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(72) Inventor: **Spotti, Giovanni**
43036 Fidenza (Pharma) (IT)

(74) Representative: **Gotra, Stefano**
BUGNION S.p.A.
Largo Michele Novaro, 1/A
43121 Parma (IT)

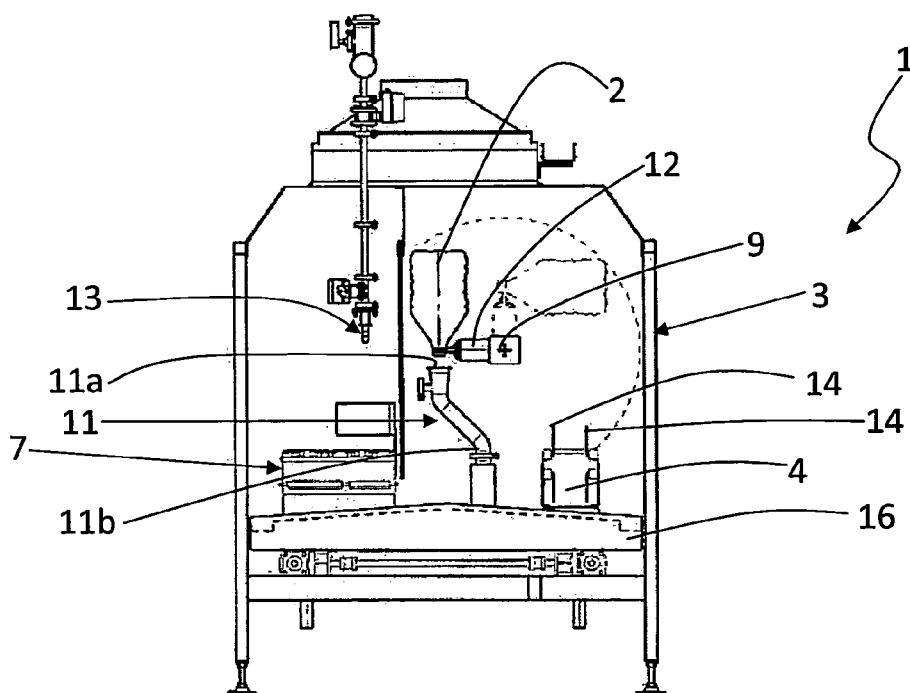
(71) Applicant: **R. Bardi S.r.l.**
43036 Fidenza (Parma) (IT)

(54) **Method and apparatus for filling and rinsing containers and integrated plant for blowing, rinsing and filling containers**

(57) Procedure for filling and rinsing containers (2) in an isolated cabin (3), comprising the following stages: advancing empty containers (2) with their mouths facing upwards along a main linear conveyor (4); rotating each container (2) through about 180° around a longitudinal axis in such a way that the mouth of the con-

tainer (2) reverts to facing downwards; rinsing the containers (2); rotating each container (2) through about 180° around a transverse axis in such a way that the mouth of the container (2) faces upwards; filling the containers (2) with a fluid.

FIG. 2



Description

[0001] The present invention has as its subject a procedure and an apparatus for filling and rinsing containers and an integrated plant for blowing, rinsing and filling containers. In particular, the procedure, the apparatus and the plant here proposed find application in the bottling sector for filling disposable containers of medium and medium - large format. It should be remembered that by containers of medium format we mean those having a capacity of between 5 litres and 12 litres, while by containers of large format we mean those having a capacity of between 12 litres and 30 litres.

[0002] As is well-known, the filling of containers of medium - large format can be performed either with rotary technology or with linear technology.

[0003] While they have the advantage of high hourly output, rotary fillers present considerable problems in terms of bulk, maintenance, format changes and hygienic safety. In fact, the diameter of the filling carousel grows with each increase in the capacity, and therefore the diameter, of the containers to be filled. Rotary fillers also feature numerous and complex mechanisms, which cause considerable difficulties with maintenance operations, sanitizing and format changes (think of the large number of devices, such as stars, screws etc.).

[0004] The combination, too, of a forming machine (blower) with a rotary filling machine is already known, for example from the document WO 2010/013201.

[0005] On the other hand, notwithstanding their low hourly output, linear fillers present considerable advantages in terms of bulk, maintenance, format changes and hygienic safety. In fact, by its very nature, the linear filler is narrower and more compact. In addition, its greater structural simplicity and smaller number of mechanical devices facilitate maintenance operations, format changes and sanitizing. In fact, the smaller number of devices used in the linear filler compared with the rotary filler means a reduction in the sources of contamination present in the filling cabin.

[0006] The applicant has already developed a linear filling apparatus (patent application PCT/IT2007/00-0883) for containers of medium - large format in which the filling stations were displaced transversely with respect to the longitudinal axis along which the empty containers are fed. In this way, the high hourly outputs typical of rotary technology (over 6000 containers per hour) were achieved while using linear technology.

[0007] However, the main disadvantage of the solution just cited, and of current rotary filling apparatuses is linked to the fact that the filling apparatus must be connected to at least one external apparatus for treating the containers in such a way as to carry out hygienic treatment operations (rinsing, for example) on the containers before filling.

[0008] In this context, the technical task at the base of the present invention is to propose an integrated blowing, rinsing and filling plant, a process and an apparatus for

filling and rinsing containers, which will overcome the above-mentioned drawbacks of the known art mentioned above.

[0009] In particular, an object of the present invention is to eliminate the above-mentioned disadvantages and to make available an apparatus for filling and rinsing containers and an integrated blowing, rinsing and filling plant which are structurally simple and compact. The declared technical task and the specified objects are substantially achieved by a procedure and apparatus for filling and rinsing containers and by an integrated blowing, rinsing and filling plant, comprising the technical characteristics set forth in one or more of the attached claims.

[0010] Additional characteristics and advantages of the present invention will become more readily apparent from the indicative, and hence non limiting, description of a preferred but not exclusive embodiment of a procedure and an apparatus for filling and rinsing containers, and of a bottling plant, as illustrated in the accompanying drawings in which:

- figure 1 illustrates a first embodiment of an apparatus for filling and rinsing containers, according to the present invention, in a first operating stage and in frontal view;
- figure 2 illustrates the apparatus of figure 1, in a second operating stage and in frontal view;
- figure 3 illustrates the apparatus of figure 1, in a third operating stage and in frontal view;
- figure 4 illustrates the apparatus of figure 1, in a fourth operating stage and in frontal view;
- figures 5, 6, 7 and 8 illustrate the apparatus of figure 1 respectively in the four operating stages of figures 1, 2, 3 and 4, on plan;
- figure 9 illustrates a second embodiment of the apparatus of figure 1, in the first operating stage and in frontal view;
- figure 10 illustrates the apparatus of figure 9, in the second operating stage and in frontal view;
- figure 11 illustrates the apparatus of figure 9, in the third operating stage and in frontal view;
- figure 12 illustrates the apparatus of figure 9, in the fourth operating stage and in frontal view;
- figures 13, 14, 15 and 16 illustrate the apparatus of figure 9 respectively in the four operating stages of figures 9, 10, 11 and 12, on plan;
- figure 17 is a more detailed version (in which the nozzles are visible) of the apparatus of figure 10;
- figure 18 illustrates an integrated blowing, rinsing and filling plant according to the present invention, on plan;
- figure 19 illustrates the integrated plant of figure 18, in a side view.

[0011] With reference to the illustrations, number 1 indicates a filling and rinsing apparatus for containers 2. For example, these containers 2 are bottles in plastic (PET) of medium or large format. The apparatus 1 com-

prises an isolated cabin 3. Preferably, this isolated cabin 3 forms a pressurized chamber inside which contamination is maintained below a predetermined level.

[0012] The apparatus 1 comprises a main linear conveyor 4, suitable for linearly moving a plurality of empty containers 2 arranged in a first configuration in which they have their mouths facing upwards. In particular, the containers 2 are fed to the main linear conveyor 4 in a row, i.e. one after the other. The main linear conveyor 4 comprises at least one belt carrying a plurality of fingers 14 (also designated 'clamps') spaced a preset distance apart and operatively active on the containers 2 to advance them in a direction of processing (parallel to the axis of extension of the main linear conveyor 4 or coinciding with this axis). In particular, this preset spacing distance is determined on the basis of the diameter of the containers 2, in such a way as to allow holding calipers 8 to grip each container 2 by its neck. Preferably, there are two belts connected to corresponding pulleys or wheels and a motor drive 15 operatively active on these belts to move them in such a way as to advance the containers 2 in the direction of processing. In particular, the two belts are parallel in such a way as to form a plurality of pairs of fingers 14 fixed onto the respective belts and transversely aligned, i.e. perpendicularly to the direction of processing. In this way, each container 2 is thrust by a pair of fingers 14 in such a way as to allow the corresponding holding calipers 8 to grip it by the neck.

