to keep the container 2 fixed to the plate 5.

[0016] In general, similarly to the known ones, the carousel apparatus 1 according to this invention also comprises a supporting structure (not visible in the accompanying figures) on which a carousel 13 is mounted (Figure 1). The carousel 13 is rotatable on itself, relative to the supporting structure, about a vertical main axis of rotation 14.

[0017] Associated with a perimetric portion 15 of the carousel 13 there is a plurality of operating units 16, each of which is configured to retain a container 2 and to move it for a predetermined angle of rotation of the carousel 13 on itself. Indeed, each operating unit 16 rotates with the carousel 13 about the main axis of rotation 14, and, in use, shifts cyclically along a movement path, which goes from a container 2 feeding station, to a container 2 releasing station. The feeding station and the releasing station are positioned at different angular positions around the carousel 13 and located along the movement path, in use, there are also one or more labelling units. Hereinafter there is a description of the structure of a single operating unit 16; although what is described applies for each operating unit 16.

[0018] The operating unit 16 comprises a plate 5 located at the bottom, and a retaining head 4 located at a predetermined distance vertically above the plate 5.

[0019] The plate 5 is rotatably connected to the carousel 13 for rotating, on itself, about its own secondary axis of rotation 17. The secondary axis of rotation 17 is parallel to the main axis of rotation 14 and is therefore also vertical. In the known way, and therefore not de-

scribed in detail, associated with the plate 5 there are suitable means of rotation which cause its controlled rotation about the secondary axis of rotation 17. Moreover, depending on the embodiments, the plate 5 may also be vertically movable relative to the carousel 13.

[0020] The retaining head 4 is vertically aligned with the plate 5 along the secondary axis of rotation 17. The retaining head also rotates together with the carousel 13 in the rotation about the main axis of rotation 14, but is fixed relative to the secondary axis of rotation 17 of the plate 5. Consequently, during the rotation of the plate 5 on itself, the retaining head 4 as a whole maintains the same orientation relative to the carousel 13 with which it rotates. In Figure 1, the retaining head 4 is supported by a cantilever arm 18, but in other embodiments different solutions may even be adopted.

[0021] According to one of the innovative aspects of this invention, each retaining head 4 comprises three or more pressure rollers which are distributed eccentrically relative to the secondary axis of rotation 17 of the plate 5. The pressure rollers 19 are also configured for pushing with their own lateral surface the container 2 towards the plate 5, in particular during the rotation of the plate 5 on itself. For that purpose, the rotation of the pressure rollers 19 occurs about a third axis of rotation 20, which is inclined relative to the secondary axis of rotation 17 in such a way that the lateral surface of the pressure rollers 19, when it is resting on the outer surface of the container 2, applies a thrust with a component which is not null along the secondary axis of rotation 17, towards the plate 5 below. Therefore, advantageously, the pressure rollers 19 are configured for pressing with their lateral surface on the perimetric zone 11 with axial symmetry of the top wall 10, or on the connecting zone 12 with axial symmetry. Moreover, advantageously, the lateral surface of the pressure rollers 19 is parallel to the relative third axis of rotation 20.

[0022] Moreover, advantageously, the pressure rollers 19 are also configured to centre the container 2 on the secondary axis of rotation 17, in particular by making the axial axis of symmetry coincide with the secondary axis of rotation 17.

[0023] In the preferred embodiment, the retaining head 4 comprises a supporting portion 21 with which the pressure rollers 19 are rotatably associated. Moreover, advantageously, the supporting portion 21 has, in plan view, a C shape, with the opening of the C facing radially outwards. The purpose of that arrangement is to allow the passage of a base of the cap 7 of the container 2 through the open part of the C, along a line which is radial relative to the secondary axis of rotation 17. In this way, the supporting portion 21, and the pressure rollers 19 associated with it, can be positioned around the container 2 at an intermediate height between that of the top wall 10 of the containment body 6, and that of the top of the cap 7. For example, in the case of a dosing cap 7, the nozzle of the cap 7 is therefore positioned above the supporting portion 21 and the rollers. In other cases that housing space 22

may in contrast house a widened part of the cap 7 itself.

[0024] Secondly, preferably, in order to leave more space for housing the upper part of the cap 7, the pressure rollers 19 are associated with the supporting portion 21 above it.

[0025] In the preferred embodiments, the third axes of rotation 20, which, as already indicated, are inclined relative to the secondary axis of rotation 17, intersect the secondary axis of rotation 17 and converge towards it moving away from the plate 5. Even more preferably, if the pressure rollers 19 are identical to each other, the third axes of rotation 20 lie on a conical surface centred on the secondary axis of rotation 17, as illustrated in Figure 3.

