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(54) APPARATUS AND METHOD FOR WASHING AN EXTERNAL SURFACE OF A CONTAINER FOR FLUIDS

(57) The present invention relates to an apparatus (1) for washing an external surface (2A) of a container (2) for fluids, wherein said apparatus (1) comprises:
- at least one rotary support element (10), rotatable about a substantially vertical first axis (A1) and adapted to rotatably support said container (2);
- cleaning means (20) configured for cleaning said external surface (2A) of the container (2) by friction.

The peculiar feature of the present invention lies in the fact that said cleaning means (20) comprise at least one cleaning element (21) comprising a cleaning portion (21A) configured to come in contact with said external surface (2A) of the container (2),
wherein said cleaning portion (21A) is associated with an arm (21B) of said at least one cleaning element (21),
and wherein said arm (21B) is hinged to a substantially vertical shaft (22), so as to oscillate or rotate about said shaft (22) in a substantially horizontal plane.

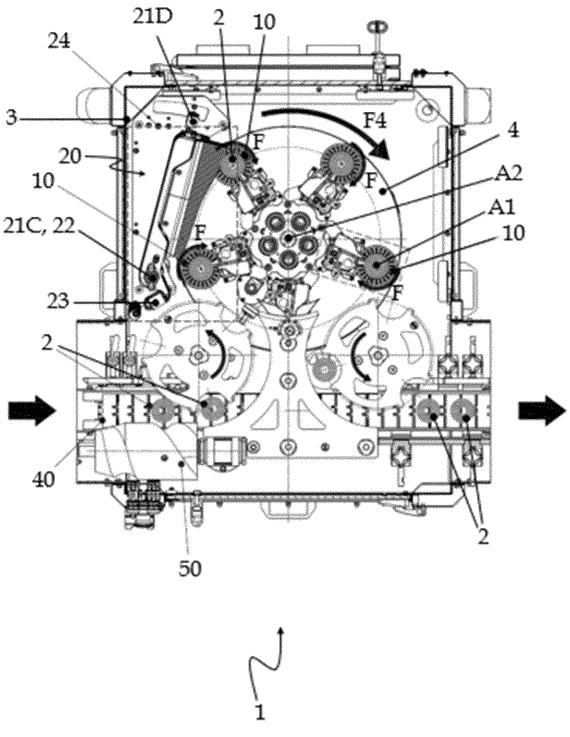

Fig. 1

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Description

[0001] The present invention relates to an apparatus for washing an external surface of a container for fluids, according to the preamble of claim 1.

[0002] The present invention also relates to a method for washing an external surface of a container for fluids, in particular glass or plastic bottles intended to contain liquids such as wine, beer, water, etc.

[0003] It is known in the art to externally clean containers for fluids (such as water, beer or wine bottles, etc.) by means of an apparatus equipped with cleaning means rubbing the external surface of said container.

[0004] Such apparatuses generally include a washing section comprising at least one brush which rotates about its axis and externally touches the container while water is being sprayed, and a drying section, separate from the washing section and comprising a plurality of nozzles blowing air onto the container to be dried.

[0005] However, since the washing brush is soaked with water and rotates about an axis, it centrifugally spreads drops and jets of washing liquid throughout the section and onto parts of the container (e.g. the cap) that should be preserved from contact with the washing liquid.

[0006] In the apparatuses currently known in the art, the washing liquid often squirts into the drying section, thus jeopardizing or impairing the effectiveness thereof, as well as against all walls and mechanical parts of the machine.

[0007] In order to limit such phenomenon and prevent the washing liquid from being sprayed out of the machine, shields and barriers have been employed to hold the washing liquid within the apparatus and insulate the various sections thereof; however, such a solution results in bigger overall dimensions and higher weight and cost.

[0008] Moreover, in the apparatuses known in the art much water is wasted because, instead of being properly directed towards the container's surface to be cleaned, it is spread in all directions.

[0009] In addition to this, an important drawback of the apparatuses currently known in the art lies in the fact that they are quite large in size, because the washing and drying sections cannot be arranged close to each other in order to prevent the washing liquid from squirting into the drying section (thereby considerably reducing the effectiveness thereof) or the drying air jets from mixing with the washing water jets, thus further increasing the scattering effect.

[0010] Furthermore, since the washing brushes rotate about their own axis, in order to perform an effective washing action they must have a profile which is complementary to the shape of the container to be washed; otherwise, in fact, a varying incidence of the brushes on the container would result, leading to an undesired lack of washing homogeneity.

[0011] This implies that, when the shape of the container changes, the shape of the washing brushes must change as well, resulting in higher equipment costs and longer downtimes due to format changes.

