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(54) **CARROUSEL APPARATUS FOR MOVING CONTAINERS**

(57) A carrousel apparatus for moving containers comprising a supporting structure and a rotatable carrousel (13) mounted on the supporting structure, wherein a plurality of operating units (16) are associated with the carrousel (13), for rotating with it about a main axis of rotation (14), each operating unit (16) comprising a plate (5) rotatable about its own secondary axis of rotation (17), and a retaining head (4) vertically aligned with the relative plate (5) along the secondary axis of rotation (17), rotating with the carrousel (13) in the rotation about the main axis of rotation (14) and fixed relative to the secondary axis of rotation (17) of the relative plate (5), during the rotation of the plate (5) on itself; wherein 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.

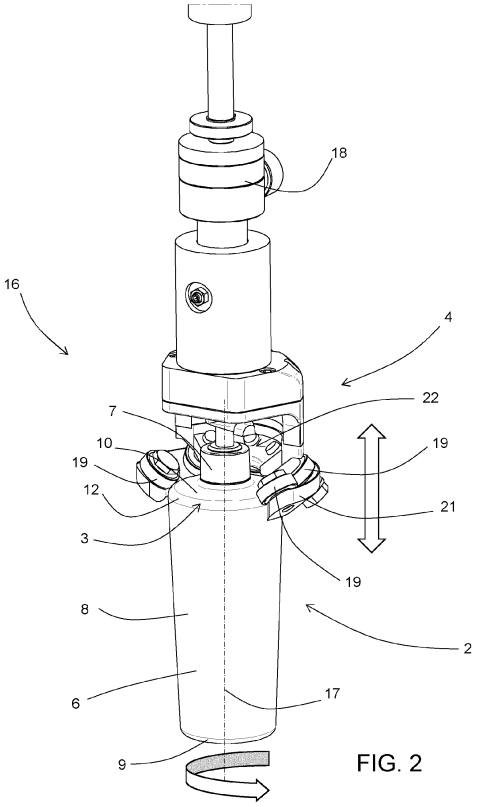

FIG. 2

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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.

[0002] 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.

[0003] As is known, rotary labelling machines constitute the most widely used solution for labelling various types of containers, such as wine bottles.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] 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.

[0009] 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).

[0010] 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.

[0011] 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.

[0012] The technical purpose specified and the aims indicated are substantially achieved by a carrousel apparatus for moving containers as described in the appended claims.

[0013] 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.

[0014] 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.

[0015] 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).

[0016] In particular, in most applications, the carrousel 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.

[0017] In general, similarly to the known ones, the carrousel apparatus 1 according to this invention also comprises a supporting structure (not visible in the accompanying figures) on which a carrousel 13 is mounted (Figure 1). The carrousel 13 is rotatable on itself, relative to the supporting structure, about a vertical main axis of rotation 14.

[0018] Associated with a perimetric portion 15 of the carrousel 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 carrousel 13 on itself.

[0019] Indeed, each operating unit 16 rotates with the carrousel 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 carrousel 13 and located along the movement path, in use, there are also one or more labelling units.

[0020] Hereinafter there is a description of the structure of a single operating unit 16; although what is described applies for each operating unit 16.

[0021] The operating unit 16 comprises a plate 5 located at the bottom, and a retaining head 4 located a predetermined distance vertically above the plate 5.

[0022] The plate 5 is rotatably connected to the carrousel 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 described 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 carrousel 13.

[0023] 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 carrousel 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 carrousel 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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° - α) 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.

[0032] In the preferred embodiments, the pressure rollers 19 are cylindrical, preferably disks with diameter significantly greater than their height.

[0033] 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.

[0034] 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.

[0035] In many embodiments, the retaining head 4 is movable between a raised position and a lowered position.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] Operation of the carrousel apparatus 1 according to this invention is easy to understand from the preceding structural descriptions.

[0040] 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.

[0041] At that point the carrousel 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.

[0042] This invention brings important advantages.

[0043] Thanks to this invention, an in particular to the innovative structure of the retaining head, it has been possible to provide a carrousel apparatus for moving containers which allows the management of many types of containers which currently cannot be managed with the prior art carrousel 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.

[0044] The carrousel 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.

[0045] 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.

[0046] The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

[0047] All details may be substituted with other technically equivalent elements and the materials used, as well as the shapes and dimensions of the various components, may vary according to requirements.

Claims

1. A carrousel apparatus for moving containers comprising:

a supporting structure;
a carrousel (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 carrousel (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 carrousel (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 carrousel (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;
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), and wherein 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
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 carrousel 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 carrousel 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 carrousel 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 carrousel 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 carrousel apparatus for moving containers (2) according to any one of claims 1 to 5 wherein the pressure rollers (19) are cylindrical.