[0026] The pressure rollers 19 (or rather, their centres), observed in plan view, are distributed along an arc of a circle centred on the secondary axis of rotation 17. That arc of a circle, which lies in a horizontal plane, defines a concavity facing radially outwards relative to the main axis of rotation 14. Therefore, it reflects the shape of the C-shaped supporting portion 21.

[0027] Along the arc of a circle it is possible to identify a first end pressure roller 19, whose centre is located at a first end of the arc of a circle, a second end pressure roller 19, whose centre is located at a second end of the arc of a circle, and one or more intermediate pressure rollers 19 whose centres lie along the arc of a circle.

[0028] In order to leave enough space for the passage of the base of the cap 7 the arc of a circle preferably extends for an angle α of between 190° and 210° . In any case, in general, it is enough for the angle α to be sufficiently greater than 180° to avoid the risk that the container 2 might escape outwards, and for it to leave a free angle β (equal to $360^\circ - \alpha$) which subtends a chord having length greater than the maximum width of the part of the container 2 (usually the base of the cap 7), which must pass between the two end pressure rollers 19 during the step of container 2 insertion and removal on/from the plate 5.

[0029] In the preferred embodiments, the pressure rollers 19 are cylindrical, preferably disks with diameter significantly greater than their height.

[0030] In some embodiments, especially those intended for moving containers 2 with high quality surfaces, the pressure rollers 19 are made of materials which have some elasticity and/or softness, such as rubber.

[0031] Moreover, in the preferred embodiments, the pressure rollers 19 are idle and, in use, rotate as a consequence of the rotation of the container 2 with which they are in contact (which is made to rotate by the plate 5). That does not rule out the fact that in other embodiments at least one of them may be motor-driven and synchronised with the plate 5, or even that the rotation of the container 2 and of the plate 5 may be caused directly using motor-driven pressure rollers 19.

[0032] In many embodiments, the retaining head 4 is movable between a raised position and a lowered position.

[0033] When it is in the raised position, the retaining head 4 allows the insertion or the removal of a container 2 in or from the space between the insertion head and the plate 5, advantageously without the container 2 making contact with any part of the retaining head 4.

[0034] In contrast, when the retaining head 4 is in the lowered position, in use the pressure rollers 19 are resting on the container 2 and apply to it a thrust towards the plate 5 as well as, advantageously, a centring on the secondary axis of rotation 17.

[0035] As can be inferred, the axial stroke which corresponds to the shifting of the retaining head 4 between the raised position and the lowered position, is a limited stroke, usually of approximately several millimetres/tens of millimetres. Indeed, when the retaining head 4 is located in the raised position, the supporting portion 21 and the pressure rollers 19 must not interfere with the containment body 6 of the container 2 or with the cap 7 during insertion and removal of the container 2.

[0036] Operation of the carousel apparatus 1 according to this invention is easy to understand from the preceding structural descriptions.

[0037] With the retaining head 4 advantageously in the raised position, the container 2 is positioned on the plate 5. Then the retaining head 4 passes to the lowered position and the pressure rollers 19 rest on the container 2 (on the connecting zone 12 in the accompanying figures). Advantageously the pressure rollers 19 also cause centring of the container 2 on the secondary axis of rotation 17.

[0038] At that point the carousel 13 rotates and moves the container 2 forward along the movement path. During the forward movement the plate 5 rotates according to requirements, and the container 2 follows its rotation due to the friction between its bottom and the plate 5 guaranteed by the pressure applied by the retaining head 4 by means of the pressure rollers 19. At the same time the rollers, rotating about the respective third axes of rotation 20, allow container 2 free rotation about the secondary axis of rotation 17.

[0039] This invention brings important advantages.

[0040] Thanks to this invention, in particular to the innovative structure of the retaining head, it has been possible to provide a carousel apparatus for moving containers which allows the management of many types of containers which currently cannot be managed with the prior art carousel apparatuses. In particular, it allows the management of all containers which have a substantial cylindrical symmetry, at least at their upper part below the cap.

[0041] The carousel apparatus according to this invention allows in particular the best moving of containers with a dosing cap as well as those with high quality or delicate surface finishes.

[0042] Finally, it should be noticed that this invention is relatively easy to produce and that even the cost linked to implementing the invention is not very high.