[0012] Italian patent 102019000013725 to the present Applicant relates to an apparatus for washing containers for fluids which comprises:

- at least one rotary plate, rotatable about a substantially vertical first axis and adapted to rotatably support a container for fluids;
- cleaning means, comprising at least one cleaning element adapted to clean an external surface of the container for fluids by friction.

[0013] In particular, said apparatus comprises a moving device adapted to support and move the cleaning element, wherein said cleaning element is movable between a passive position, transversally retracted from the rotary plate, and an active position, transversally proximal to the rotary plate, wherein the cleaning element is configured to come in contact with said external surface of the container for fluids.

[0014] The apparatus further comprises an actuating mechanism configured in such a way to move said cleaning element in a reciprocate manner along a direction parallel to said vertical first axis.

[0015] Even though the apparatus shown in Italian patent No. 102019000013725 makes it possible to overcome many of the problems suffered by prior-art apparatuses, it still has a few drawbacks.

[0016] Such drawbacks relate to the fact that, for washing containers shaped as a traditional water, beer or wine bottle (i.e. containers having a narrower neck section and wider body section), the cleaning means are designed to comprise two different cleaning elements, i.e. a lower cleaning element (for washing the wider section of the container's body) and an upper cleaning element (for washing the narrower section of the container's neck), wherein each cleaning element is associated with a respective moving device.

[0017] It is clear, therefore, that such features impair the effectiveness and cost of the apparatus disclosed in Italian patent No. 102019000013725.

[0018] The high complexity and cost of such apparatus are further increased by the fact that said apparatus comprises a base rotatable about a second vertical axis, wherein said base supports a plurality of rotary plates (defining different washing stations for washing respective containers) about a first vertical rotation axis, wherein each plate rotates integrally with said base. In such a context, each rotary plate of the apparatus is associated with a respective assembly comprising at least one cleaning element, a respective moving device (to obtain the horizontal displacement of the cleaning element between the passive position and the active position), and a respective actuating mechanism (to move the cleaning element vertically, in particular reciprocating along a direction parallel to a vertical axis).

[0019] It is apparent, therefore, that such features

complicate the construction of the apparatus considerably, which inevitably translates into higher costs and complexity.

[0020] In this frame, it is the main object of the present invention to provide an apparatus for washing an external surface of a container for fluids, wherein said apparatus has been so conceived as to overcome the drawbacks of prior-art apparatuses.

[0021] It is therefore one object of the present invention to provide an apparatus so conceived as to ensure proper washing of the external surface of a container for fluids without increasing the dimensions, weight and cost of said apparatus.

[0022] In particular, it is one object of the present invention to provide an apparatus that requires no special shields or barriers to hold the washing liquid within the apparatus or insulate the different sections thereof.

[0023] It is another object of the present invention to provide an apparatus so conceived as to avoid any waste of water and/or any other washing liquid, in particular said apparatus being so constructed as to direct water (or any other washing liquid) correctly towards the external surface of the container to be cleaned, without uselessly spreading it in all directions.

[0024] It is another object of the present invention to provide an apparatus whose outer dimensions are not too large, in particular wherein the washing and drying sections can be arranged close to each other, or even integrated into a single section, without any problem whatsoever.

[0025] It is a further object of the present invention to provide an apparatus so conceived as to not require the cleaning elements to be changed according to the format of the container, thus avoiding format change downtimes and equipment costs.

[0026] It is yet another object of the present invention to provide an apparatus so conceived that it is less complex and easier to manufacture, while the costs thereof are considerably reduced.

[0027] Further objects, features and advantages of the present invention will become apparent in light of the following detailed description and of the annexed drawings, which are provided herein merely by way of non-limiting explanatory example, wherein:

- Figure 1 shows a plan or top view of an apparatus for washing an external surface of a container for fluids according to one embodiment of the present invention;
- Figures 2A and 2B show two schematic views, i.e. a lateral one and a front one, of an embodiment of a component of the apparatus of Figure 1;
- Figures 3A and 3B show two schematic views, i.e. a top view and a sectional view along a substantially horizontal plane P-P (drawn with a dashed line in Figure 2B), of an embodiment of the component shown in Figures 2A and 2B.

[0028] The following description will illustrate several specific details to facilitate an in-depth understanding of one or more exemplary embodiments of the invention. The various embodiments may also be implemented without one or more of such specific details or by using other methods, components, materials, etc. In some cases, known structures, materials or operations will not be shown or described in detail to avoid shadowing some aspects of such embodiments. In this description, any reference to an "embodiment" will indicate that a particular configuration, structure or feature described herein in relation to an embodiment is comprised in at least one embodiment of the invention. Therefore, expressions such as "in one embodiment" and the like, which may be found in different parts of this description, will not necessarily refer to the same embodiment. Moreover, any particular configuration, structure or feature may be combined as deemed appropriate in one or more embodiments and/or associated with such embodiments differently than shown herein; for example, a feature described herein with reference to a specific drawing may be applied to one or more embodiments exemplified in another drawing.