[0013] The apparatus 1 comprises movement means 8, 9, operatively active on the containers 2 to bring them from the first configuration to a second configuration in which their mouths are facing downwards and they are arranged along at least one treatment line 5 parallel to the main linear conveyor 4. In particular, these movement means 8, 9 comprise a rotating bar 9 having an extension substantially parallel to the main linear conveyor 4. For example, this bar 9 consists of a tubular body or a shaft rotating around its own axis of longitudinal extension. In particular, the bar 9 can perform a rotation through about 180° around its longitudinal axis in such a way as to bring the containers 2 from the first to the second configuration. The bar 9 carries a plurality of holding calipers 8 (already mentioned above) suitable for gripping the containers 2 by the neck.

[0014] The apparatus 1 comprises rinsing means 10, 11, operatively active on the containers 2 placed in the second configuration along the treatment line 5 to rinse them. In this context, the term 'rinsing' must be taken to mean either an operation of washing or an operation of removing dust (also known by the English term "dedusting"). Preferably, rinsing means 10, 11 include a plurality of nozzles 10 and an equal number of collecting ducts 11 (see figure 17). The nozzles 10, of known type, (penetrating or external), are suitable for delivering a rinsing fluid. The collecting ducts 11 are positionable below the treatment line 5 in such a way as to receive the used rinsing fluid (see figures 2 and 6). In particular, each of these collecting ducts has two ends: a first end 11a, open

for receiving drops of used fluid and a second end 11b communicating with a drain tank (not illustrated). Each collecting duct 11 is rotatably pivoted on a support surface 16 on the apparatus 1 adjacent to said second end 11b. In this way, each collecting duct 11 is movable by rotation through about 90° between a first position in which this first end 11a is centred lower than the mouth of container 2 which is to be rinsed, and a second position in which this first end 11a is brought towards the main linear conveyor 4 in such a way that the duct 11 does not interfere with the subsequent movement and with the filling of the relative container 2.

[0015] The apparatus 1 is provided with second movement means 8, 12, operatively active on containers 2 to bring them back to the first configuration and arrange them along at least one filling line 6 parallel to the main linear conveyor 4. In the embodiments here described and illustrated, these second movement means 8, 12 are formed by the calipers 8 and by arms 12 supporting the calipers 8 themselves. In particular, the calipers 8 are supported rotatably by the arms 12, which are in their turn integral with the bar 9. In this way, the calipers 8 are free to rotate through about 180° around a transverse axis. Preferably, the transverse axis around which the calipers 8 rotate is the axis of arms 12. Each caliper 8 is movable between a closed position in which it grips the relative container 2 by the neck, and an open position in which it avoids interfering with the container 2 itself.

[0016] In a first embodiment described and illustrated in figures 1 to 8, the bar 9 is translatable transversely to its longitudinal axis in such a way that the containers 2 are carried on at least one lateral linear conveyor 7 parallel to the main linear conveyor 4. This translation is made possible thanks to the presence of transverse guides 17 on which opposed ends of the bar 9 run. The movement of the bar 9, both in translation along the transverse guides 17 and in rotation around its longitudinal axis, is effected by electrical, mechanical or pneumatic movement systems of known type. In an alternative embodiment, not illustrated, each of the arms 12 is slidably coupled to a hollow cylindrical body, inside which a cylinder carrying one of the calipers 8 is rotatably movable. In particular, each caliper 8 is slidably mounted on the corresponding cylinder. This cylinder can pass from a retracted configuration in which the container 2 supported by the caliper 8 is inverted or rinsed, to an extended configuration in which the container 2 is carried on the lateral linear conveyor 7 adjacent to filling means 13. The movement of the cylinders inside the hollow cylindrical bodies is effected by electrical, mechanical or pneumatic movement systems of known type.

[0017] The containers 2, carried along the filling line 6 (see figure 8), are filled with a fluid substance, typically a drink, through filling means 13 consisting of nozzles. Preferably, the lateral linear conveyor 7 comprises a pair of belts 19a, 19b parallel to each other and to the main linear conveyor 4. In particular, a first belt 19a is arranged below the filling nozzles 13 to form the filling line 6, while

a second belt 19b is located externally alongside the first belt 19a. Preferably, above the first belt 19a there is a plurality of strips 18 which alternate with the filling nozzles 13. These strips 18 are oriented in such a way as to form an angle of about 45° with respect to the longitudinal axis of the first belt 19a (considered in the direction of movement of the containers 2). In this way the strips 18 form guide elements capable of deviating the trajectory of the containers 2, transferring them to the exit in order to move them from the first belt 19a to the second belt 19b.

[0018] Advantageously, the height of the support surface 16 with respect to the ground can be varied by adjustment means (for example by motorized means controlled by PLC), in such a way as to make format changes possible. Since the main linear conveyor 4 and the lateral linear conveyor 7 are integral with the support surface 16, they too as a result are vertically movable away from or towards the filling means 13.

[0019] Preferably, the apparatus 1 conforming to the first embodiment has a use in low-speed applications (up to 2000 containers per hour).

[0020] Figures 9 to 16 illustrate a second embodiment of the apparatus 1, which provides for the presence of two lateral linear conveyors 7a and 7b, both integral with the support surface 16, between which the main linear conveyor 4 is interposed. In this case, the first movement means 8, 9 comprise two rotating bars 9a, 9b having extension substantially parallel to the main linear conveyor 4. Each bar 9a, 9b carries a plurality of calipers 8 for holding the containers 2. In particular, a first bar 9a and its calipers 8 are operatively active on a first group of containers 2 to bring them from the first to the second configuration and arrange them along a first treatment line 5a. A second bar 9b and its calipers 8 are operatively active on a second group of containers 2 to bring them from the first to the second configuration and arrange them along a second treatment line 5b. The first treatment line 5a and the second treatment line 5b are parallel to each other.

[0021] Each bar 9a, 9b can perform a rotation through about 180° around its longitudinal axis in such a way as to bring the relative group of containers 2 from the first to the second configuration.

[0022] In addition, the two bars 9a, 9b are translatable transversely to their longitudinal axis, in such a way that the first group of containers 2, after having been rotated through about 180° around a transverse axis, is brought onto the first lateral linear conveyor 7a and the second group of containers 2 is brought onto the second lateral linear conveyor 7b.

[0023] The rinsing means 10, 11 include two series of nozzles 10 and two series of collecting ducts 11. In particular, a first series of collecting ducts 11 is positionable below the first treatment line 5a, while a second series of collecting ducts 11 is positionable below the second treatment line 5b.

[0024] Preferably, both the lateral linear conveyors 7a, 7b comprise a pair of belts 19a, 19b parallel to each other

and to the main linear conveyor 4.

[0025] Preferably, the apparatus 1 conforming to the second embodiment has a use in applications at speeds of between 2000 and 6000 containers per hour.

[0026] Figures 18 and 19 illustrate an integrated blowing, rinsing and filling plant 100 comprising an apparatus 20 for forming by blowing and, downstream from this, the apparatus 1 for filling and rinsing containers 2. The apparatus 20 for forming by blowing (linear, for example) is operatively active on parisons in plastic to transform them into containers 2 according to an already-known procedure. The containers 2 that are formed are delivered directly, i.e. avoiding the use of screws, stars or other intermediate elements, by the forming apparatus 20 to the main linear conveyor 4 for the filling and rinsing apparatus 1. The containers 2 are then advanced in the direction of processing by the fingers 14 or clamps.

[0027] In figures 18 and 19, the plant 100 uses a filling and rinsing apparatus 1 according to the first embodiment, i.e. with a single linear conveyor 7 parallel to the main conveyor 4. Alternatively, the plant 100 uses a filling and rinsing apparatus 1 as in the second embodiment, i.e. with two lateral linear conveyors 7a, 7b

[0028] The procedure for filling and rinsing containers, according to the present invention, is described below with reference to the first embodiment.

[0029] The empty containers 2, arranged in the first configuration, are fed to the main linear conveyor 4, which advances them in the direction of processing by means of the fingers 14. The main linear conveyor 4 stops in such a way that the containers 2 come to occupy corresponding picking up stations (see figures 1 and 5). The containers 2, located in the picking up stations, are gripped by the neck by the corresponding calipers 8. The containers 2 are then inverted in such a way as to assume the second configuration. In particular, the bar 9 rotates through about 180° around its longitudinal axis, so that the containers 2 also perform a rotation of about 180° and are arranged along the treatment line 5 (see figures 2 and 6).

[0030] At this point, the containers 2 undergo a rinsing treatment. In fact, the nozzles 10 deliver rinsing fluid into the inside of the containers 2, and the collecting ducts 11, arranged in the first position, receive drops of used rinsing fluid.

[0031] The containers 2 are then once more inverted in such a way as to be brought back to the first configuration (see figures 3 and 7) and arranged along the filling line 6 (see figures 4 and 8). To this end, the calipers 8 rotate through about 180° around the transverse axis of the arms 12 so that the containers 2 also perform a rotation through about 180°. The containers 2 are then sent to the first belt 19a of the lateral linear conveyor 7 in such a way as to be arranged along the filling line 6. This movement is made possible by the transverse translation of the bar 9 towards the first belt 19a. Alternatively, this movement is made possible by the sliding of the cylinders inside the hollow cylindrical bodies.

