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(54) **A MACHINE FOR FILLING CONTAINERS**

(57) A machine for filling containers (2) is provided with a plurality of handling units (13), each of which has a filling valve (20) and a filling head (24), which defines, together with the filling valve (20), a supply path for a pourable product into a relative container (2), is coupled in an angularly fixed manner to a support device (32) for receiving and retaining a relative container (2), and is coupled, further, in a rotary and fluid-tight manner to the filling valve (20) by interposing a mechanical gasket (38) having a first ring (40) angularly fixed to the filling valve (20) and a second ring (39) angularly fixed to the filling head (24); a washing device (43) being provided for washing the mechanical gaskets (38) of the handling units (13) so as to remove the residuals of the pourable product from the mechanical gaskets (38) itself.

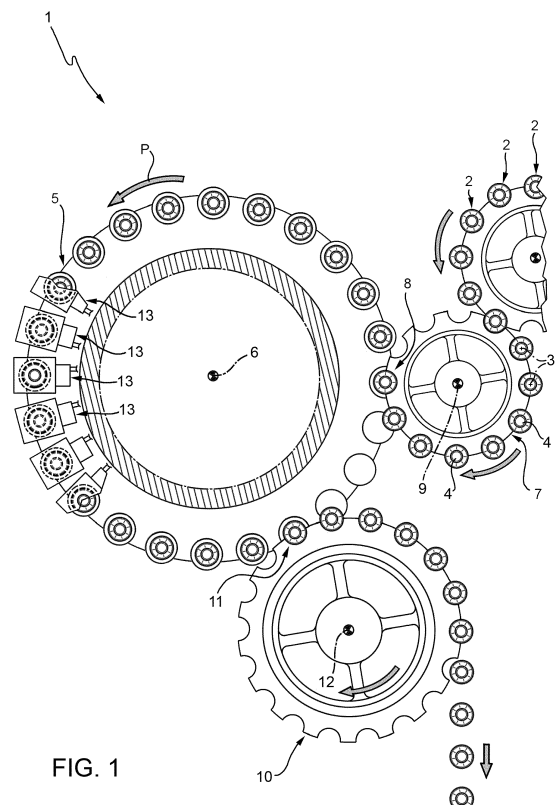


FIG. 1

Description

TECHNICAL FIELD

[0001] The present invention relates to a machine for filling containers, such as bottles, with pourable products, such as carbonated liquids, non-carbonated liquids, emulsions, suspensions and high viscosity liquids.

BACKGROUND ART

[0002] As is known, many pourable products are sold in a wide range of containers, which are sterilized, filled and closed in container handling plants typically including a plurality of processing stations or machines, such as rinsing machines, filling machines, capping machines and labelling machines.

[0003] The containers to be handled are generally fed to and removed from these machines by means of a transport system including star wheels and linear conveyors.

[0004] Each filling machine generally comprises a conveying wheel, which is mounted to rotate about a rotation axis, and is provided with a plurality of handling units, which are mounted along a peripheral edge of the conveying wheel, and are fed by the conveying wheel along a path extending about the rotation axis.

[0005] Each handling unit comprises a support device for receiving and retaining a relative container and a filling device for feeding a pourable product into the container.

[0006] The filling device comprises a vertical post, which has an upper wide portion and a lower narrow portion, and is engaged in a sliding manner by a tubular shutter.

[0007] The shutter defines, together with the post, an annular outer feeding duct, which extends between the post and the shutter, and is connected to a tank of the pourable product to be fed into the containers.

[0008] The shutter is axially mobile between a lowered closing position, in which the shutter is arranged in contact with the post so as to be coupled to the post in a fluid-tight manner and the outer feeding duct is closed, and a raised opening position, in which the outer feeding duct is open.

[0009] The shutter defines an inner feeding duct, which extends inside the shutter, and is connected to a feeding device, which is adapted to feed a gas under pressure along the inner feeding duct and into the containers.

[0010] The filling device comprises, furthermore, a cylindrical filling head, which is coupled to the lower end of the post in a rotary manner so as to rotate around a longitudinal axis of the post, and is provided with an annular gasket configured to be coupled to a top neck of the container in a fluid-tight manner.

[0011] The filling device is further provided with a gripping device for a container, which is provided with a pair of holding jaws configured to hold a container in correspondence to its top neck, and is coupled to the filling

head in an angularly fixed manner so as to rotate around the longitudinal axis of the post.

[0012] The gripping device is further coupled to the filling head in an axially sliding manner so as to move between a raised operating position, in which the top neck of the container is coupled in a fluid-tight manner to the above mentioned annular gasket, and a lowered rest position, in which the top neck of the container is arranged at a given distance from the annular gasket.