[0029] The references below are therefore used only for simplicity's sake, and shall not limit the protection scope or extension of the various embodiments.

[0030] In the annexed Figure 1, reference 1 designates as a whole a preferred embodiment of an apparatus for washing an external surface 2A of a container 2 for fluids according to the present invention.

[0031] In particular, the container 2 may consist of a glass or plastic bottle intended to contain liquids such as (for example) wine, beer, water, etc.

[0032] The apparatus 1 comprises at least one rotary support element 10, rotatable about a substantially vertical first axis A1 (see arrows F in the annexed drawings) and adapted to rotatably support a container 2 for fluids. Essentially, when the container 2 is positioned on the support element 10 (i.e., when the container 2 is supported by the support element 10), said first axis A1 substantially coincides with a longitudinal axis of the container 2. In the embodiment shown in Figure 1, the apparatus 1 comprises a plurality of support elements 10, e.g. comprising a rotary plate, wherein each support element 10 is rotatable about a respective substantially vertical first axis A1 and is adapted to rotatably support a respective container 2; it is however clear that the apparatus 1 according to the present invention may alternatively comprise just one support element 10 or a number of support elements 10 greater than shown in Figure 1.

[0033] The apparatus 1 further comprises cleaning means (designated as a whole by reference numeral 20 in the accompanying drawings) configured for cleaning said external surface 2A of the container 2 by friction.

[0034] In accordance with the present invention, said cleaning means 20 comprise at least one cleaning element 21 comprising a cleaning portion 21A configured to come in contact with said external surface 2A of the

container 2, wherein said cleaning portion 21A is associated with an arm 21B hinged to a substantially vertical shaft 22 so as to oscillate or rotate (see double arrow F1 shown in Figures 3A and 3B) about said shaft 22 in a substantially horizontal plane (i.e. a plane coinciding with or substantially parallel to the plane P shown in Figure 2B and substantially perpendicular to the first axis A1 of the support element 10). It should be noted that said cleaning portion 21A may consist of a brush (as shown in the accompanying drawings), a sponge, a cloth, a belt (as will be explained in detail hereinafter), or other similar and/or technically equivalent elements. In one embodiment, said arm 21B is provided with a housing 21C (which may consist of a hole, an aperture, or another technically equivalent element), preferably located in correspondence of one end of said arm 21B, wherein said housing 21C is configured to be coupled with the shaft 22 to allow said at least one cleaning element 21 to oscillate about the shaft 22 in a substantially horizontal plane.

[0035] In accordance with the present invention, said cleaning means 20 comprise return means (which may also be defined as "thrust means") 23 configured for keeping the cleaning portion 21A in contact with said external surface 2A of the container 2. Essentially, the return means 23 are configured to prevent an idle rotation of the cleaning element 21, while at the same time keeping the cleaning portion 21A in contact with said external surface 2A of the container 2.

[0036] In accordance with a preferred embodiment, said return means 23 comprise a spring, in particular a coil spring, having a first end associated with the arm 21B and a second end associated with a fixed or stable (i.e. non-movable) element of the apparatus 1 (as shown in Figures 1 and 3A); for example, said stable element may comprise a frame 24 belonging to said cleaning means 20 or to other components of the apparatus 1 according to the present invention (e.g. a frame 3 of the apparatus 1). It is however clear that said return means 23 may also be realized differently, e.g. they may comprise an elastic element other than a coil spring. In this context, it should be noted that said spring can be associated with the arm 21B in such a way as to exert either a thrust action or a pulling action on said arm 21B, depending on how it is pivoted to or associated with the various components of the apparatus 1 according to the present invention. In addition to this, said return means 23 may also be so constructed as to comprise magnetic elements attracting or repelling each other, or they may also be constructed as to comprise at least one cylinder (for example, of hydraulic or electric type), in particular configured to be actuated upon transit of the container 2. It is therefore apparent that, in all embodiments described herein and as previously explained, the return means 23 according to the present invention are configured to prevent an idle rotation of the cleaning element 21, while at the same time keeping the cleaning portion 21A in contact with said external surface 2A of the container 2.

[0037] Said at least one cleaning element 21 may then be so designed as to comprise at least one bearing element 21D, in particular associated with a distal end of the arm 21B (i.e. associated with that end of the arm 21B which is opposite the one where the housing 21C and the shaft 22 are coupled together), said bearing element 21D being configured to support said arm 21B, in particular during the oscillating or rotating motion thereof about said shaft 22.

[0038] Said bearing element 21D turns out to be especially useful when a big and/or heavy cleaning element 21 is employed.