Claims

1. A carousel apparatus for moving containers comprising:

a supporting structure;
 a carousel (13) mounted on the supporting structure and rotatable on itself about a main axis of rotation (14); and
 a plurality of operating units (16), associated with a perimetric portion (15) of the carousel (13), for rotating with it about the main axis of rotation (14), each operating unit (16) being configured to retain and move a container (2), along a movement path which goes from a container (2) feeding station to a container (2) releasing station;

wherein:

each operating unit (16) comprises a plate (5) and a retaining head (4);
 each plate (5) is rotatably connected to the carousel (13) for rotating, on itself about its own secondary axis of rotation (17), which is vertical and parallel to the main axis of rotation (14);
 each retaining head (4) is vertically aligned with the relative plate (5) along the secondary axis of rotation (17), rotates with the carousel (13) in the rotation about the main axis of rotation (14) and is fixed relative to the secondary axis of rotation (17) of the relative plate (5), during the rotation of the plate (5) on itself;
 each retaining head (4) comprises three or more pressure rollers (19) distributed eccentrically relative to the respective secondary axis of rotation (17), and configured for pushing a container (2) towards the plate (5) during the rotation of the plate (5) on itself; and
 each retaining head (4) comprises a supporting portion (21) with which the pressure rollers (19) are rotatably associated, each according to a third axis of rotation (20);

characterised in that the third axes of rotation (20) are inclined relative to the secondary axis of rotation (17), intersect the secondary axis of rotation (17) and converge towards it moving away from the plate (5); and **in that** the pressure rollers (19) of each retaining head (4) are configured to centre the container (2) on the secondary axis of rotation (17).

2. The carousel apparatus for moving containers (2) according to claim 1 wherein the third axes of rotation (20) of each retaining head (4) lie on a conical surface.
3. The carousel apparatus for moving containers (2)

according to claim 1 or 2 wherein the pressure rollers (19) of each retaining head (4) are distributed along an arc of a circle centred on the secondary axis of rotation (17), which lies in a horizontal plane and which defines a concavity facing radially outwards relative to the main axis of rotation (14), said pressure rollers (19) comprising a first end pressure roller (19) whose centre is located at a first end of the arc of a circle, a second end pressure roller (19) whose centre is located at a second end of the arc of a circle, and one or more intermediate pressure rollers (19) whose centres lie along the arc of a circle.

4. The carousel apparatus for moving containers (2) according to claim 3 wherein the arc of a circle extends for an angle of between 190° and 210°.
5. The carousel apparatus for moving containers (2) according to any one of claims 1 to 4 wherein the supporting portion (21) has a C shape and wherein the pressure rollers (19) are positioned above the supporting portion (21).
6. The carousel apparatus for moving containers (2) according to any one of claims 1 to 5 wherein the pressure rollers (19) are cylindrical.
7. The carousel apparatus for moving containers (2) according to any one of claims 1 to 6 wherein the pressure rollers (19) are idle rollers.
8. The carousel apparatus for moving containers (2) according to any one of claims 1 to 7 wherein each retaining head (4) is movable between a raised position in which, in use, it allows the insertion or the removal of a container (2) in or from the space between the insertion head and the plate (5), and a lowered position in which, in use, the pressure rollers (19) are resting on the container (2).
9. The carousel apparatus for moving containers (2) according to any one of claims 1 to 8 wherein each retaining head (4) defines a housing space (22) for a cap (7) of the container (2), above said pressure rollers (19).
10. The carousel apparatus for moving containers (2) according to any one of claims 1 to 9 wherein each operating unit (16) is configured for moving a container (2) which comprises:

a lower containment body (6) which has a lateral wall (8), a bottom wall (9) connected to the bottom of the lateral wall (8), and a top wall (10) connected to the top of the lateral wall (8) and in which an opening is made;
 and a cap (7) associated with the opening;
 and wherein at least a perimetric zone (11) of

the top wall (10) or a connecting zone (12) between the top wall (10) and the lateral wall (8) has a cylindrical axial symmetry relative to a vertical central axis of the container (2);

wherein the pressure rollers (19) are configured for pressing with their lateral surface on said perimetric zone (11) or on said connecting zone (12) which has an axial symmetry.

Patentansprüche

1. Eine Karussellvorrichtung zum Bewegen von Behältern, Folgendes beinhaltend:

eine Trägerstruktur;
ein Karussell (13), das an der Trägerstruktur montiert und um sich selbst um eine Hauptrotationsachse (14) drehbar ist; und
eine Mehrzahl von Betriebseinheiten (16), verbunden mit einem perimetrischen Anteil (15) des Karussells (13), um sich damit um die Hauptrotationsachse (14) zu drehen, jede Betriebseinheit (16) ist dabei konfiguriert, um einen Behälter (2) festzuhalten und auf einem Bewegungsweg, der von einer Zuführstation von Behältern (2) zu einer Freigabestation von Behältern (2) reicht, zu bewegen; wobei:

jede Betriebseinheit (16) eine Platte (5) und einen Rückhaltekopf (4) beinhaltet; jede Platte (5) ist drehbar mit dem Karussell (13) verbunden, um sich um sich selbst um seine eigene, sekundäre Rotationsachse (17) zu drehen, die vertikal und parallel zur Hauptrotationsachse (14) ist;