[0013] The filling head and the filling valve are coupled in a fluid-tight manner to one another by interposing a mechanical sliding gasket having a rotary lower ring fixed to the filling head so as to rotate around the longitudinal axis of the post and an upper ring fixed to the lower free end of a sleeve, which is coupled in an angularly fixed and axially sliding manner to the post.

[0014] The upper ring is kept in contact with the lower ring by a spring, which is interposed between the post and the sleeve.

[0015] Known filling machines of the type described above have some drawbacks mainly deriving from the fact that during the filling phase leakages of the pourable product between the upper ring and the lower ring of the mechanical sliding gasket are possible, which could compromise the correct functionality of the filling device.

DISCLOSURE OF INVENTION

[0016] It is an object of the present invention to provide a machine for filling containers, designed to eliminate the aforementioned drawback, and which is cheap and easy to implement.

[0017] According to the present invention, there is provided a machine for filling containers as claimed in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic top plan view, with parts removed for clarity, of a preferred embodiment of a machine for filling containers according to the present invention;

Figure 2 shows a schematic side view, with parts in section and parts removed for clarity, of a detail of the filling machine of Figure 1;

Figures 3 and 4 show a schematic side view, with parts in section and parts removed for clarity, of a detail of Figure 2 illustrated in two different operating positions; and

Figure 5 shows a schematic perspective view, with parts removed for clarity, of a further detail of Figure 2.

PREFERRED EMBODIMENT OF THE INVENTION

[0019] Number 1 in Figure 1 indicates as a whole a machine for filling containers, in particular bottles 2, with pourable products, such as carbonated liquids, non-carbonated liquids, emulsions, suspensions and high viscosity liquids.

[0020] Each bottle 2 has a longitudinal axis 3 and has a top neck 4 substantially coaxial with the axis 3.

[0021] The machine 1 comprises a filling wheel 5, which is mounted to rotate continuously (anticlockwise in Figure 1) about a vertical axis 6 perpendicular to the Figure 1 plane. The wheel 5 receives a succession of empty bottles 2 from an input star wheel 7, which is connected to the wheel 5 at a first transfer station 8 and is mounted to rotate continuously about a respective longitudinal axis 9 parallel to the axis 6.

[0022] The wheel 5 releases a succession of filled bottles 2 to an output star wheel 10, which is connected to the wheel 5 at a second transfer station 11 and is mounted to rotate continuously about a respective longitudinal axis 12 parallel to the axes 6 and 9.

[0023] Wheel 5 is provided with a plurality of handling units 13, which are equally angularly spaced about the axis 6, are mounted along a peripheral edge of the wheel 5, and are moved by the wheel 5 along a path P extending about the axis 6 and through the stations 8 and 11.

[0024] As shown in Figure 2, each handling unit 13 comprises a filling device 14 comprising, in turn, a vertical post 15 with a cylindrical shape, which has a longitudinal axis 16 parallel to axis 6, and is radially delimited by an inner wall comprising an upper wide portion 17 and a lower narrow portion 18.

[0025] The post 15 is engaged in a sliding manner by a shutter 19 with a tubular shape, which is mounted inside the post 15 coaxial to the axis 16, and defines, together with the post 15, a filling valve 20 of the filling device 14.

[0026] The shutter 19 is coupled to the post 15 by means of a deformable annular membrane (not shown), which is interposed between the post 15 and the shutter 19 itself.

[0027] The shutter 19 defines, together with the post 15, an annular outer feeding duct 21, which extends between the post 15 and the shutter 19, and is connected to a tank (not shown) of the pourable product to be fed into the bottles 2.

[0028] The shutter 19 is axially mobile between a lowered closing position (not shown), in which the shutter 19 is arranged in contact with the inner wall of the post 15 so as to be coupled to the post 15 in a fluid-tight manner and close the duct 21, and a raised opening position (Figure 2), in which the duct 21 itself is open.

[0029] The shutter 19 is moved to its raised opening position - and normally kept there - by a spring (not shown), which is mounted between the post 15 and the shutter 19 coaxial to the axis 16, and is moved to its lowered closing position, against the action of the spring (not shown), by an actuating cylinder (not shown).

[0030] The actuating cylinder (non shown) is obtained in the post 15 coaxial to the axis 16, is connected to a known pneumatic device, which is not shown, and is provided with a piston, which extends perpendicularly to the axis 16 and is coupled to the shutter 19 in an axially and angularly fixed manner.

[0031] The shutter 19 has, furthermore, a swirler 22, which is obtained on the outer surface of the shutter 19 itself, and extends along - and around - the axis 16, so as to cause the pourable product fed along the duct 21 to have a swirling movement.

[0032] The shutter 19 defines an inner feeding duct 23, which extends inside the shutter 19, and is connected to a supply device (not shown), which is adapted to feed a gas under pressure along the duct 23 and into the bottles 2.