[0039] In the embodiment shown in the accompanying drawings, said at least one bearing element 21D comprises a roller adapted to rotate about an axis coinciding with a longitudinal axis of the arm 21B (and hence of the entire cleaning element 21), wherein said roller is supported by and rotates on a suitable guide or on a suitable support (the guide and the support are not shown in the accompanying drawings).

[0040] It is however clear that, in this case as well, said at least one bearing element 21D may also be constructed differently than described herein.

[0041] In accordance with the present invention, the apparatus 1 comprises moving means (designated as a whole by reference numeral 30 in Figure 3B) configured to move (see double arrow F2 in Figures 3A and 3B) the cleaning portion 21A of said at least one cleaning element 21 along a substantially horizontal direction (i.e. a direction substantially parallel to the plane P shown in Figure 2B and substantially perpendicular to the first axis A1 of the support element 10).

[0042] In the embodiment shown in Figure 3B, said moving means 30 comprise:

- actuating means (not shown in the accompanying drawings) configured to obtain a rotation of the shaft 22 about its longitudinal axis (see arrow F3 in Fig. 3B),
- a cam 31 integrally connected to said shaft 22 and rotating along with it,
- an abutment element 32 integrally connected to the cleaning portion 21A and positioned in contact with said cam 31,

wherein the rotation of the shaft 22 and of the cam 31 results in a displacement of the abutment element 32 and of the cleaning portion 21A along a substantially horizontal direction (i.e. a direction substantially parallel to the plane P shown in Figure 2B and substantially perpendicular to the first axis A1 of the support element 10).

[0043] In this embodiment, the cam 31 can be integrally connected to said shaft 22 through the use of tangs or keys (not shown) providing a coupling between such elements and causing the shaft 22 and the cam 31 to rotate integrally with each other; alternatively, the connection between the cam 31 and the shaft 22 may be obtained by manufacturing such elements as one piece. In this context, said displacement of the cleaning portion

21A along a substantially horizontal direction occurs in an alternating fashion (i.e. forwards and backwards along said substantially horizontal direction, as indicated by double arrow F2 in Figure 3B).

[0044] It is evident that the moving means according to the present invention may also be constructed otherwise. By way of example, said moving means may be so constructed as to comprise a pair of rotary elements, each one rotating about a respective substantially vertical (and hence substantially parallel to the first axis A1 of the support element 10) axis, in particular one of said rotary elements being fixedly connected to said shaft 22 to rotate along with it, wherein said rotary elements support and move a cleaning portion 21A comprising a continuous belt, in particular made of abrasive material; it should be noted that said continuous belt develops in a substantially vertical direction (i.e. substantially parallel to the first axis A1 of the support element 10). In this context, said displacement of the cleaning portion 21A along a substantially horizontal direction preferably occurs in a continuous manner, i.e. in such a way that the continuous belt is moved in one direction only, preferably a direction opposite to the direction of rotation (arrow F) of the support element 10 about the first axis A1.

[0045] As can be particularly appreciated in Figures 2A and 2B, in a preferred embodiment said cleaning means 20 comprise a plurality of cleaning elements 21 overlapping each other, wherein each cleaning element 21 is made as already described above, i.e. each cleaning element 21 comprises a cleaning portion 21A configured to come in contact with said external surface 2A of the container 2, wherein said cleaning portion 21A is associated with an arm 21B hinged to a substantially vertical shaft 22, so as to oscillate or rotate about said shaft 22 in a substantially horizontal plane. Such a provision turns out to be particularly advantageous when the container 2 has a typical bottle shape, i.e. with a body having a first cross-section, a neck having a second cross-section, and an inclined part connecting the body to the neck. Indeed, the construction of the cleaning means 20 featuring a plurality of stacked cleaning elements 21 ensures optimal cleaning of all portions of the container 2 without the need for changing any components of the apparatus 1, in that each cleaning element 21 can be used for cleaning a respective portion of the external surface 2A of the container 2; thus, the various cleaning elements 21 make it possible to adequately follow the profile of said external surface 2A of the container (as clearly visible in Figure 2A).

[0046] Referring back to Figure 1, it can be noticed therein that the apparatus 1 according to the present invention comprises a rotary base 4 configured to rotate (see arrow F4 in Figure 1) about a substantially vertical (and substantially parallel to said substantially vertical first axis A1 of the support element 10) second axis A2, said base 4 supporting the at least one support element 10 in rotation about said substantially vertical second axis A2.

[0047] Preferably, the apparatus 1 according to the present invention is constructed in such a way that the cleaning means 20 are associated with a fixed (non-movable) element of the apparatus 1; it is therefore clear that said at least one cleaning element 21 is not associated with the rotary base 4, being directly or indirectly (e.g. through connecting elements not shown in the accompanying drawings) supported by a fixed frame 3 of the apparatus 1. In this context, the contact between the cleaning portion 21A of the cleaning element 21 and the external surface 2A of the container 2 is obtained through a rotation of the base 4 about the second axis A2, wherein (as previously described herein) said base 4 supports the at least one support element 10 in rotation about said second axis A2 (and wherein, in its turn, the support element 10 rotates about said first axis A1).