jeder Rückhaltekopf (4) ist auf der sekundären Rotationsachse (17) vertikal mit der jeweiligen Platte (5) gefluchtet, dreht sich mit dem Karussell (13) bei der Drehung um die Hauptrotationsachse (14) und ist im Verhältnis zur sekundären Rotationsachse (17) der jeweiligen Platte (5) während der Drehung der Platte (5) um sich selbst feststehend;

jeder Rückhaltekopf (4) beinhaltet drei oder mehr Druckrollen (19), die exzentrisch im Verhältnis zur jeweiligen sekundären Rotationsachse (17) verteilt sind, und konfiguriert sind, um einen Behälter (2), während der Drehung der Platte (5) um sich selbst, in Richtung der Platte (5) zu drücken; und jeder Rückhaltekopf (4) beinhaltet einen Trägerabschnitt (21), mit dem die Druckrollen (19) drehbar verbunden sind, jede entsprechend einer dritten Rotationsachse (20);

gekennzeichnet dadurch, dass die dritten Rotationsachsen (20) im Verhältnis zur sekundären Rotationsachse (17) geneigt sind, die sekundäre Rotationsachse (17) schneiden und in Richtung dieser konvergieren, sich dabei von der Platte (5) weggehend; und dadurch, dass die Druckrollen (19) jedes Rückhaltekopfs (4) konfiguriert sind, um den Behälter (2) an der sekundären Rotationsachse (17) zu zentrieren.

2. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach dem Patentanspruch 1, wobei die dritten Rotationsachsen (20) jedes Rückhaltekopfs (4) auf einer konischen Oberfläche liegen.
3. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach dem Patentanspruch 1 oder 2, wobei die Druckrollen (19) jedes Rückhaltekopfs (4) auf einem Kreisbogen verteilt sind, der an der sekundären Rotationsachse (17) zentriert ist, die auf einer horizontalen Ebene liegt und die eine Konkavität definiert, die radial nach außen im Verhältnis zur Hauptrotationsachse (14) gerichtet ist, besagte Druckrollen (19) beinhalten dabei eine erste Enddruckrolle (19), deren Mitte sich an einem ersten Ende des Kreisbogens befindet, eine zweite Enddruckrolle (19), deren Mitte sich an einem zweiten Ende des Kreisbogens befindet, und eine oder mehrere Zwischendruckrollen (19), deren Mitteln auf dem Kreisbogen liegen.
4. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach dem Patentanspruch 3, wobei sich der Kreisbogen auf einem Winkel zwischen 190° und 210° erstreckt.
5. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 4, wobei der Trägerabschnitt (21) die Form eines "C" hat und wobei die Druckrollen (19) über dem Trägerabschnitt (21) positioniert sind.
6. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 5, wobei die Druckrollen (19) zylindrisch sind.
7. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 6, wobei die Druckrollen (19) Losrollen sind.
8. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 7, wobei jeder Rückhaltekopf (4) zwischen einer erhöhten Position, in der er im Gebrauch das Einfügen oder das Entfernen eines Behälters (2) in oder aus dem Zwischenraum zwischen dem Einfügekopf und der Platte (5) erlaubt, und einer gesenkten Position, in der die Druckrollen (19) im Gebrauch auf dem Be-

hälter (2) aufliegen, beweglich ist.

9. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 8, wobei jeder Rückhaltekopf (4) einen Aufnahmeraum (22) für einen Deckel (7) des Behälters (2) über besagten Druckrollen (19) definiert. 5
10. Die Karussellvorrichtung zum Bewegen von Behältern (2) nach jedem der Patentansprüche 1 bis 9, wobei jede Betriebseinheit (16) konfiguriert ist, um einen Behälter (2) zu bewegen, der Folgendes beinhaltet: 10
- einen unteren Behälterkörper (6), der eine Seitenwand (8) eine Bodenwand (9), die mit dem Boden der Seitenwand (8) verbunden ist, und eine Oberwand (10), die mit der Oberseite der Seitenwand (8) verbunden ist und in der eine Öffnung hergestellt wurde, hat; und einen Deckel (7), der mit der Öffnung verbunden ist; 20
- und wobei zumindest ein perimetrischer Bereich (11) der Oberwand (10) oder ein Verbindungsbereich (12) zwischen der Oberwand (10) und der Seitenwand (8) eine zylindrische Achsensymmetrie im Verhältnis zu einer vertikalen Mitlenachse des Behälters (2) hat; 25
- wobei die Druckrollen (19) konfiguriert sind, um mit ihrer Seitenfläche auf besagten perimetrischen Bereich (11) oder auf besagten Verbindungsbereich (12), der eine Achsensymmetrie aufweist, zu drücken. 30