[0032] It should be noted that, to avoid interference with the further movements of the containers 2, the collecting ducts 11 are brought into the second position.

[0033] The containers 2 are then filled with the fluid delivered by the filling nozzles 13.

[0034] During the filling stage, the calipers 8 remain in closed position around the necks of the containers 2 at least for a preset interval of time in such a way as to guarantee the stabilization of the containers 2 until the level of fluid introduced into the containers 2 themselves is sufficient to guarantee their stability by itself.

[0035] The full containers 2 are released by the calipers 8 and sent to the exit of the isolated cabin 3 by means of the strips 18, which deviate the trajectory of the containers 2 in order to displace them from the first belt 19a to the second belt 19b.

[0036] The stage of filling a plurality or row of containers 2 at least partially overlaps with the stage of advancing another plurality or row of empty containers 2 along the main linear conveyor 4.

[0037] Preferably, the apparatus 1 conforming to the first embodiment has a use in low-speed applications (up to 2000 containers per hour).

[0038] In the second embodiment, the procedure is altogether similar to the one just described for the first embodiment, but halved for the management of the first and second groups of containers 2.

[0039] Preferably, the apparatus 1 conforming to the second embodiment has a use in high-speed applications (from 2000 to 6000 containers per hour).

[0040] The characteristics of the procedure and apparatus for filling and rinsing containers and of the integrated blowing, rinsing and filling plant, according to the present invention, are clear from the description given above, as also are the advantages.

[0041] In particular, thanks to the fact that the rinsing of the containers is carried out during their movement towards the filling line, the proposed apparatus is able to perform both the filling and the rinsing function, avoiding the need to provide a further apparatus for rinsing independently of the filling line. In this way, the overall dimensions are reduced by comparison with the known solutions, and the proposed apparatus is structurally simple and compact.

[0042] Furthermore, in order to fully exploit the potential of linear technology, rinsing has been inserted as an intermediate stage during the double rotation of the containers, in such a way that the dead times of the operation of the apparatus are reduced.

[0043] This characteristic, together with the fact that the filling of the containers is performed laterally with respect to the main linear conveyor, enables the apparatus to reach hourly outputs typical of rotary technology (up to 6,000 5-litre containers per hour) while using linear technology. In fact, some stages of the filling procedure can be overlapped: for example, as we have seen, while a new row of containers is advanced along the main linear conveyor, another row of containers is in process of being

filled.

[0044] Furthermore, thanks to the possibility of automatically (through management by PLC) varying the height of the support surface and the stopping point of the clamps, format-changing operations are fast and do not require any changing of components.

[0045] In addition, in one of the embodiments the transverse movement of the containers is effected by the translation of the bar or bars, which greatly simplifies maintenance and control operations by comparison with known art solutions.

[0046] Finally, the proposed integrated plant is structurally simple and compact because it specifies the direct coupling of a blowing plant to the main linear conveyor of the filler/rinser, thus avoiding the provision of intermediate elements such as screws and stars.

Claims

1. Procedure for filling and rinsing containers (2) in an isolated cabin (3), **characterized by** comprising the following stages:

feeding to a main linear conveyor (4) a plurality of empty containers (2) arranged in a first configuration in which they have their mouths facing upwards;

inverting the containers (2) in such a way that they assume a second configuration in which their mouths are facing downwards and they are arranged along at least a treatment line (5) parallel to the main linear conveyor (4);

performing a treatment of rinsing the containers (2) placed in the second configuration along said at least one treatment line (5);

inverting the containers (2) once more in such a way as to bring them back to the first configuration and

arrange them along at least one filling line (6) parallel to said main linear conveyor (4);

filling the containers (2) positioned along the filling line (6);

transporting the full containers (2) leaving said isolated cabin (3) along at least one lateral linear conveyor (7) parallel to the main linear conveyor (4).

2. Procedure according to claim 1, wherein the stage of inverting the containers (2) consists in rotating each container (2) through about 180° around a longitudinal axis.

3. Procedure according to claim 1 or 2, wherein the stage of inverting the containers (2) once more consists in rotating each container (2) through about 180° around a transverse axis.

4. Procedure according to any one of the preceding claims, wherein the stage of transporting the full containers (2) leaving said isolated cabin (3) comprises a stage of deviating the trajectory of the containers (2) to displace them laterally away from a first belt (19a) forming the lateral linear conveyor (7), towards a second belt (19b), this too forming the lateral linear conveyor (7).
5. Procedure according to any one of the preceding claims, wherein the stage of inverting the containers (2) consists in bringing a first group of containers (2) into the second configuration along a first treatment line (5a) and bringing a second group of containers (2) into the second configuration along a second treatment line (5b), said first and said second treatment lines (5a, 5b) being parallel to each other.
6. Procedure according to claim 5, wherein the stage of inverting the containers (2) once more consists in bringing them into the first configuration and arranging said first group of containers (2) along a first filling line (6a) and said second group of containers (2) along a second filling line (6b), said first and said second filling lines (6a, 6b) being parallel to each other.
7. Procedure according to claim 6, wherein the stage of transporting the full containers (2) leaving the isolated cabin (3) consists in sending them to a first lateral linear conveyor (7a) and to a second lateral linear conveyor (7b), both being parallel to the main linear conveyor (4) which is interposed between said lateral linear conveyors (7a, 7b).
8. Apparatus (1) for filling and rinsing containers (2), **characterized by** comprising, in combination:
 - a main linear conveyor (4) suitable for linearly moving a plurality of empty containers (2) arranged in a first configuration in which they have their mouths facing upwards;
 - first movement means (8, 9) for said containers (2) for bringing them from said first configuration to a second configuration in which their mouths are facing downwards and they are arranged along at least one treatment line (5) parallel to the main linear conveyor (4);
 - rinsing means (10, 11) operatively active on the containers (2) placed in the second configuration along said at least one treatment line (5) to rinse them;
 - second movement means (8, 12) for containers (2) to bring them back to the first configuration and arrange them along at least one filling line (6) parallel to the main linear conveyor (4);
 - filling means (13) operatively active on the containers (2) positioned along the filling line (6) for filling them with a fluid substance.
9. Apparatus (1) according to claim 8, wherein said first movement means (8, 9) for the containers (2) comprise a rotating bar (9) having extension substantially parallel to said main linear conveyor (4) and carrying a plurality of calipers (8) suitable for gripping the containers (2) by the neck, said bar (9) rotating through about 180° around its longitudinal axis in such a way as to bring the containers (2) from the first to the second configuration.
10. Apparatus (1) according to claim 8 or 9, wherein said rinsing means (10, 11) comprise a plurality of nozzles (10) suitable for delivering a rinsing fluid, and an equal number of collection ducts (11) positionable below the treatment line (6) in such a way as to receive the used rinsing fluid.
11. Apparatus (1) according to claims 9 or 10, wherein said calipers (8) are supported rotatably by arms (12) integral with said bar (9) in such a way that said calipers (8) can rotate through about 180° around a transverse axis, said calipers (8) and said arms (12) forming the second movement means (8, 12) for the containers (2).
12. Apparatus (1) according to claims 9 to 11, wherein said bar (9) is translatable transversely to its longitudinal axis in such a way that the containers (2) are carried on at least one lateral linear conveyor (7) parallel to the main linear conveyor (4).
13. Apparatus (1) according to claim 11, wherein each of said arms (12) comprises a hollow cylindrical body inside which a cylinder carrying one of said calipers (8) is slidably movable, said cylinder passing from a retracted configuration in which the container (2) supported by the caliper (8) is inverted or rinsed, to an extended configuration in which the container (2) is carried on at least one lateral linear conveyor (7) parallel to the main linear conveyor (4).
14. Apparatus (1) according to claims 8 to 13, comprising furthermore a support surface (16) and means of adjusting the height of the support surface with respect to the ground, said main linear conveyor (4) and said at least one lateral linear conveyor (7) being integral with the support surface (16) in such a way as to be vertically movable away from or towards filling means (13) depending on the height of the containers (2).
15. Apparatus (1) according to claims 8 to 14, wherein said main linear conveyor (4) is provided with at least one belt carrying a plurality of fingers (14) spaced a preset distance apart and operatively active on said containers (2) to advance them in a direction of

processing.

16. Integrated blowing, rinsing and filling plant (100) for containers (2) comprising an apparatus (20) for forming by blowing, operatively active on parisons in plastic to transform them into said containers (2), **characterized by** comprising an apparatus (1) for filling and rinsing containers (2) according to claim 15, located downstream from said apparatus (20) for forming by blowing, in such a way that the containers (2) formed are delivered directly by it, i.e. avoiding the use of screws, stars or other intermediate elements, to said main linear conveyor (4) whose fingers (14) bring about the advancement of the containers (2) themselves in the direction of processing.

