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(54) **BEVERAGE BOTTLING PLANT FOR FILLING BOTTLES WITH A LIQUID BEVERAGE MATERIAL**

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(57) **ABSTRACT**

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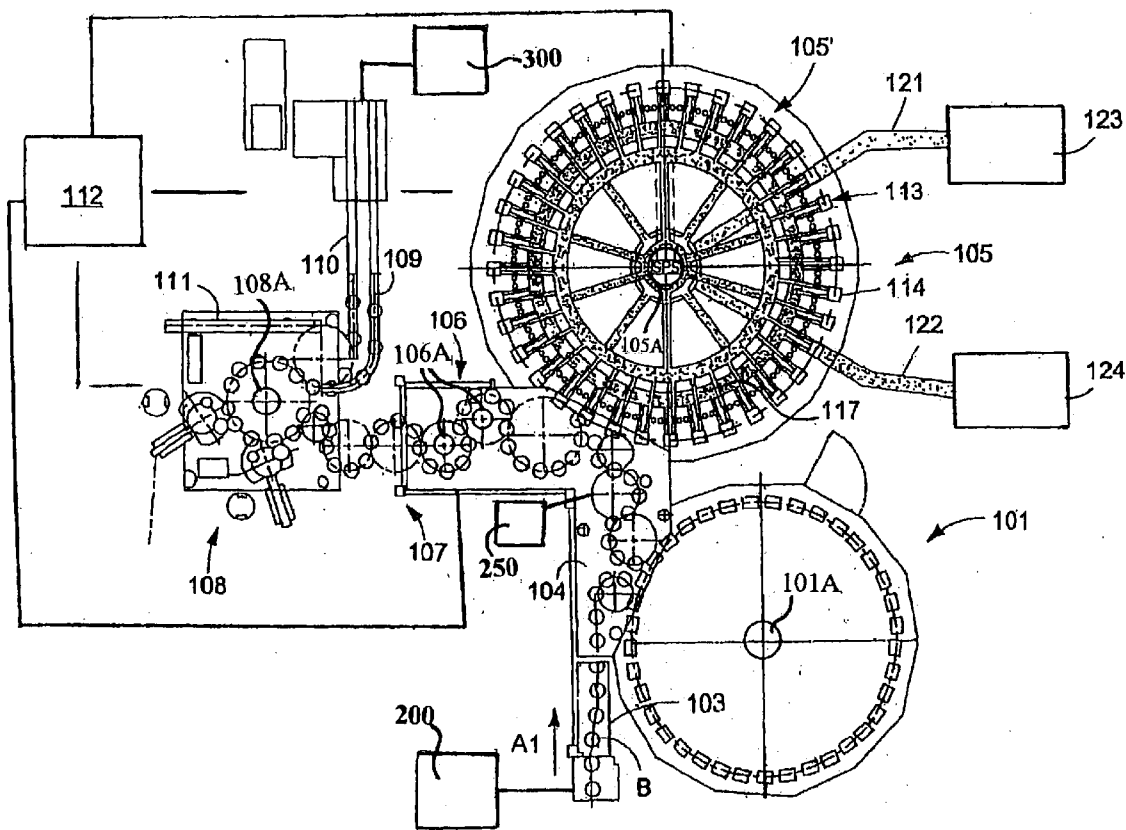
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A beverage bottling plant for filling bottles with a liquid beverage material. The abstract of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b): A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading "Abstract of the Disclosure." The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims. Therefore, any statements made relating to the abstract are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.