[0048] The apparatus 1 according to the present invention comprises at least one nozzle (not shown in the accompanying drawings) configured to deliver a cleaning fluid onto the external surface 2A of the container 2, in particular said at least one nozzle being rotated by the base 4 about the second vertical axis A2, preferably in correspondence of a rotary support element 10.

[0049] Conveniently, the apparatus 1 comprises at least one drying device (not shown in the accompanying drawings, and definable also as a "drying station") configured to deliver an air flow towards the external surface 2A of the container 2. Also said drying device may be rotated by the base 4 about the second vertical axis A2, preferably in correspondence of a rotary support element 10.

[0050] According to one embodiment, said at least one nozzle and/or said at least one drying device are arranged on the base 4 in a position interposed between the support element 10 and the second axis A2. In this way, the outer dimensions of the apparatus 1 are reduced, in that said nozzle and/or drying device are contained in the radially innermost part of the base 4, while the support elements 10 are located on the radially outermost part of said base 4.

[0051] The apparatus 1 according to the present invention may comprise a conveyor belt 40, adapted to convey the containers 2 towards the cleaning means 20, and at least one distribution device 50 (e.g. a screw, a star, a diverter, etc.), configured to pick up the containers 2 from said conveyor belt 40 and arrange each one of them on a respective rotary support element 10.

[0052] The apparatus 1 according to the present invention may comprise a head 60 (shown in Figures 2A and 2B), in particular coaxial to a respective support element 10 and idly rotatable, said head 60 being configured to hold the container 2 in position on the support element 10 (e.g. said head 60 may be configured to retain the ring at the top of the neck of a bottle, thereby preventing the rotation motion from unseating the container 2 from the support element 10).

[0053] The features of the apparatus 1 according to the present invention, as well as the advantages thereof, are

apparent from the above description.

[0054] As a matter of fact, the provisions of the present invention make it possible to overcome the drawbacks of prior-art apparatuses by means of an apparatus 1 so conceived as to ensure an optimal washing of the external surface 2A of the container 2 without increasing the size, weight and cost of the apparatus 1.

[0055] Another advantage of the apparatus 1 according to the present invention lies in the fact that it has been so conceived as to not require any special shields or barriers to hold the water (or any other washing liquid) within the apparatus 1 and to insulate the various sections thereof, since the provisions of the present invention result in the apparatus 1 being so constructed as to properly direct the water (or any other washing liquid) towards the external surface 2A of the container 2 to be cleaned, without uselessly spreading it in all directions.

[0056] It is therefore apparent that the apparatus 1 according to the present invention does not take much room, since in said apparatus 1 the washing section (which comprises the cleaning means 20) and an optional drying section can be arranged close to each other, or even integrated into a single section, without any problem whatsoever.

[0057] The peculiar provision of the cleaning means 20 according to the present invention makes it possible to obtain an apparatus 1 so conceived as to not require the cleaning elements 21 to be changed according to the format of the container 2, thus avoiding format change downtimes and equipment costs.

[0058] It is therefore clear that the apparatus 1 according to the present invention has been conceived to be simpler and easier to manufacture, while the costs thereof are considerably reduced.

[0059] The apparatus 1 described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea; it is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0060] It can therefore be easily understood that the present invention is not limited to the above-described apparatus 1, but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the novelty spirit of the inventive idea, as clearly specified in the following claims.

Claims

1. An apparatus (1) for washing an external surface (2A) of a container (2) for fluids, wherein said apparatus (1) comprises:

   - at least one rotary support element (10), rotatable about a substantially vertical first axis (A1) and adapted to rotatably support said container (2);
   - cleaning means (20) configured for cleaning said external surface (2A) of the container (2) by friction,
   said apparatus (1) being **characterized in that** said cleaning means (20) comprise at least one cleaning element (21) comprising a cleaning portion (21A) configured to come in contact with said external surface (2A) of the container (2),
   wherein said cleaning portion (21A) is associated with an arm (21B) of said at least one cleaning element (21),
   and wherein said arm (21B) is hinged to a substantially vertical shaft (22), so as to oscillate or rotate about said shaft (22) in a substantially horizontal plane.

2. Apparatus (1) according to claim 1, **characterized in that** said arm (21B) is provided with a housing (21C), in particular located in correspondence of one end of said arm (21B), wherein said housing (21C) is configured to be coupled with the shaft (22) to allow said at least one cleaning element (21) to oscillate about the shaft (22) in said substantially horizontal plane.