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FIG. 1

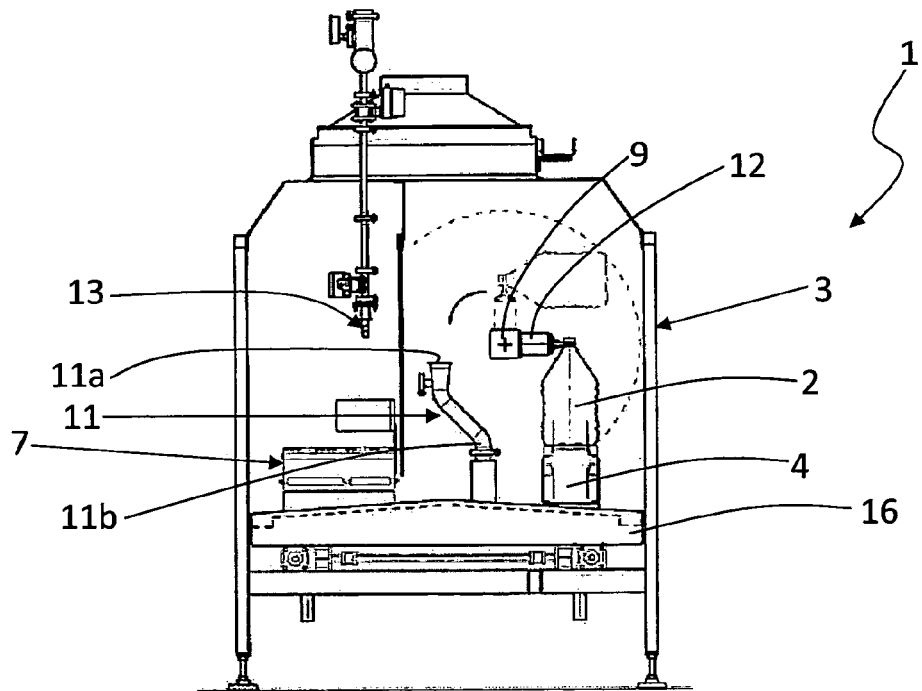


FIG. 2

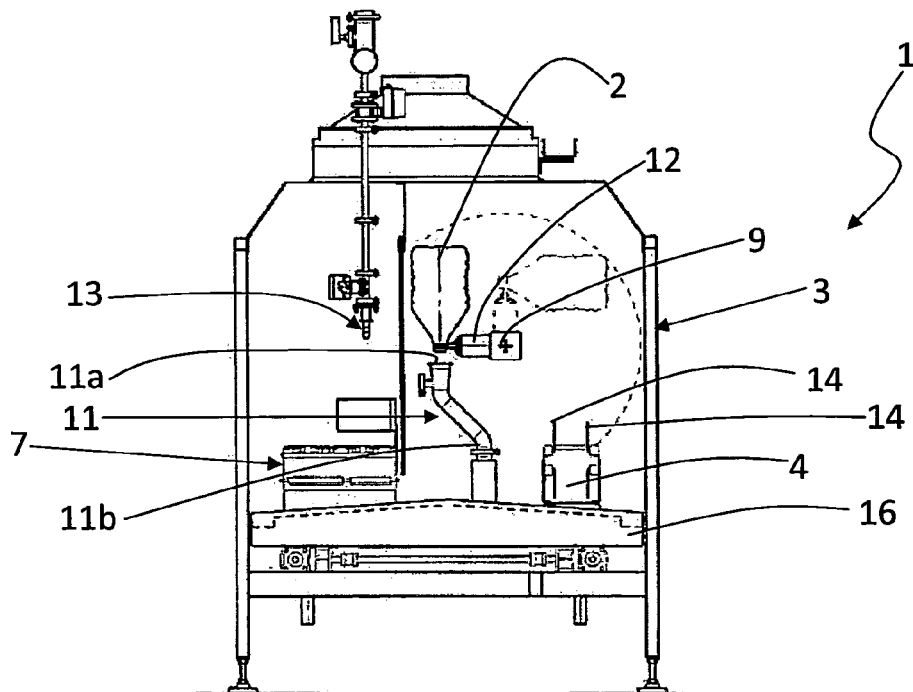


FIG. 3

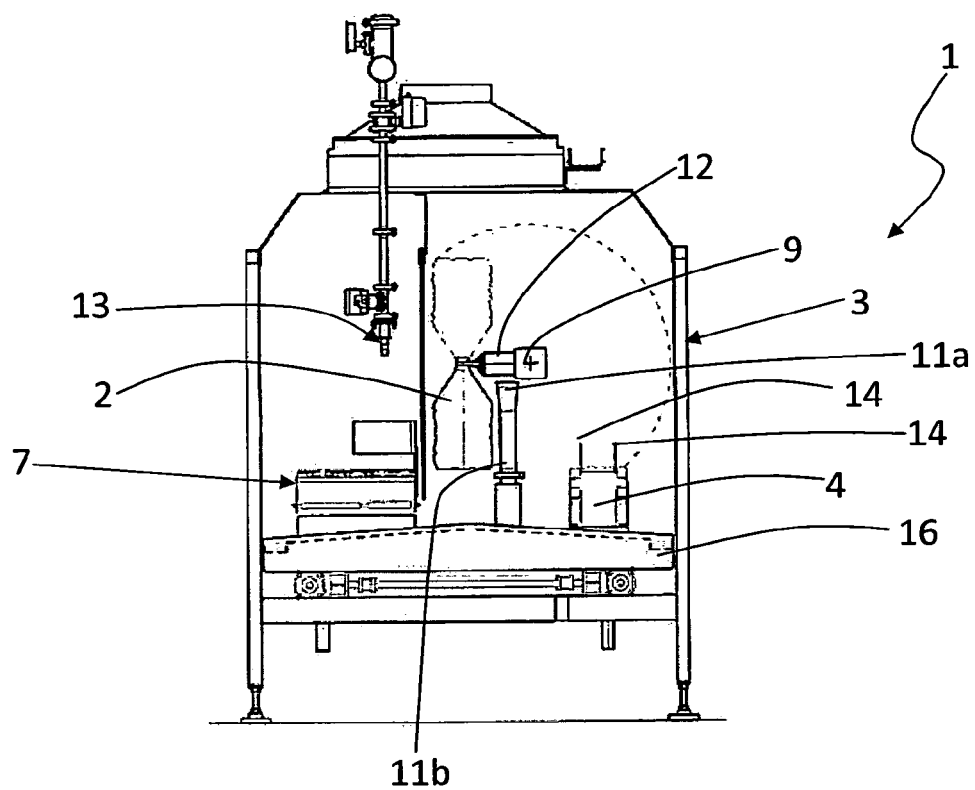
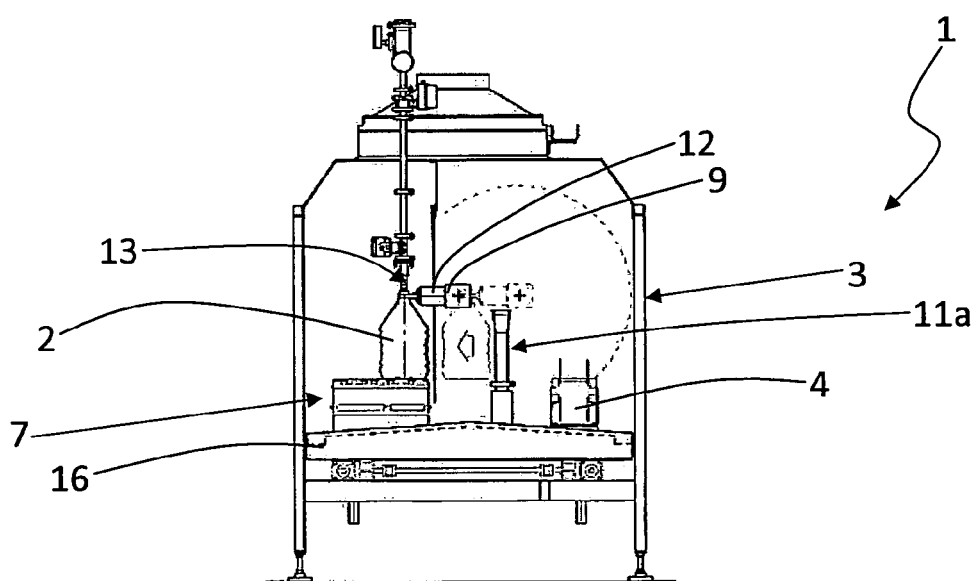