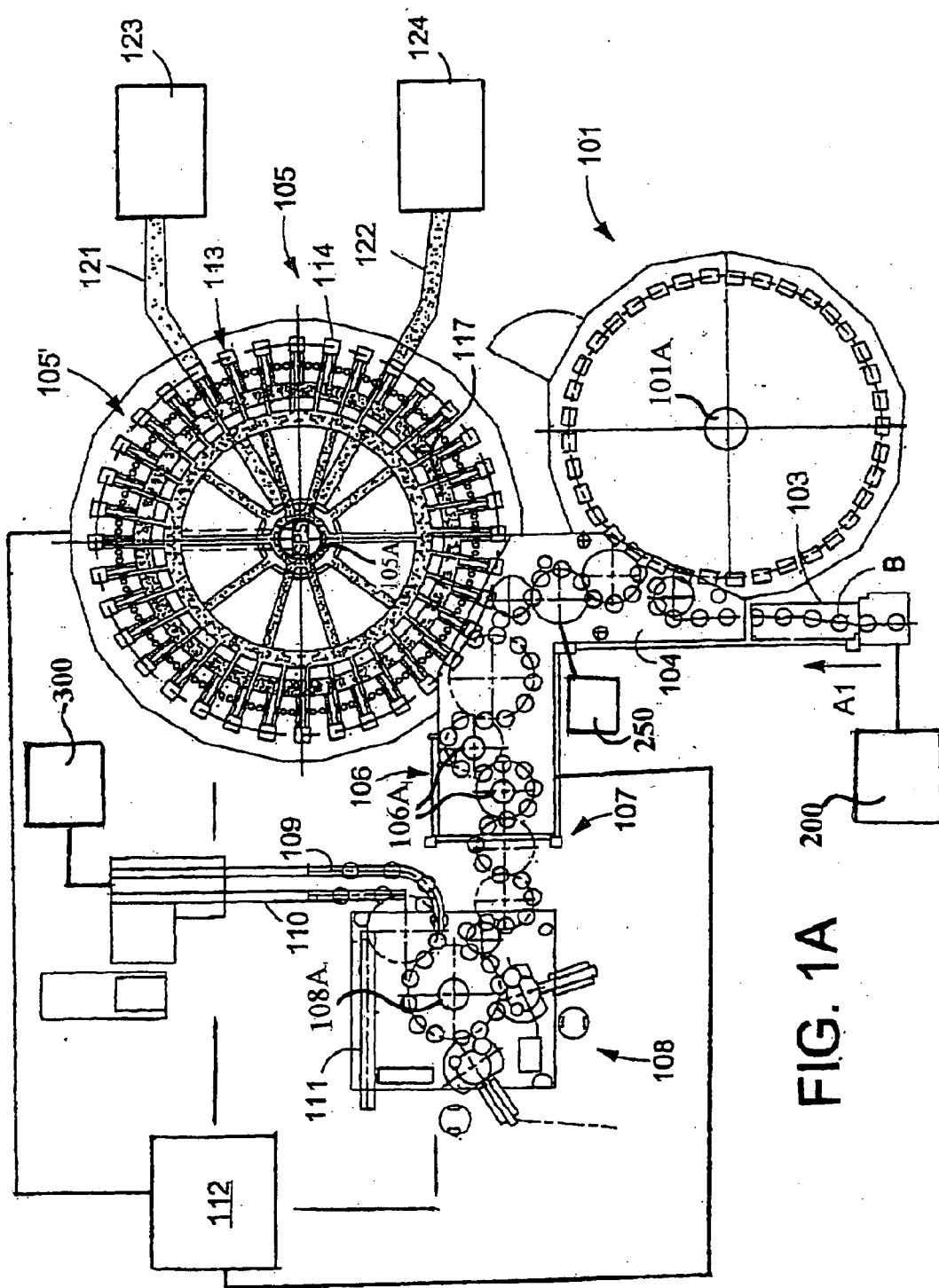
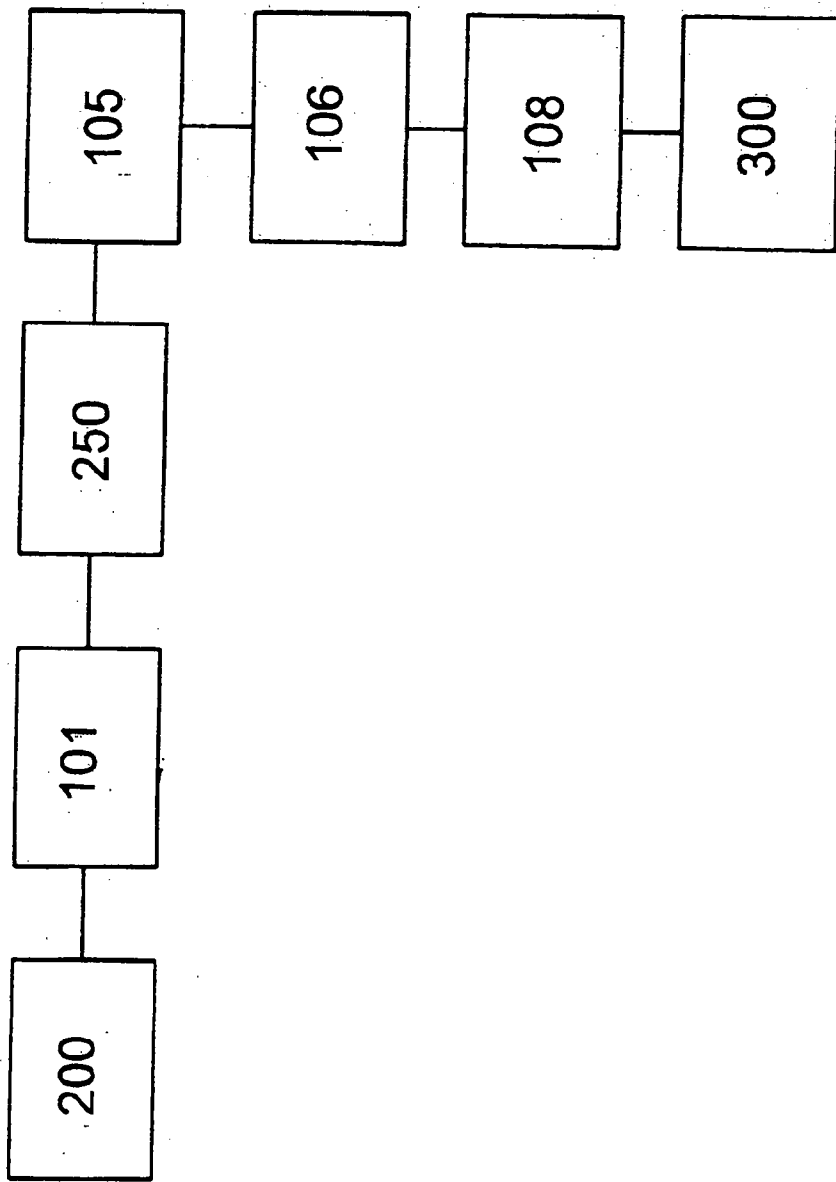