Revendications

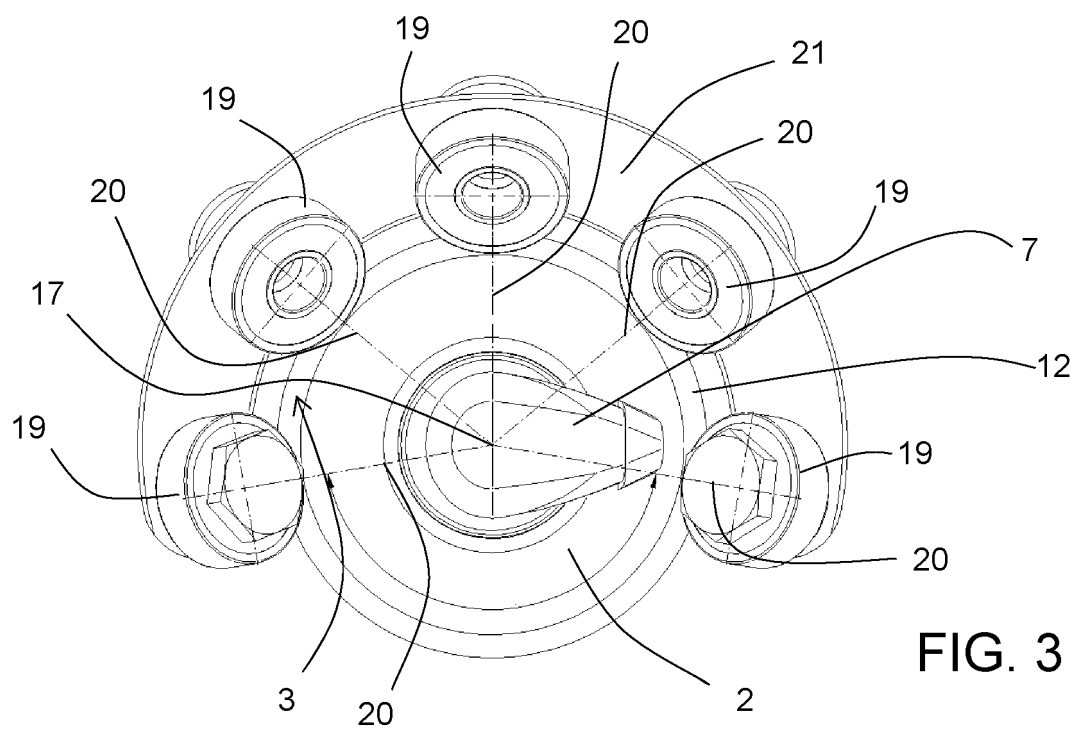
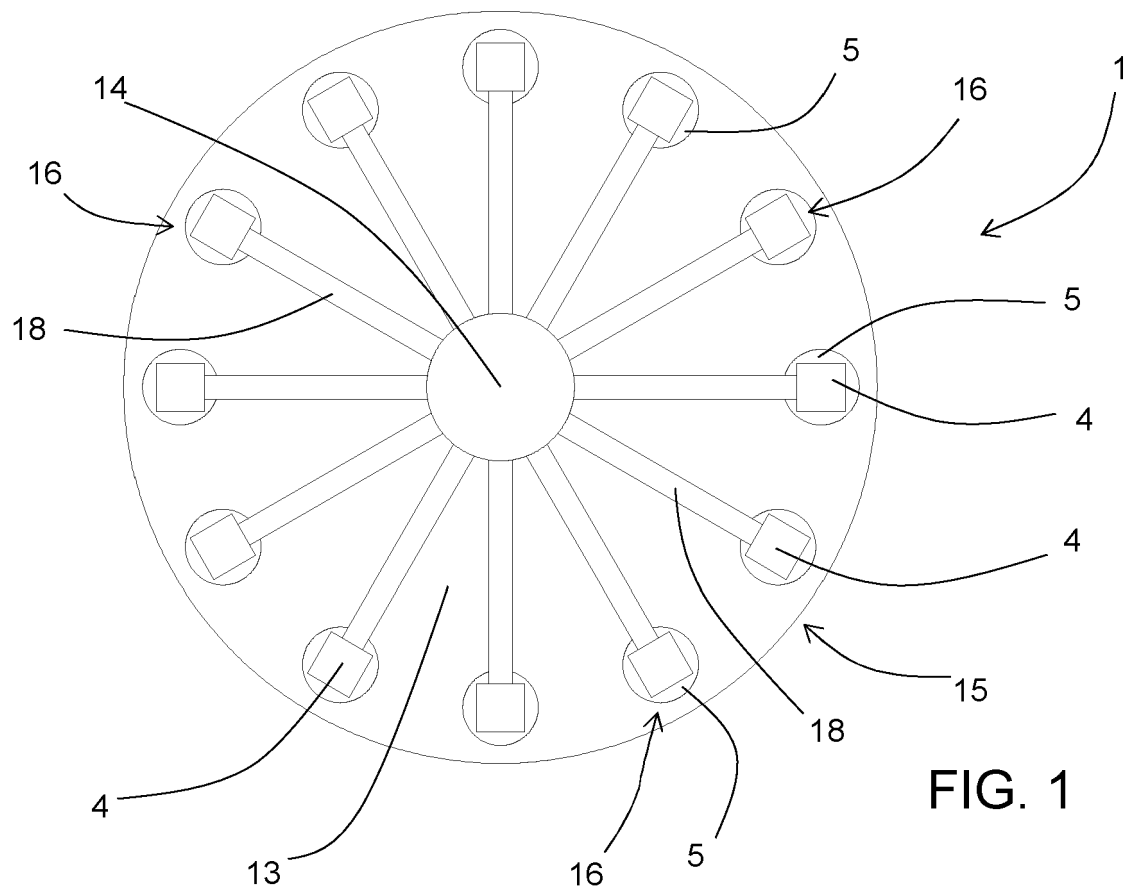
1. Un appareil à carrousel pour déplacer des récipients, comprenant : 35
- une structure de support ;
un carrousel (13) monté sur la structure de support et pouvant tourner sur lui-même autour d'un axe de rotation principal (14) ; et
une pluralité d'unités opérationnelles (16), associées à une portion périmétrique (15) du carrousel (13), pour tourner avec ce dernier autour de l'axe de rotation principal (14), chaque unité opérationnelle (16) étant configurée pour retenir et déplacer un récipient (2), le long d'un parcours de déplacement qui va d'une station d'alimentation de récipients (2) à une station de relâche de récipients (2) ; 40 45 50
- dans lequel : 55
- chaque unité opérationnelle (16) comprend un plateau (5) et une tête de retenue (4) ;