FIG. 4



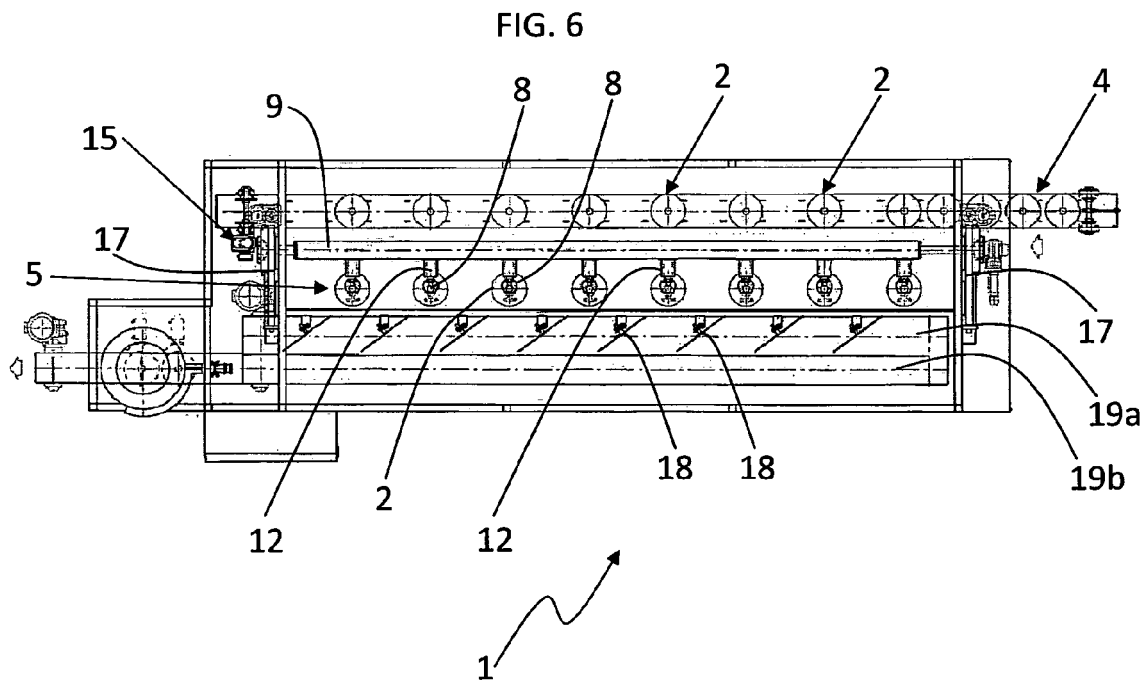
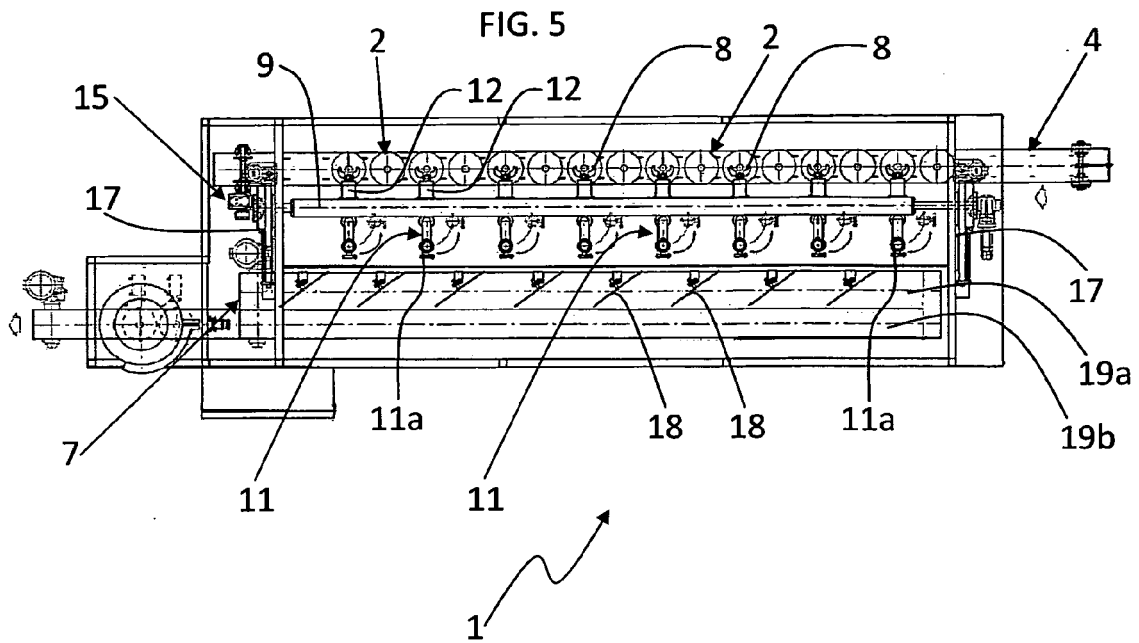