[0033] The filling device 14 comprises, furthermore, a cylindrical filling head 24, which extends around the post 15 coaxial to the axis 16, projects axially below the lower end of the post 15, and defines, together with the filling valve 20, a supply path for the pourable product into the bottle 2.

[0034] The filling head 24 is coupled to the post 15 in an axially fixed manner and, furthermore, is coupled to the post 15 in a rotary manner by interposing an upper rolling bearing 25a and a lower rolling bearing 25b, so as to rotate, relative to the post 15 itself and under the thrust of an actuating device 26, around the axis 16.

[0035] The device 26 comprises an electric motor 27, which is fixed to the post 15, and is provided with an output shaft 28 having a longitudinal axis 29 that is parallel to the axis 16.

[0036] The shaft 28 is coupled to the filling head 24 by means of a pair of gears 30, of which one is splined to the shaft 28 and the other is obtained on the outer surface of the filling head 24 itself.

[0037] The lower end of the filling head 24 is provided with a gasket 31 made of an elastomer material, which has an annular shape coaxial to the axis 16, and faces, in use, the top neck 4 of the bottle 2.

[0038] As shown in Figures 2 and 5, the filling device 14 cooperates with a gripping member 32 for a bottle 2 comprising a support plate 33, which protrudes below the filling head 24, is coupled to the filling head 24 in an angularly fixed manner, and, furthermore, is coupled to the filling head 24 in an axially sliding manner so as to move, relative to the filling head 24, parallel to the axis 16.

[0039] The support plate 33 supports a pair of holding jaws 34, which are configured to hold a relative bottle 2 in correspondence to its top neck 4.

[0040] The jaws 34 are hinged to the plate 33 so as to rotate, relative to the plate 33 itself, around respective fulcrum axes 35, which are parallel to one another and to the axis 16.

[0041] The jaws 34 are moved to a clamping position - and normally kept there - by a spring 36, which is interposed between the jaws 34, and are moved to a release position by the thrust exerted on the jaws 34 themselves

by the relative bottle 2 during its insertion into the gripping member 32 or its extraction from the gripping member 32.

[0042] The gripping member 32 is moved by an actuating cylinder 37 parallel to the axis 16 between a raised operating position, in which the top neck 4 is coupled to the gasket 31 in a fluid-tight manner, and a lowered rest position, in which the upper neck 4 is arranged at a given distance from the gasket 31 itself.

[0043] The filling valve 20 and the filling head 14 are coupled in a fluid-tight manner to one another by interposing a mechanical sliding gasket 38, which is mounted below the shutter 19 coaxial to the axis 16.

[0044] The gasket 38 comprises a rotary lower ring 39 fixed to the filling head 24 so as to rotate around the axis 16 and an upper ring 40 fixed to the lower free end of a sleeve 41, which is mounted inside the post 15 coaxial to the axis 16, and is coupled in an angularly fixed and axially sliding manner to the post 15.

[0045] The upper ring 40 is kept in contact with the lower ring 39 by a spring 42, which is interposed between the post 15 and the sleeve 41.

[0046] As shown in Figures 2, 3, and 4, the filling wheel 5 comprises, furthermore, a washing device 43 to wash the gaskets 38 and, in the case in point, the lower rolling bearings 25b of the handling units 13.

[0047] The washing device 43 comprises an annular manifold 44, which is fixed to the wheel 5 coaxial to the axis 6; and, for each handling unit 13, a respective annular manifold 45, which is obtained in the lower end of the corresponding post 15 coaxial to the axis 16.

[0048] Each manifold 45 is concentric to the bearing 25b, and is connected with the manifold 44 by means of a feeding duct 46, which extends through the post 15 to feed a washing liquid for removing the residuals of the pourable product from the gaskets 38 and the lower rolling bearings 25b.

[0049] The supply of the washing liquid along each feeding duct 46 is selectively controlled by a supply valve 47 having a tubular valve body 48, which is fitted in the feeding duct 46, has a longitudinal axis 49 parallel to the axis 16, and is engaged in a sliding manner by a shutter 50.

[0050] The shutter 50 is axially mobile between a lowered closing position (Figure 3), in which the shutter 50 closes the duct 46, and a raised opening position (Figure 4), in which the duct 46 itself is open.

[0051] The shutter 50 is moved to its raised opening position - and normally kept there - by a spring 51, which is mounted between the valve body 48 and the shutter 50 coaxial to the axis 49, and is moved to its lowered closing position, against the action of the spring 51, by an actuating cylinder 52.

[0052] The cylinder 52 is obtained in the wheel 5 coaxial to the axis 49, is connected to a known pneumatic device, which is not shown, and is provided with a piston 53, which extends perpendicularly to the axis 49, and is coupled to the shutter 50 in an axially and angularly fixed manner.