chaque plateau (5) est relié de façon rotative au carrousel (13) pour tourner sur lui-même autour de son propre axe de rotation secondaire (17), qui est vertical et parallèle à l'axe de rotation principal (14) ;
chaque tête de retenue (4) est verticalement alignée avec le plateau (5) correspondant le long de l'axe de rotation secondaire (17), tourne avec le carrousel (13) lors de la rotation autour de l'axe de rotation principal (14) et est fixe par rapport à l'axe de rotation secondaire (17) du plateau (5) correspondant, pendant la rotation du plateau (5) sur lui-même ;
chaque tête de retenue (4) comprend trois ou plus rouleaux de pression (19) répartis excentriquement par rapport à l'axe de rotation secondaire (17) respectif, et configurés pour pousser un récipient (2) vers le plateau (5) pendant la rotation du plateau (5) sur lui-même ; et
chaque tête de retenue (4) comprend une portion de support (21) avec laquelle les rouleaux de pression (19) sont associés de façon rotative, chacun selon un troisième axe de rotation (20) ;

caractérisé en ce que les troisièmes axes de rotation (20) sont inclinés par rapport à l'axe de rotation secondaire (17), coupent l'axe de rotation secondaire (17) et convergent vers celui-ci en s'éloignant du plateau (5) ; et **en ce que** les rouleaux de pression (19) de chaque tête de retenue (4) sont configurés pour centrer le récipient (2) sur l'axe de rotation secondaire (17).

2. L'appareil à carrousel pour déplacer des récipients (2) selon la revendication 1, dans lequel les troisièmes axes de rotation (20) de chaque tête de retenue (4) reposent sur une surface conique. 35
3. L'appareil à carrousel pour déplacer des récipients (2) selon la revendication 1 ou 2, dans lequel les rouleaux de pression (19) de chaque tête de retenue (4) sont répartis le long d'un arc de cercle centré sur l'axe de rotation secondaire (17), qui repose dans un plan horizontal et qui définit une concavité orientée radialement vers l'extérieur par rapport à l'axe de rotation principal (14), lesdits rouleaux de pression (19) comprenant un premier rouleau de pression (19) d'extrémité dont le centre est situé au niveau d'une première extrémité de l'arc de cercle, un deuxième rouleau de pression (19) d'extrémité dont le centre est situé au niveau d'une deuxième extrémité de l'arc de cercle, et un ou plus rouleaux de pression (19) intermédiaires dont les centres reposent le long de l'arc de cercle. 40 45 50 55
4. L'appareil à carrousel pour déplacer des récipients (2) selon la revendication 3, dans lequel l'arc de cercle s'étend sur un angle compris entre 190° et 210°.

5. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 4, dans lequel la portion de support (21) a une forme en C et dans lequel les rouleaux de pression (19) sont positionnés au-dessus de la portion de support (21). 5 axiale.
6. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 5, dans lequel les rouleaux de pression (19) sont cylindriques. 10
7. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 6, dans lequel les rouleaux de pression (19) sont des rouleaux fous. 15
8. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 7, dans lequel chaque tête de retenue (4) est mobile entre une position élevée dans laquelle, en utilisation, elle permet l'insertion ou le retrait d'un récipient (2) dans ou de l'espace compris entre la tête d'insertion et le plateau (5), et une position abaissée dans laquelle, en utilisation, les rouleaux de pression (19) sont en appui sur le récipient (2). 20 25
9. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 8, dans lequel chaque tête de retenue (4) définit un espace de logement (22) pour un bouchon (7) du récipient (2), au-dessus desdits rouleaux de pression (19). 30
10. L'appareil à carrousel pour déplacer des récipients (2) selon l'une quelconque des revendications de 1 à 9, dans lequel chaque unité opérationnelle (16) est configurée pour déplacer un récipient (2) qui comprend : 35 40
- un corps de confinement (6) inférieur qui a une paroi latérale (8), une paroi de fond (9) raccordée au bas de la paroi latérale (8), et une paroi de dessus (10) raccordée au haut de la paroi latérale (8) et dans laquelle une ouverture est pratiquée ; 45
- et un bouchon (7) associé à l'ouverture ;
- et dans lequel au moins une zone périmétrique (11) de la paroi de dessus (10) ou une zone de raccordement (12) entre la paroi de dessus (10) et la paroi latérale (8) a une symétrie axiale cylindrique par rapport à un axe central vertical du récipient (2) ; 50
- dans lequel les rouleaux de pression (19) sont configurés pour exercer une pression avec leur surface latérale sur ladite zone périmétrique (11) ou sur ladite zone de raccordement (12) qui a une symétrie 55