FIG. 7

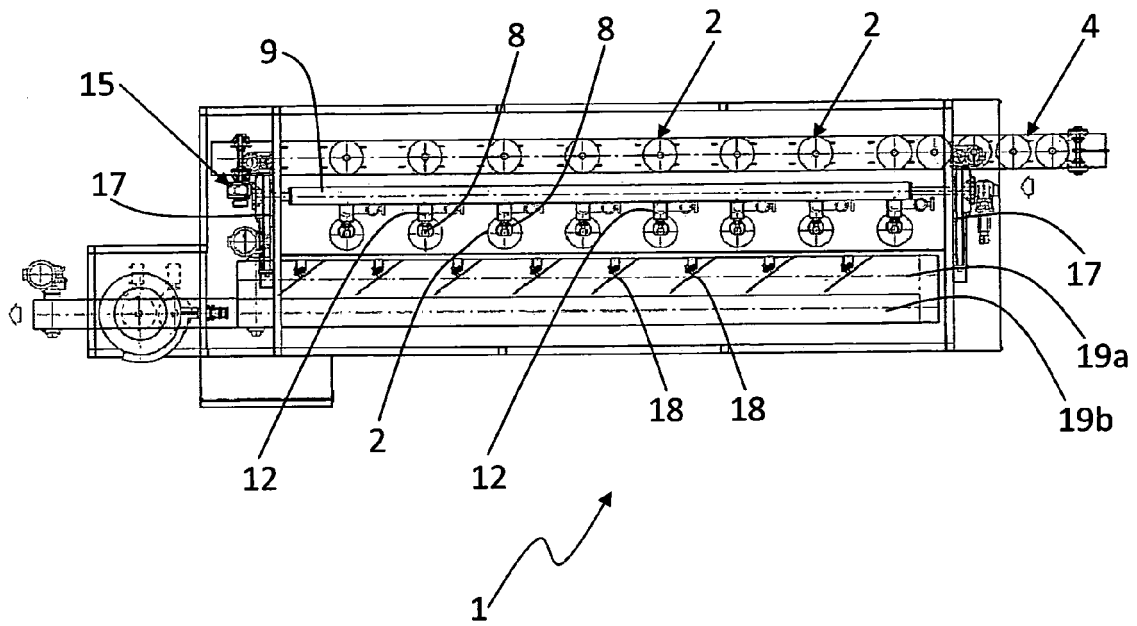


FIG. 8

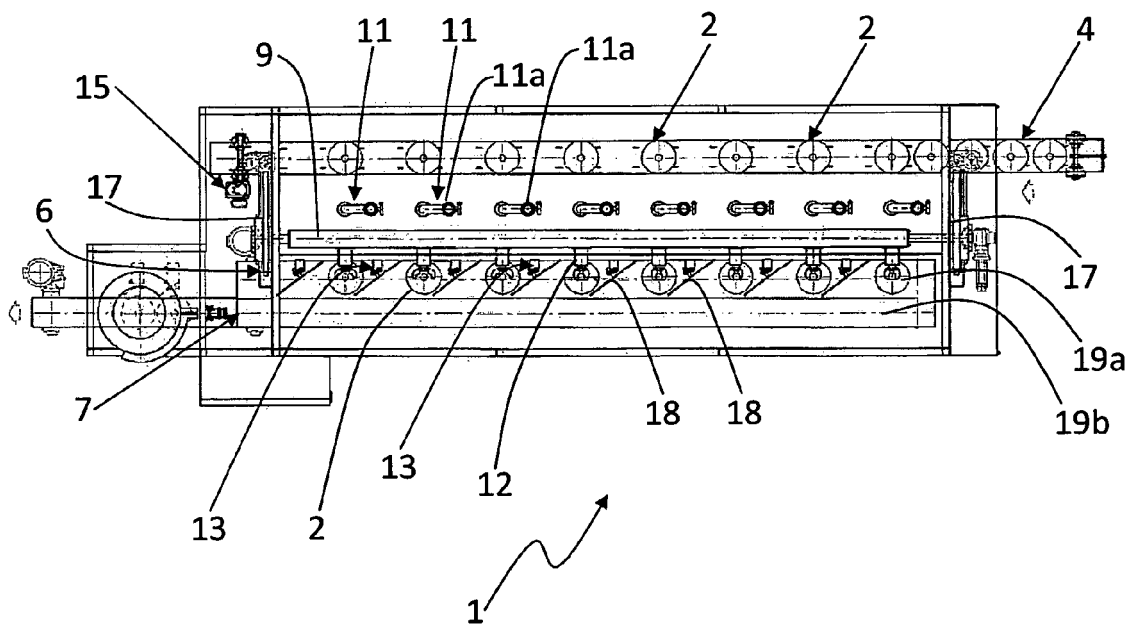


FIG. 9

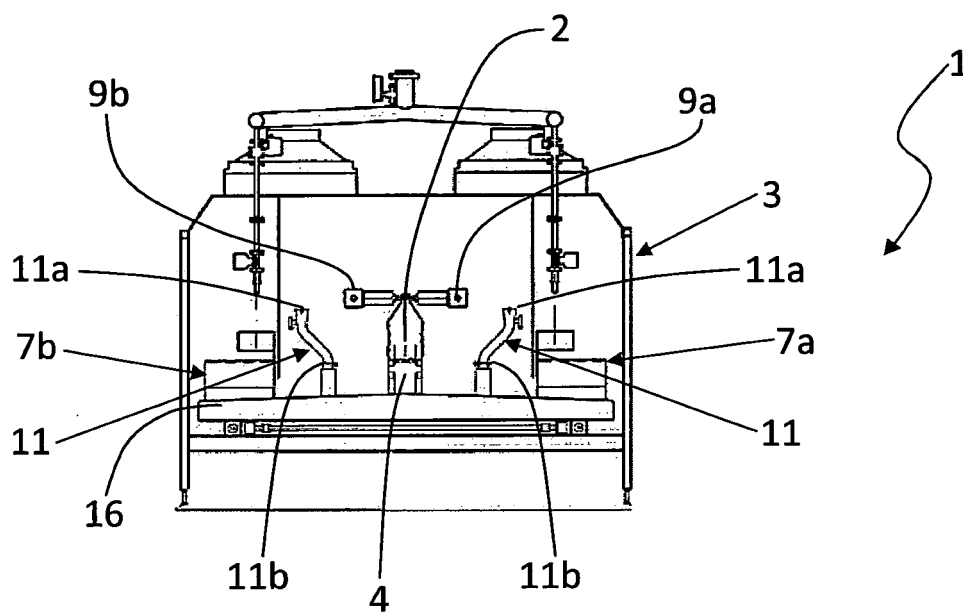


FIG. 10

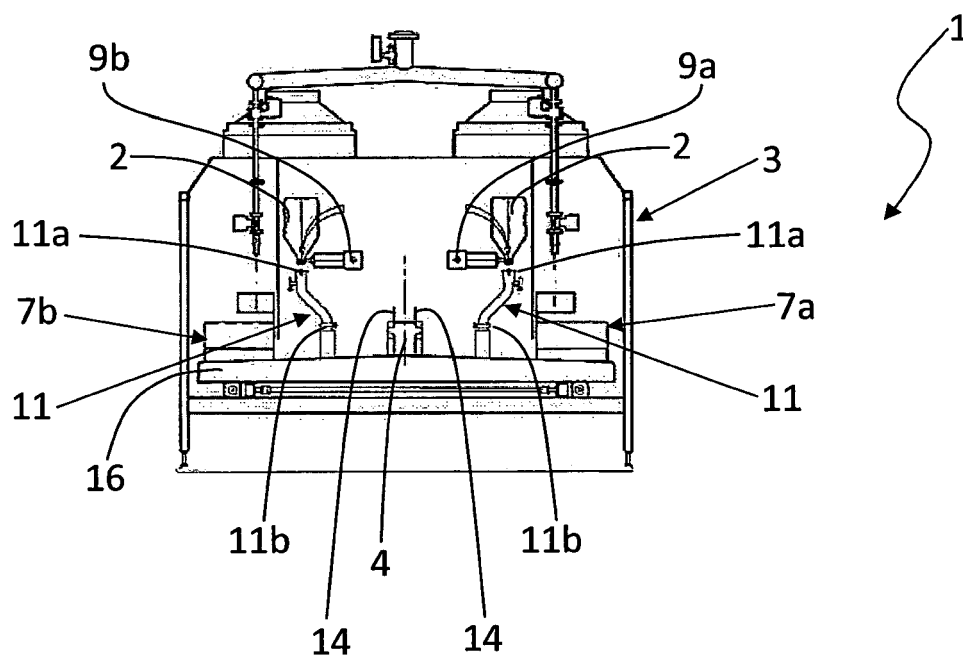


FIG. 11

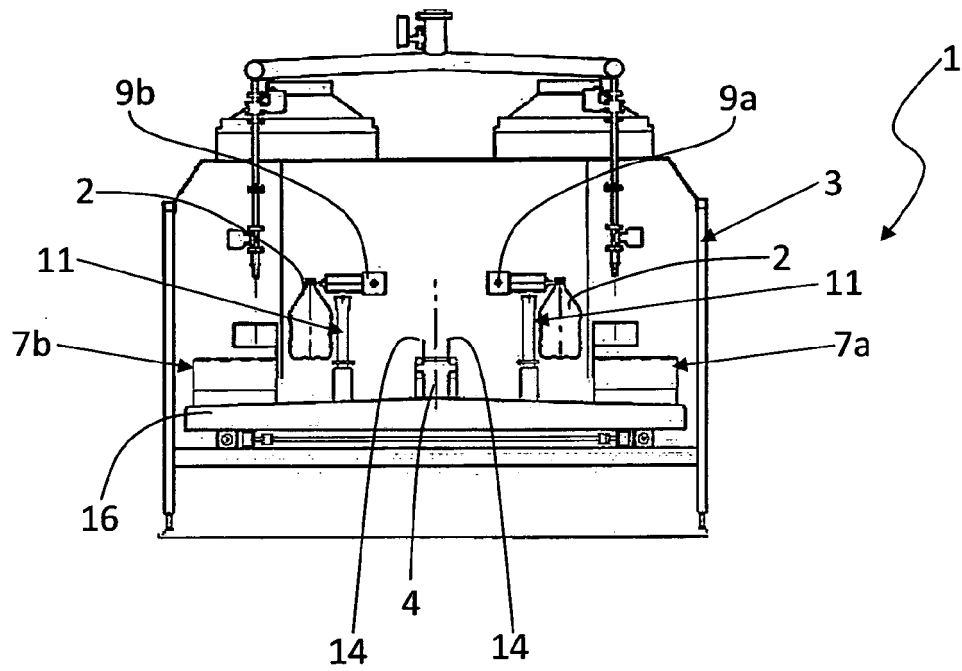


FIG. 12

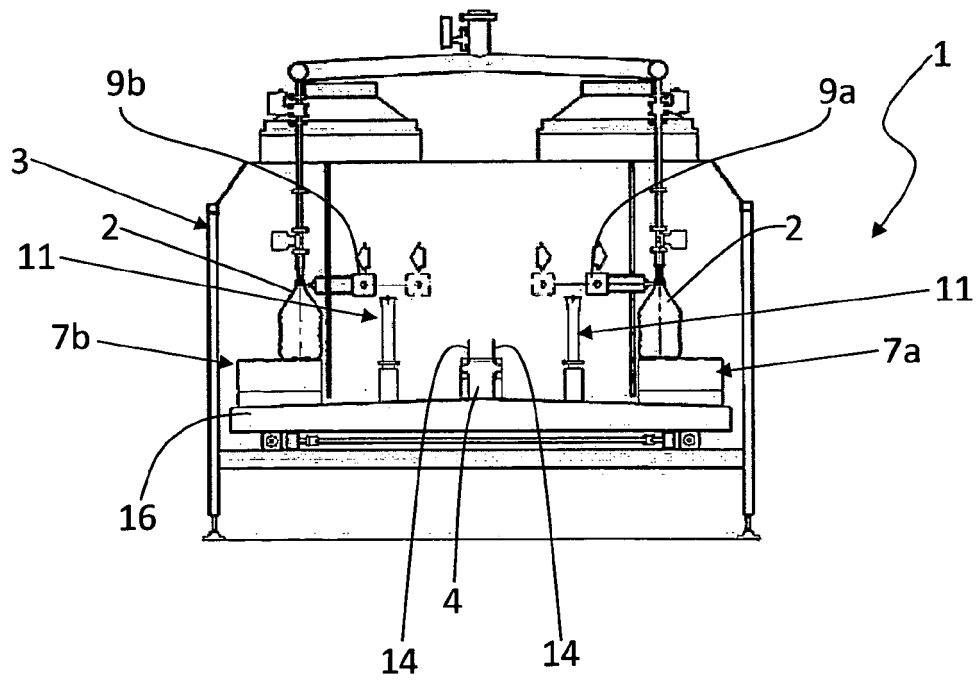


FIG. 13