3. Apparatus (1) according to one or more of the preceding claims, **characterized in that** said cleaning means (20) comprise return means (23) configured for keeping the cleaning portion (21A) of said at least one cleaning element (21) in contact with said external surface (2A) of the container (2).

4. Apparatus (1) according to claim 3, **characterized in that** said return means (23) comprise a spring, in particular a coil spring, associated with the arm (21B) and with a fixed or stable element of the apparatus (1).

5. Apparatus (1) according to one or more of the preceding claims, **characterized in that** said at least one cleaning element (21) comprises at least one bearing element (21D), in particular associated with a distal end of the arm (21B), wherein said at least one bearing element (21D) is configured to support said arm (21B), in particular during the oscillating or rotating motion thereof about said shaft (22).

6. Apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises moving means (30) configured to move the cleaning portion (21A) of said at least one cleaning element (21) along a substantially horizontal direction.

7. Apparatus (1) according to claim 6, **characterized in that** said moving means (30) comprise:

   - actuating means configured to obtain a rotation of the shaft (22) about its longitudinal axis,

- a cam (31) connected to said shaft (22) and rotating along with it,
- an abutment element (32) integrally connected to the cleaning portion (21A) and positioned in contact with said cam (31),

wherein the rotation of the shaft (22) and of the cam (31) results in a displacement of the abutment element (32) and of the cleaning portion (21A) along said substantially horizontal direction.

8. Apparatus (1) according to claim 6, **characterized in that** said moving means comprise a pair of rotary elements rotating about a respective substantially vertical axis, in particular one of said rotary elements being fixedly connected to said shaft (22) to rotate along with it, wherein said rotary elements support and move a cleaning portion (21A) comprising a continuous belt.

9. Apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises a rotary base (4) configured to rotate about a substantially vertical second axis (A2), said base (4) supporting at least one support element (10) in rotation about said substantially vertical second axis (A2).

10. Apparatus (1) according to one or more of the preceding claims, **characterized in that** said at least one cleaning element (21) is supported by a fixed frame (3) of the apparatus (1).

11. Apparatus (1) according to one or more of the preceding claims, **characterized in that** said cleaning means (20) comprise a plurality of cleaning elements (21) overlapping each other,

wherein each cleaning element (21) comprises a cleaning portion (21A) configured to come in contact with said external surface (2A) of the container (2),
and wherein said cleaning portion (21A) is associated with an arm (21B) hinged to a substantially vertical shaft (22), so as to oscillate or rotate about said shaft (22) in a substantially horizontal plane.

12. Method for washing an external surface (2A) of a container (2) for fluids, comprising the steps of:

a) providing an apparatus (1) according to any one of the preceding claims;
b) placing a container (2) on a rotary support element (10);
c) imparting a rotation to the container (2) about a substantially vertical first axis (A1) of the support element (10);
d) bringing said external surface (2A) of the container (2) in contact with a cleaning portion (21A) of at least one cleaning element (21), wherein said cleaning portion (21A) is associated with an arm (21B) of said at least one cleaning element, and wherein said arm (21B) is hinged to a substantially vertical shaft (22), so as to oscillate or rotate about said shaft (22) in a substantially horizontal plane.

13. Method according to claim 12, **characterized in that** said step d) of bringing the external surface (2A) of the container (2) in contact with the cleaning portion (21A) of at least one cleaning element (21) is carried out by rotating a base (4) of the apparatus (1) about a substantially vertical second axis (A2), wherein said base (4) supports said support element (10) in rotation about said second axis (A2).

14. Method according to one or more of the preceding claims 12 and 13, **characterized in that** it comprises a step e) of operating moving means (30) for moving the cleaning portion (21A) of said at least one cleaning element (21) along a substantially horizontal direction or along a direction substantially perpendicular to said substantially vertical first axis (A1).