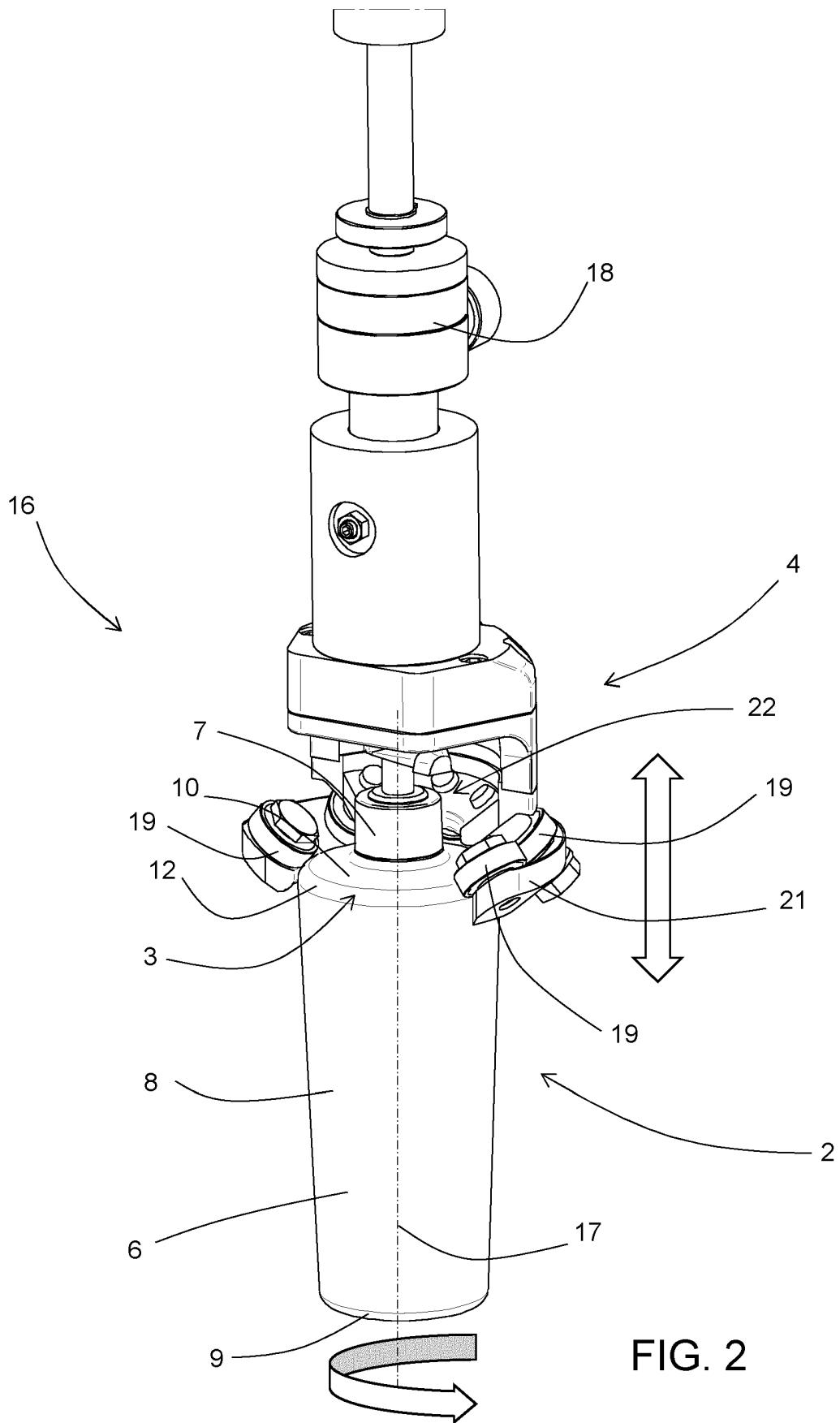


FIG. 2

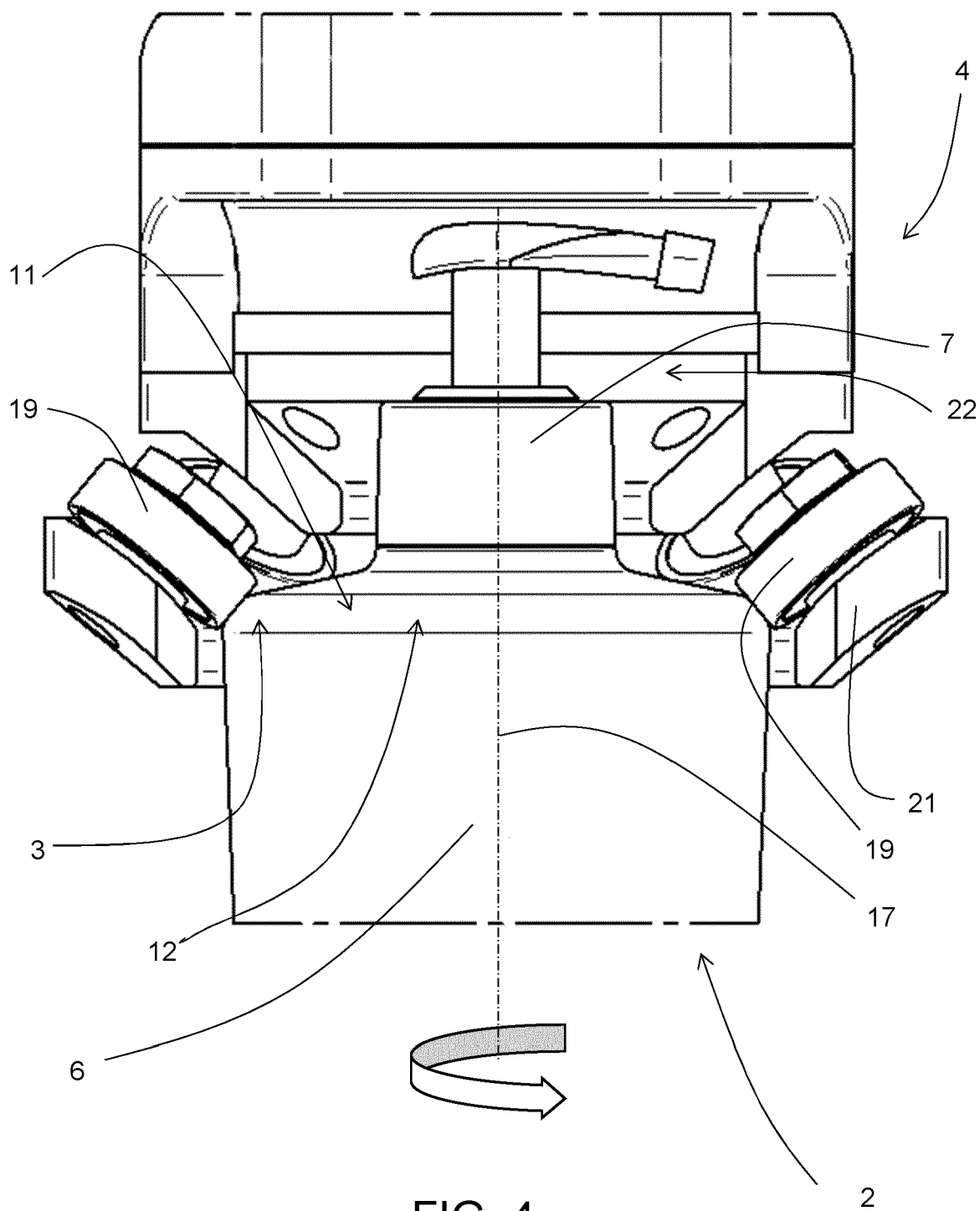


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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