[0053] The washing device 43 comprises, furthermore, for each handling unit 13, a respective annular cavity 54, which is obtained in the corresponding filling head 24 coaxial to the axis 16, extends below the manifold 45, and is shaped so as to face both the gasket 38, in particular the region between the lower ring 39 and the upper ring 40, and the bearing 25b.

[0054] The annular cavity 54 communicates with the manifold 45 through a plurality of holes 55, which are obtained in the post 15, and are uniformly distributed around the axis 16.

[0055] The annular cavity 54 communicates, furthermore, with the external environment through a pair of apertures 56, which are obtained in the filling head 24, and are uniformly distributed around the axis 16 to discharge the washing liquid.

[0056] The washing device 43 allows operators to perform a washing phase for removing the residuals of the pourable product from the gaskets 38 and the lower rolling bearings 25b, thus increasing the efficiency of the filling machine 1.

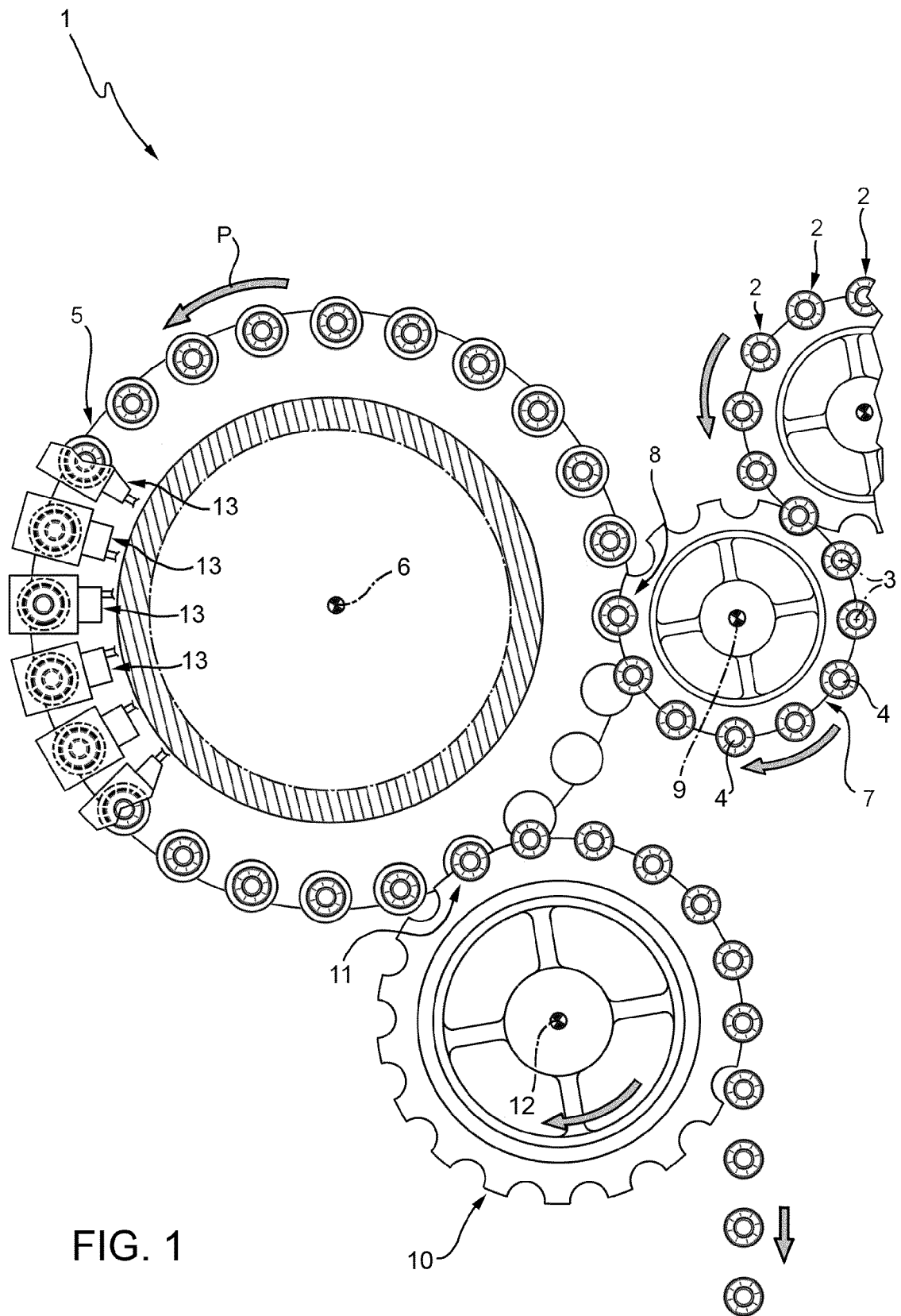
Claims

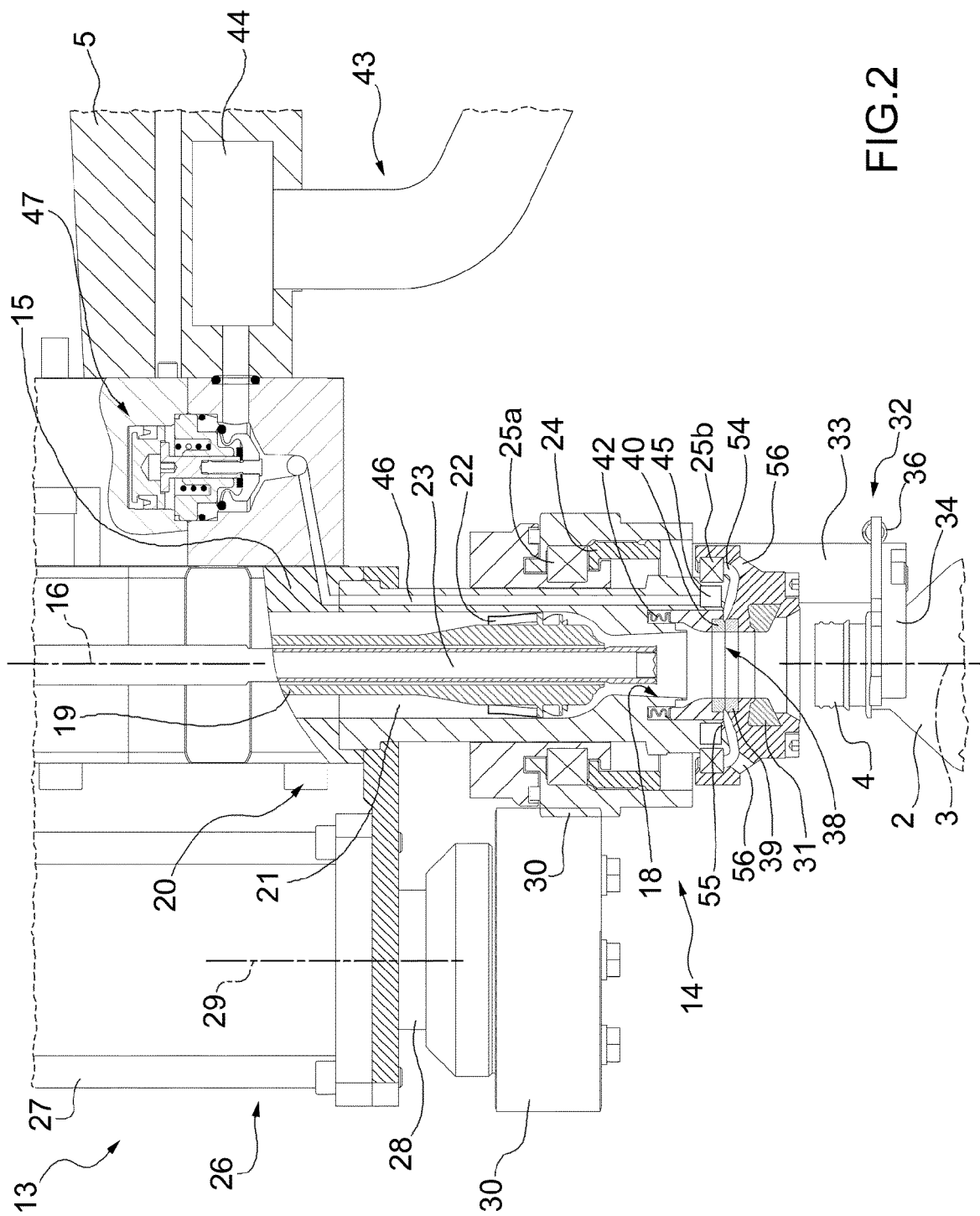
1. A machine for filling containers (2) comprising a conveying device (5) provided with a plurality of handling units (13), each of which is fed by the conveying device (5) along a given feeding path (P), and comprises a support device (32) for receiving and retaining a relative container (2) and a filling device (14) for feeding a pourable product into the container (2); the filling device (14) comprising a filling valve (20) and a filling head (24), which is configured to be coupled to the container (2) in a fluid-tight manner, and defines, together with the filling valve (20), a supply path for the pourable product into the container (2); the support device (32) and the filling head (24) being coupled in an angularly fixed manner to one another and being further coupled to the filling valve (20) in a rotary manner to rotate around a rotation axis (16); the filling device (14) comprising, furthermore, a mechanical gasket (38) for coupling the filling valve (20) and the filling head (24) to one another in a fluid-tight manner; the mechanical gasket (38) comprising a first ring (40) coupled in an angularly fixed manner to the filling valve (20) and a second ring (39) coupled in an angularly fixed manner to the filling head (24); and **characterized by** comprising, furthermore, a washing device (43) for washing the mechanical gaskets so as to remove the residuals of the pourable product from the mechanical gaskets (38) itself.
2. The machine as claimed in claim 1, wherein the filling head (24) is coupled to the filling valve (20) in a rotary manner by interposing at least a rolling bearing (25b); the washing device (43) being configured to wash the rolling bearings (25b) so as to remove the

residuals of the pourable product from the rolling bearings (25b) itself.

is coupled to the container (2) in a fluid-tight manner, and a rest position, in which the filling head (24) is spaced from the top neck (4) of the container (2).