7. The carrousel apparatus for moving containers (2) according to any one of claims 1 to 6 wherein the pressure rollers (19) are idle rollers.

8. The carrousel 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 carrousel 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 carrousel 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.

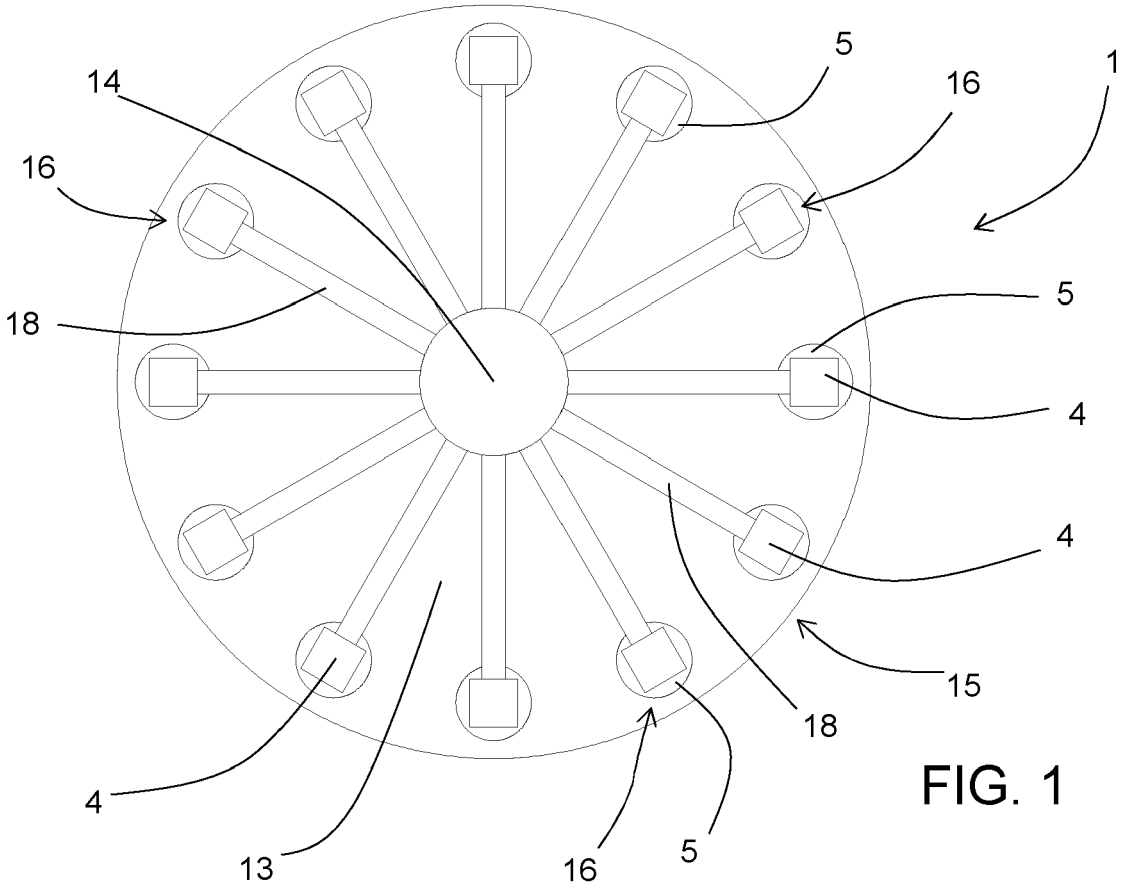
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FIG. 1