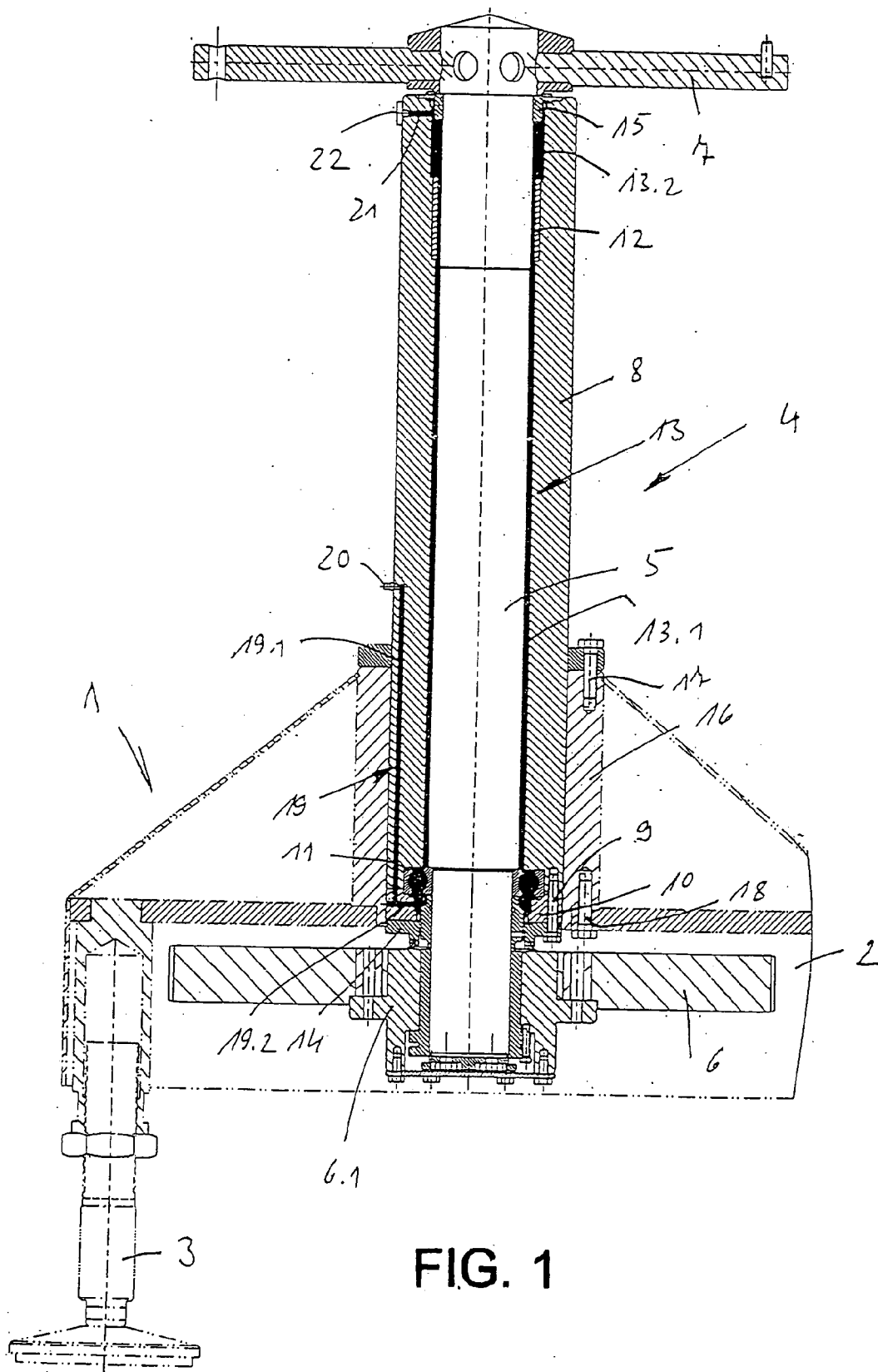