3. The machine as claimed in claim 1 or 2, wherein the washing device (43) comprises, for each handling unit (13), a respective hydraulic circuit (45, 46, 54) to feed a washing liquid at least to the corresponding mechanical gasket (38), and a supply valve (47) to selectively control the supply of the washing liquid along the hydraulic circuit (45, 46, 54). 5
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4. The machine as claimed in claim 3, wherein the hydraulic circuit (45, 46, 54) comprises a first portion (46) obtained through the filling valve (20) and a second portion (54) obtained through the filling head (24). 15
5. The machine as claimed in claim 4, wherein the hydraulic circuit (45, 46, 54) comprises, furthermore, at least an aperture (56) obtained through the filling head (24) to connect the second portion (54) with the external environment. 20
6. The machine as claimed in claim 4 or 5, wherein the filling head (24) is coupled to the filling valve (20) in a rotary manner by interposing at least a rolling bearing (25b); the second portion (54) of the hydraulic circuit (45, 46, 54) having an annular shape, extending around the rotation axis (16), and being shaped so as to face the corresponding mechanical gasket (38), in particular the region between said first and second rings (40, 39), and the corresponding rolling bearing (25b). 25
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7. The machine as claimed in any one of the claims from 3 to 6, wherein the washing device (43) comprises, further, a manifold (44) connected with the hydraulic circuits (45, 46, 54) of the handling units (13). 35
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8. The machine as claimed in any one of the preceding claims, wherein the first ring (40) is further coupled in an axially displaceable manner to the filling valve (20); a push device (42) being arranged between the filling valve (20) and the first ring (40) to move, and normally maintain, the first ring (40) into contact with the second ring (39). 45
9. The machine as claimed in any one of the preceding claims, wherein the support device (32) comprises gripping means (34) acting upon a top neck (4) of a container (2) to retain it in a suspended position. 50
10. The machine as claimed in any one of the preceding claims, wherein the filling device (14) and the support device (32) are movable relative to one another between an operating position, in which the filling head (24) contacts a top neck (4) of the container (2) and 55