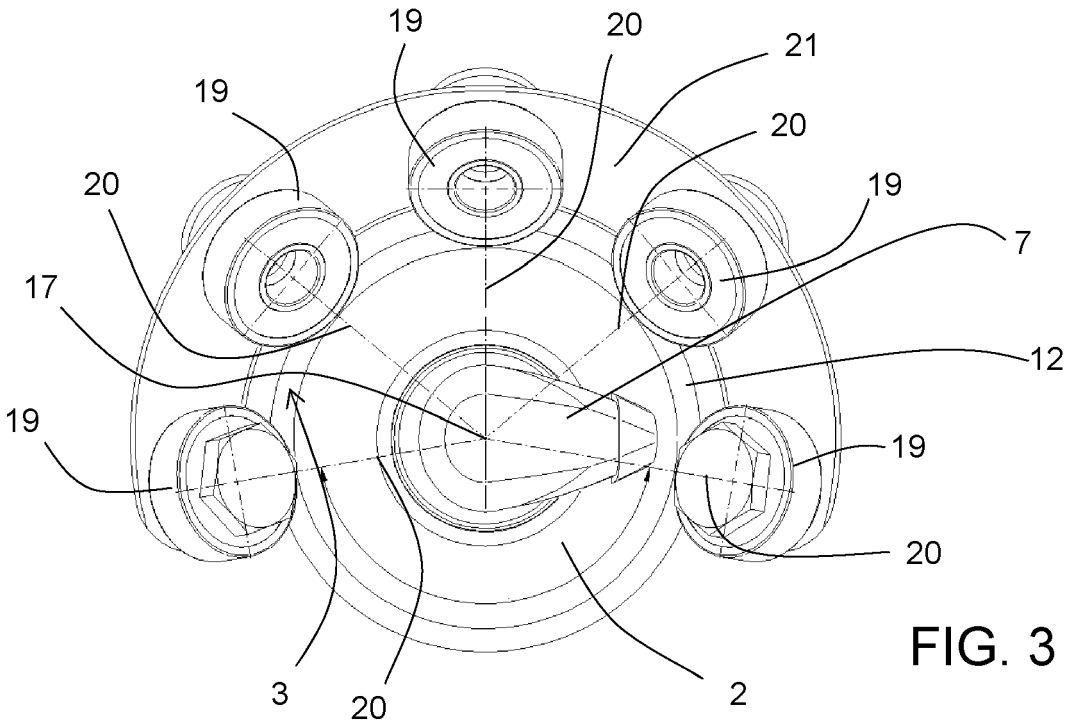
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FIG. 3