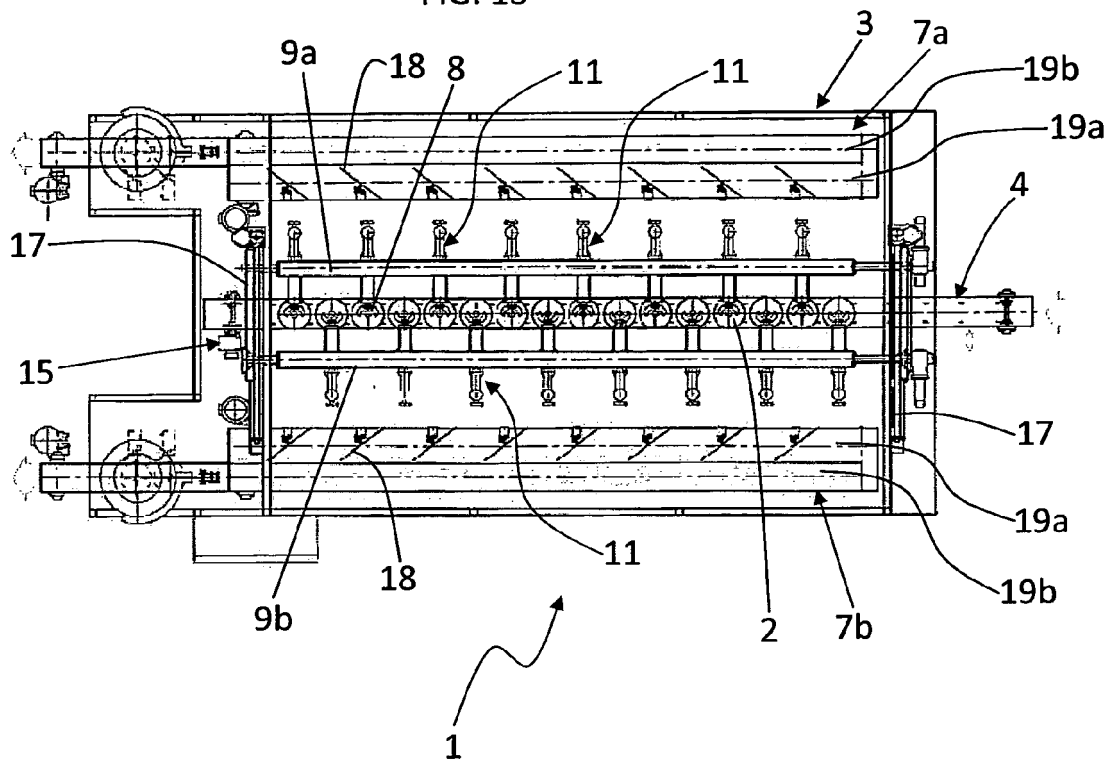


FIG. 14

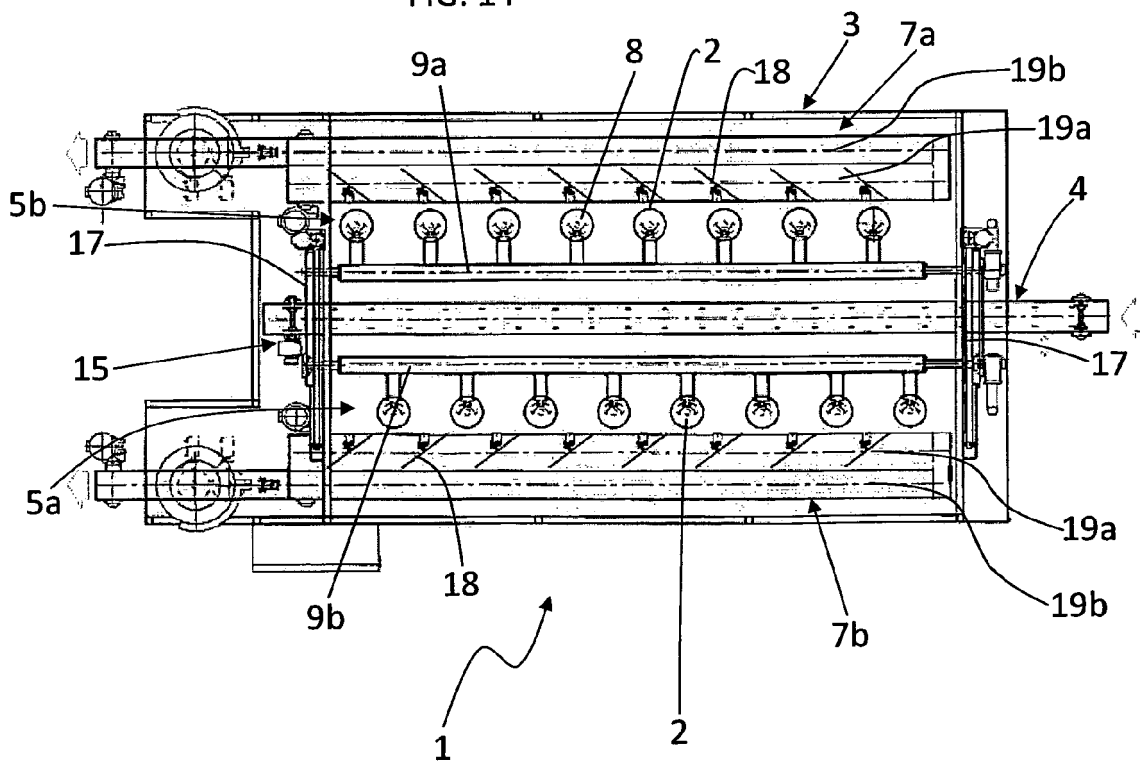


FIG. 15

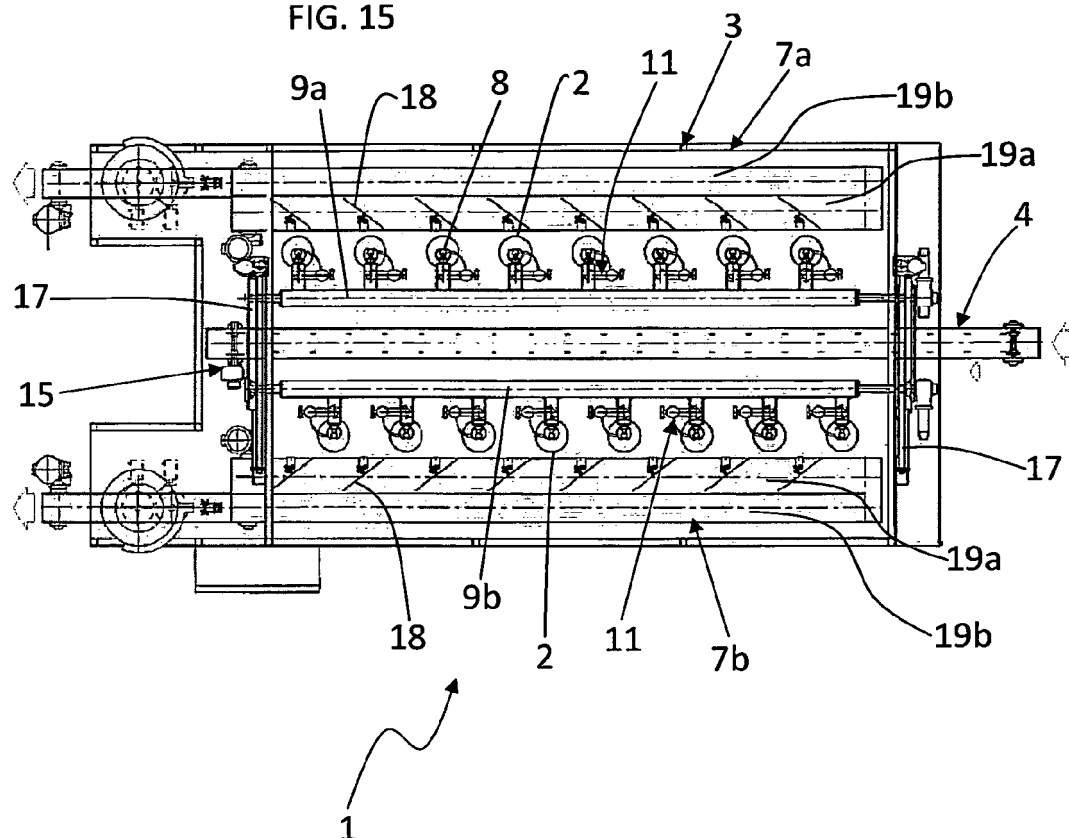


FIG. 16

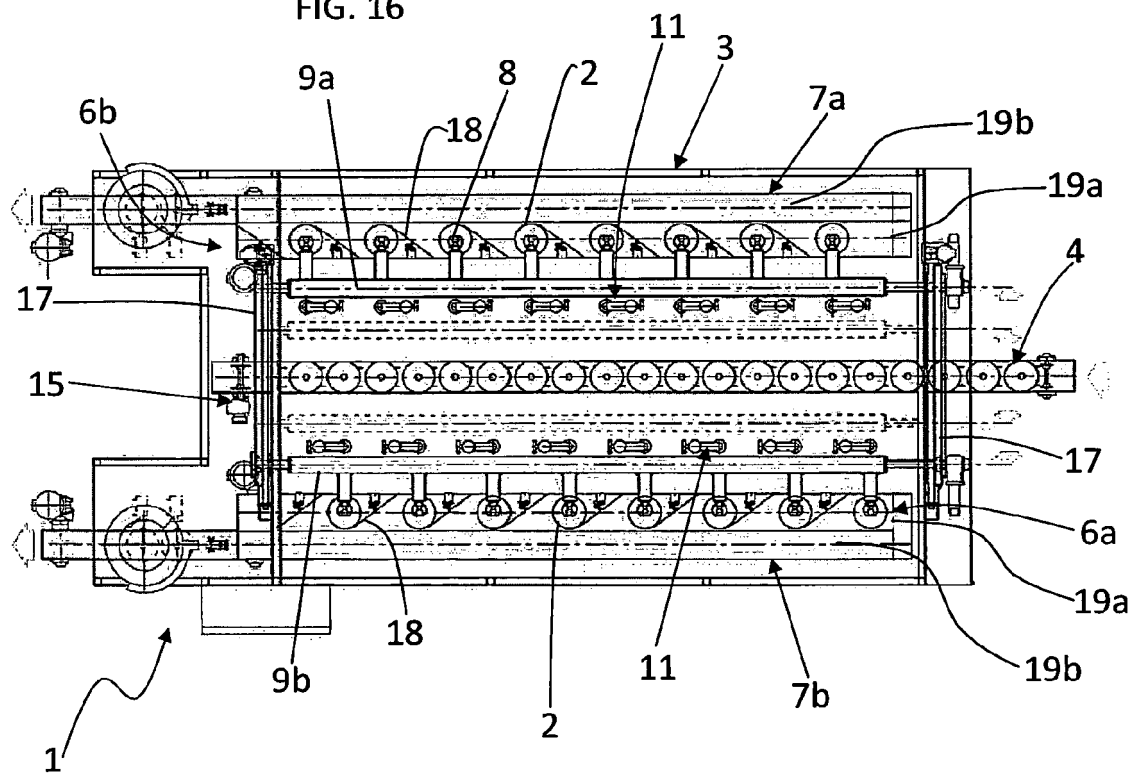


FIG. 17

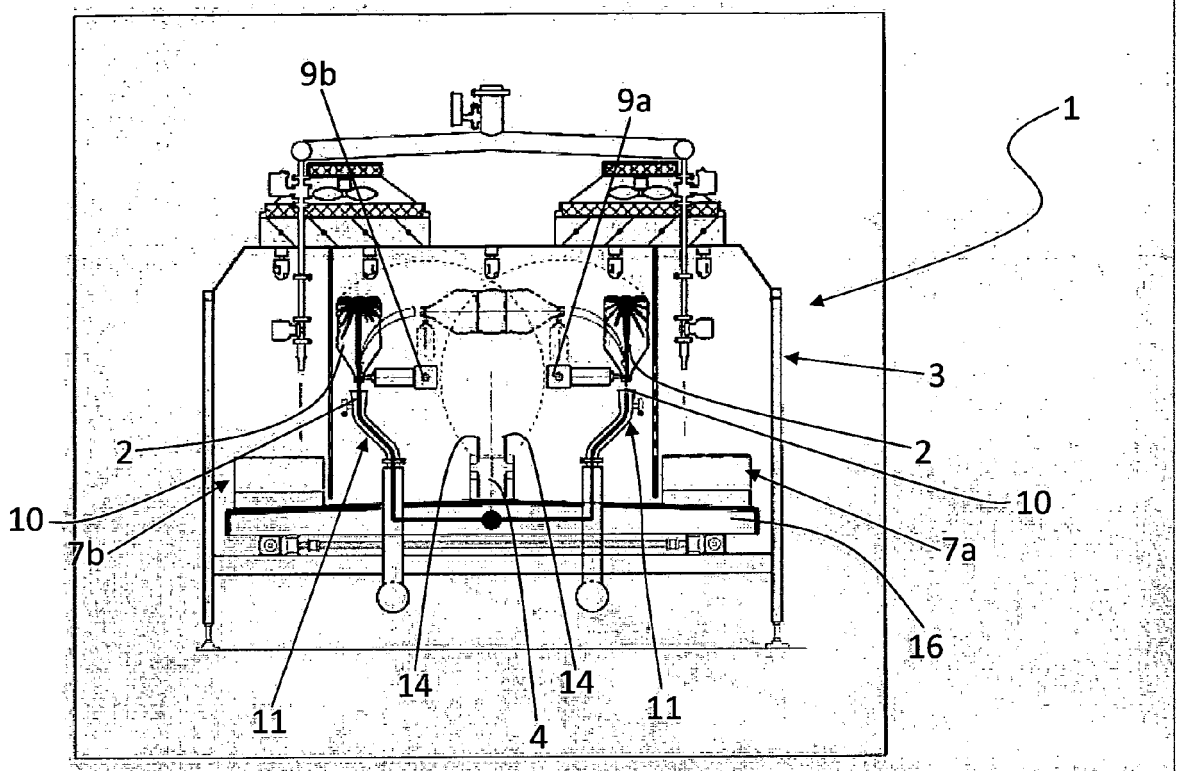


FIG. 18

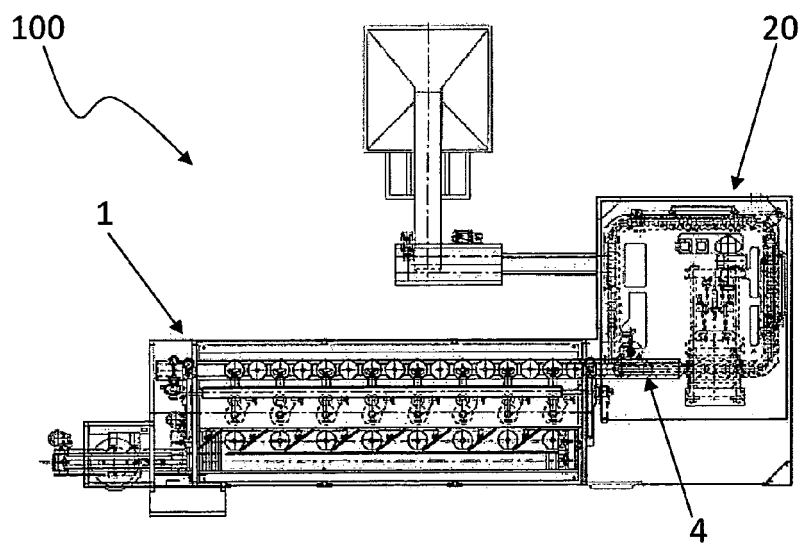
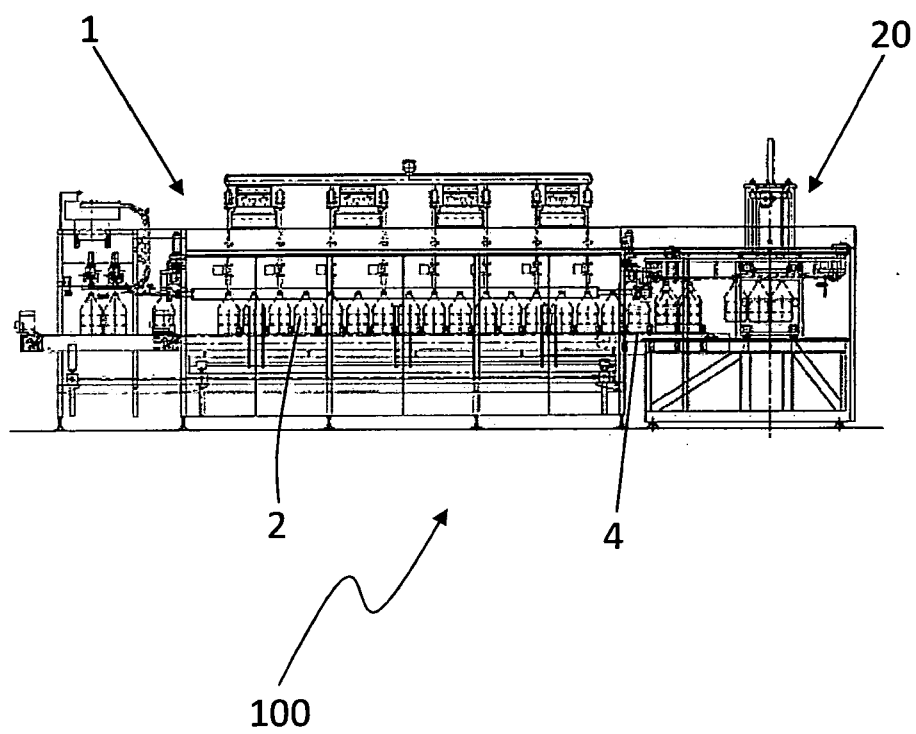


FIG. 19





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Place of search The Hague		Date of completion of the search 12 November 2010	Examiner Pardo, Ignacio
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EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

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