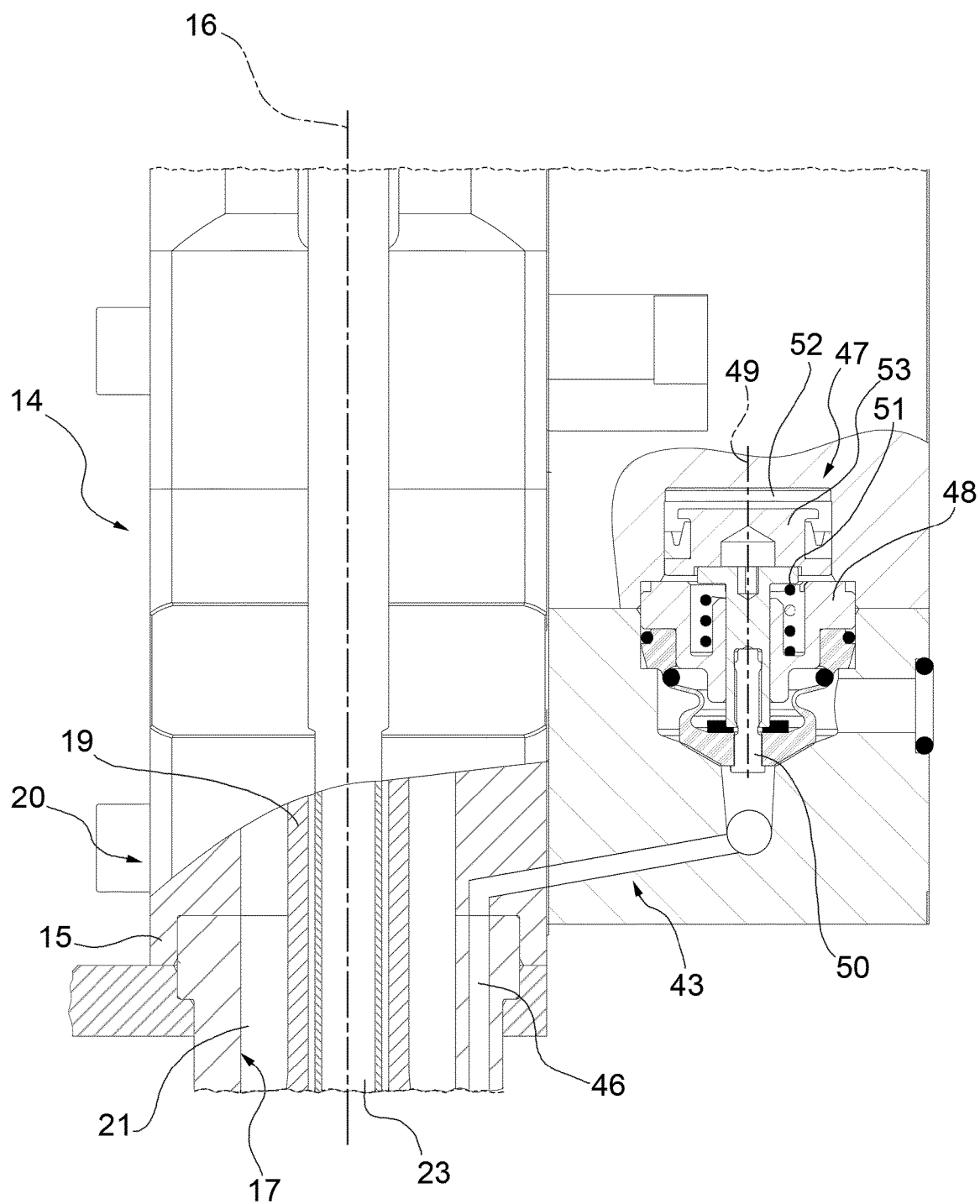


FIG.3

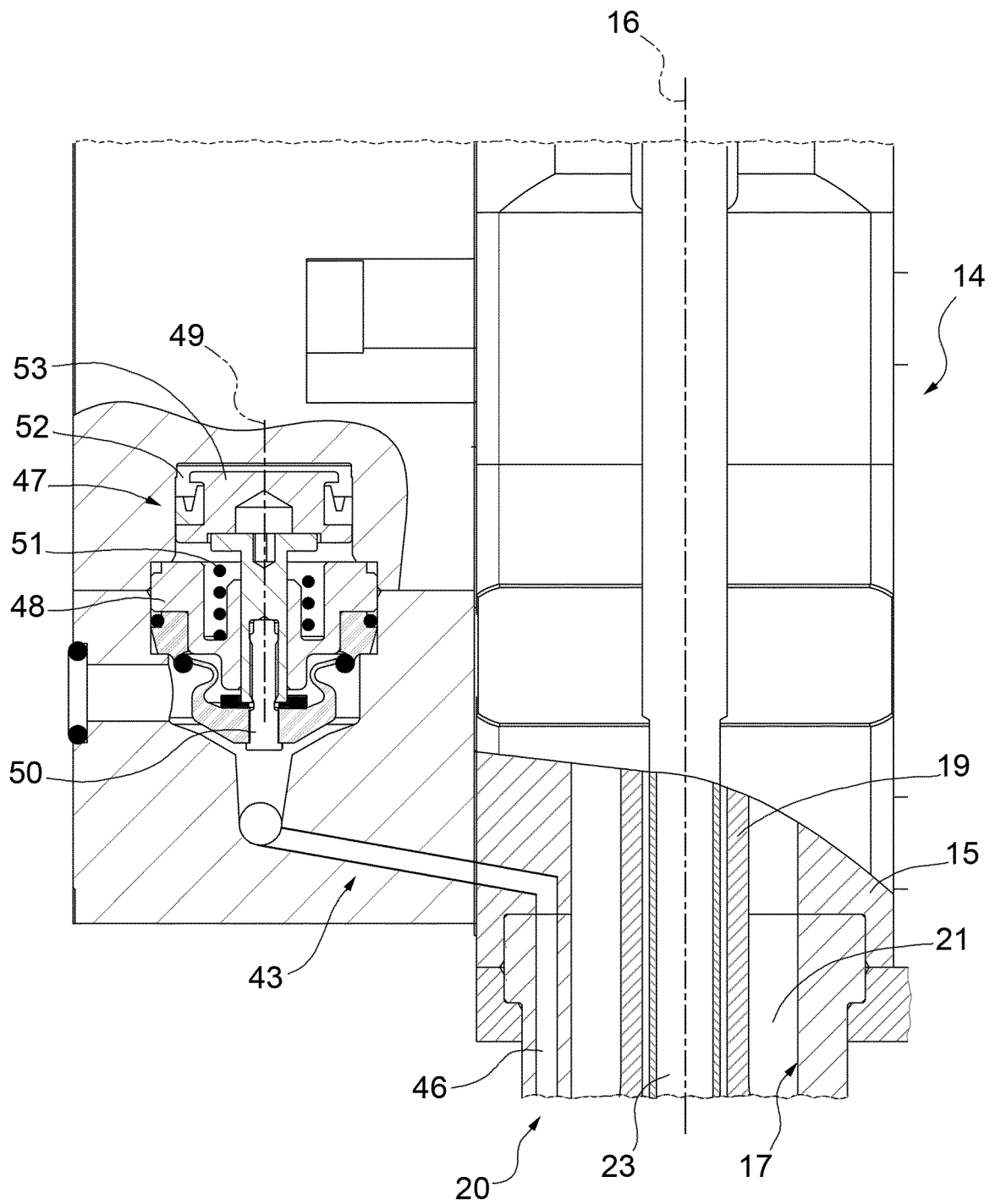


FIG.4

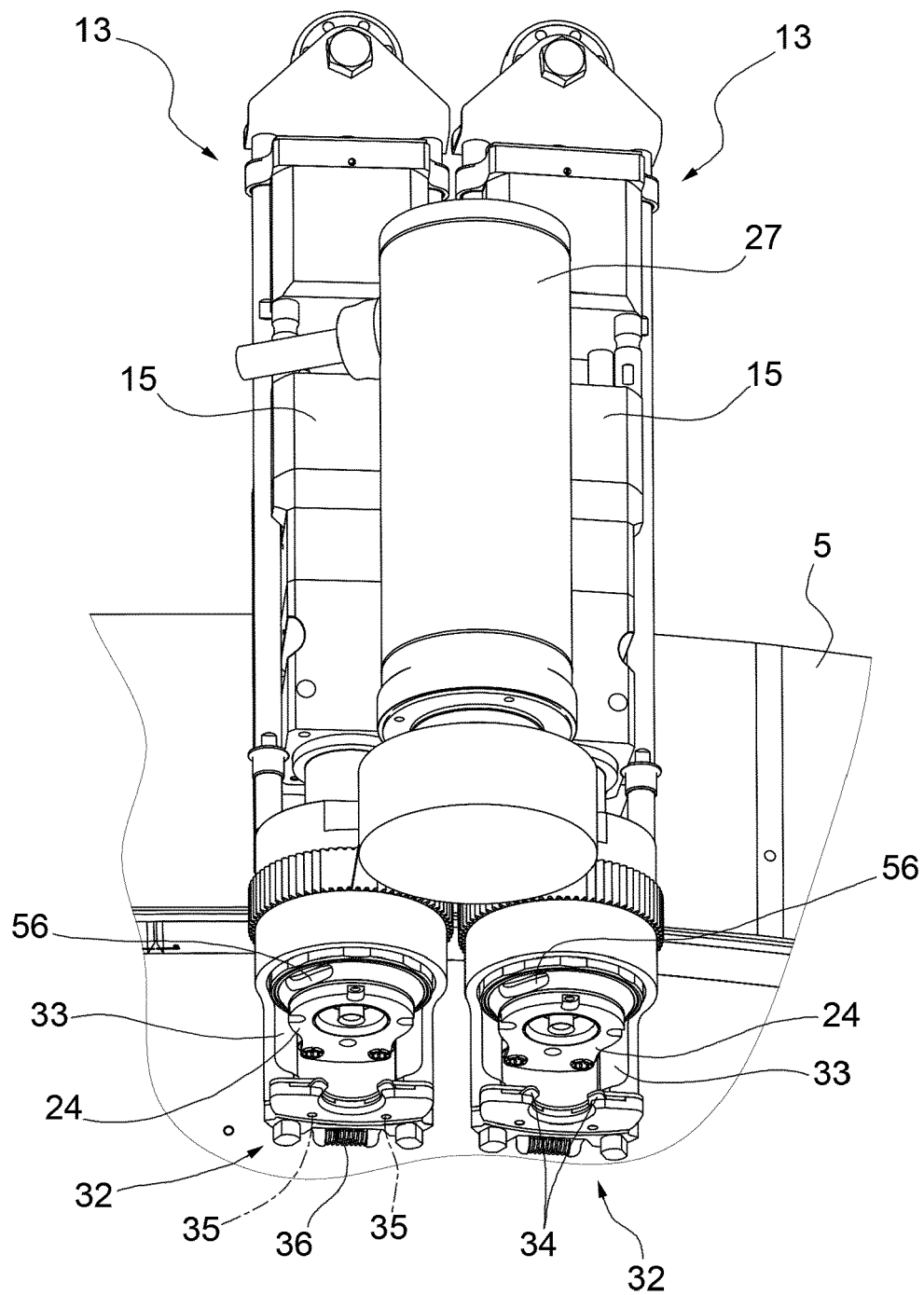


FIG.5



EUROPEAN SEARCH REPORT

Application Number
EP 15 30 6332

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B67C
Place of search		Date of completion of the search	Examiner
The Hague		2 February 2016	Pardo Torre, Ignacio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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