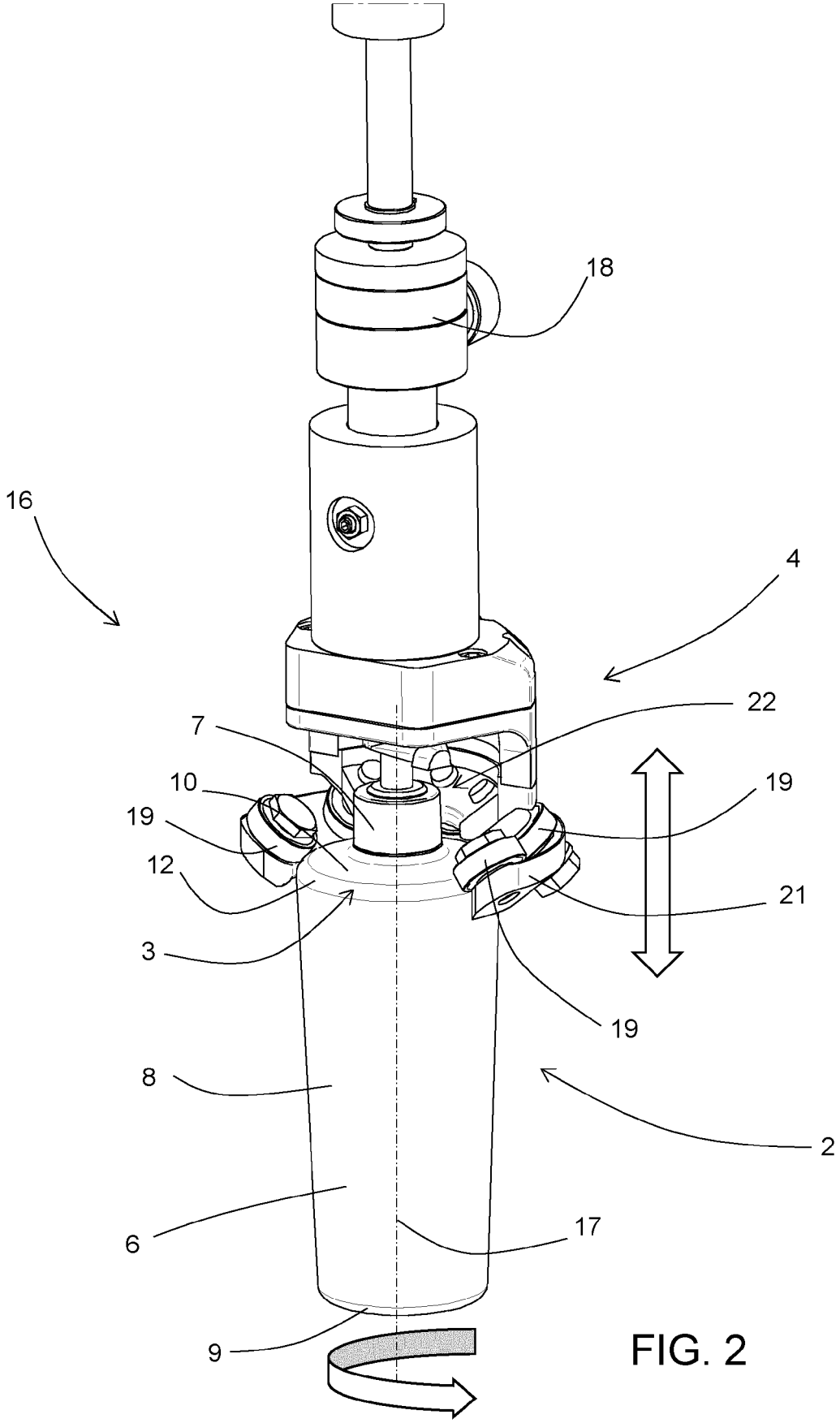

FIG. 2

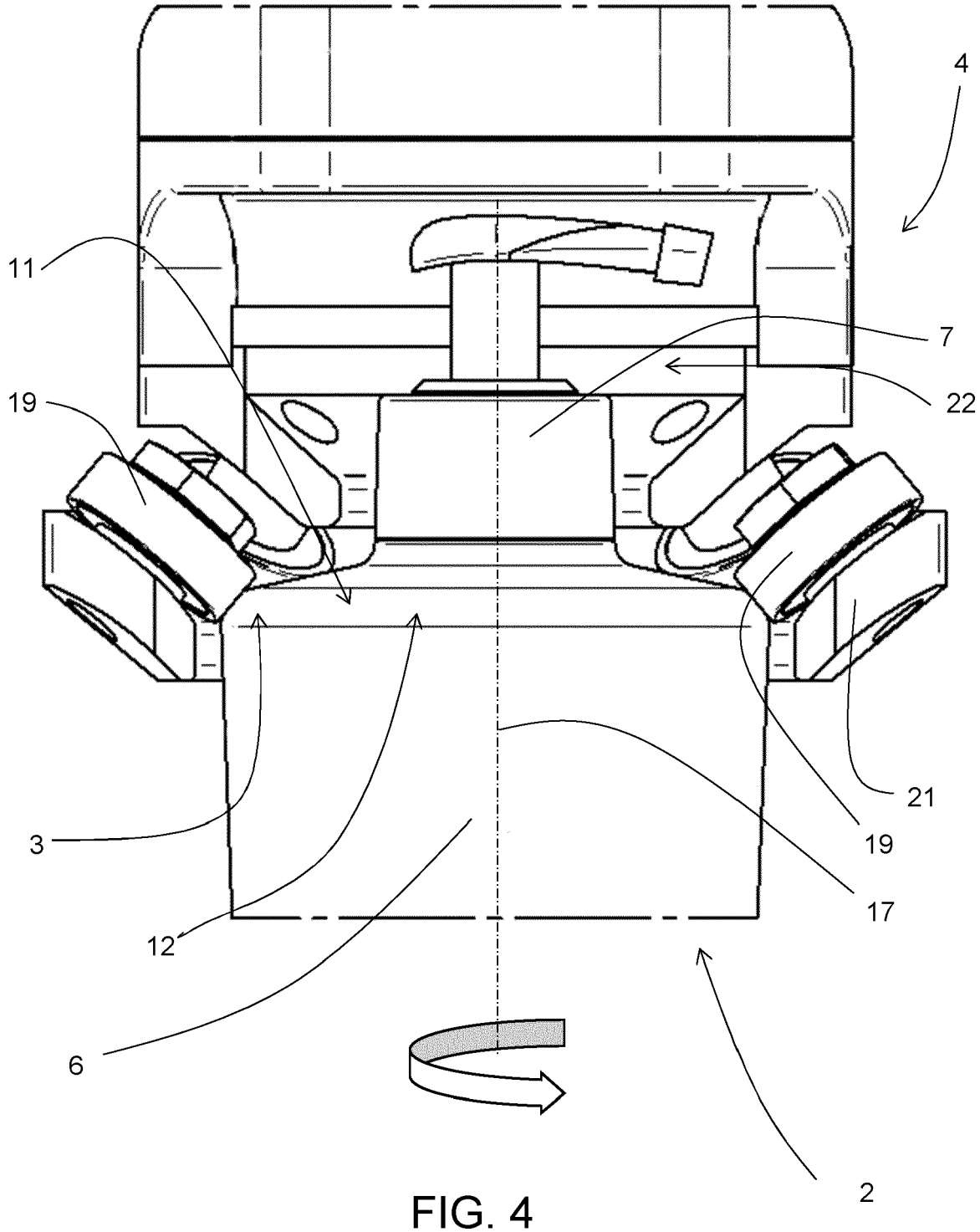

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 16 8978

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC) B65C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 September 2021	Luepke, Erik

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