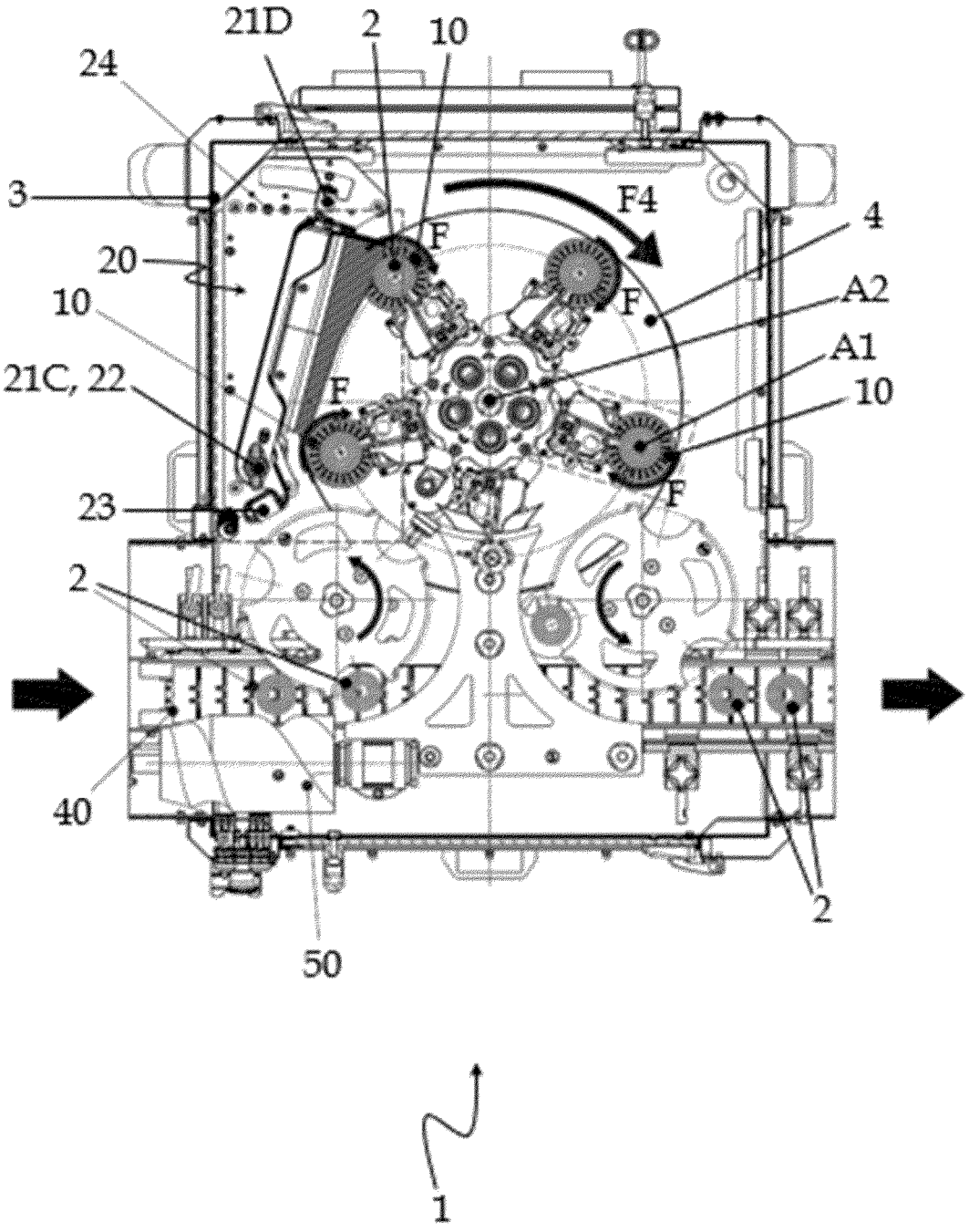


Fig. 1

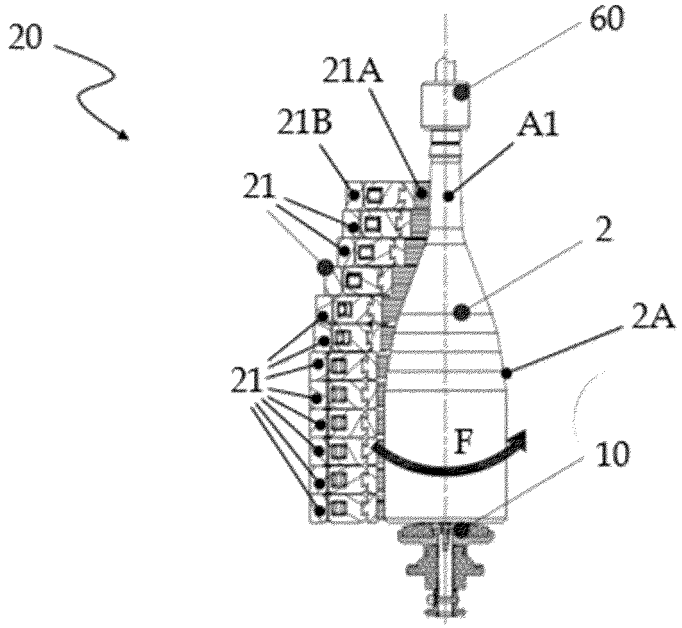


Fig. 2A

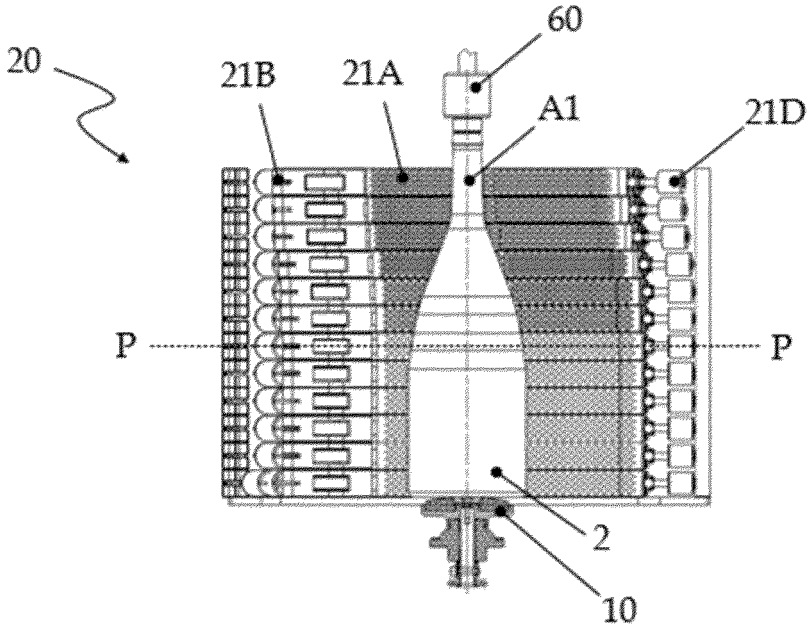


Fig. 2B

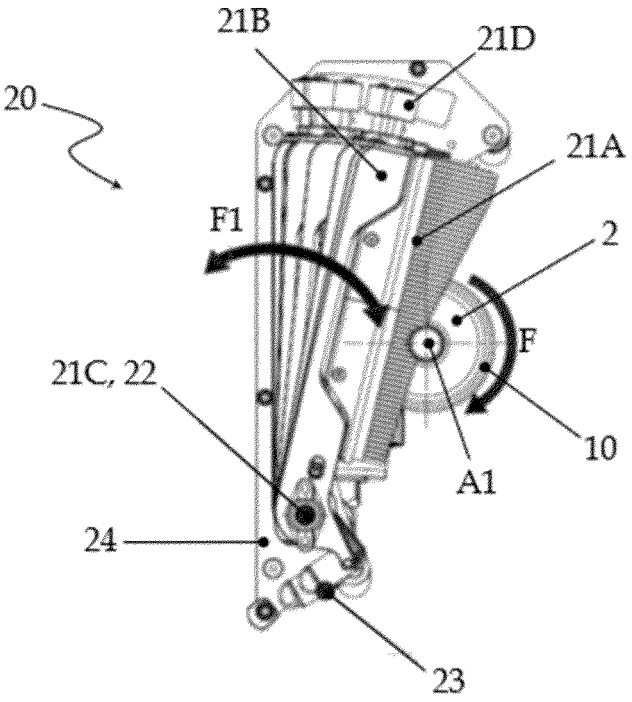
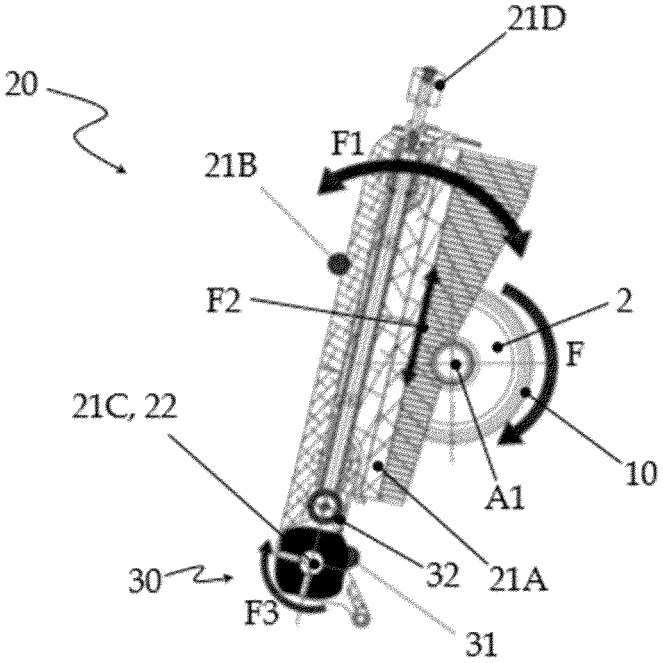

21B
21D
20
21A
F1
2
F
21C, 22
10
A1
24
23

Fig. 3A


21D
20
F1
21B
F2
2
F
21C, 22
10
A1
21A
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32
F3
31

Fig. 3B

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EUROPEAN SEARCH REPORT

Application Number
EP 24 18 7393

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Place of search	Date of completion of the search	Examiner
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