FIG. 1A

Fig. 1B





**BEVERAGE BOTTLING PLANT FOR FILLING
BOTTLES WITH A LIQUID BEVERAGE
MATERIAL**

BACKGROUND

[0001] 1. Technical Field

[0002] A beverage bottling plant for filling bottles with a liquid beverage material.

[0003] 2. Background Information

[0004] A beverage bottling plant for filling bottles with a liquid beverage filling material can possibly comprise a beverage filling machine with a plurality of beverage filling positions, each beverage filling position having a beverage filling device for filling bottles with liquid beverage filling material. The filling devices may have an apparatus designed to introduce a predetermined volume of liquid beverage filling material into the interior of bottles to a substantially predetermined level of liquid beverage filling material. The apparatus designed to introduce a predetermined flow of liquid beverage filling material further comprises an apparatus that is designed to terminate the filling of the beverage bottles upon the liquid beverage filling material reaching the predetermined level in bottles. There may also be provided a conveyer arrangement that is designed to move bottles, for example, from an inspecting machine to the filling machine. Upon filling, a closing station closes the filled bottles. There may further be provided a conveyer arrangement configured to transfer filled bottles from the filling machine to the closing station. Bottles may be labeled in a labeling station, the labeling station having a conveyer arrangement to receive bottles and to output bottles. The closing station and the labeling station may be connected by a corresponding conveyer arrangement.

[0005] One possible embodiment of a beverage bottling plant for filling bottles with a liquid beverage material could comprise an unpacking machine for unpacking bottles to be filled according to one possible embodiment. After leaving the unpacking machine, bottles could travel to a rinsing station to be rinsed. After bottles have been rinsed, they could be transported to an inspection station to check for the presence of any residual alien substances. After being inspected, bottles may next be transported to a filling machine to be filled with a liquid beverage. Once bottles have been filled, they could continue to a bottle closing station to have bottle caps or tops added to seal the bottles. Once the bottles have been sealed at the closing station, they may travel to a labeling station to have labels applied. After being labeled, bottles may travel to a packing station to be packed in boxes for transport.

[0006] Especially on machines that are used for the handling and/or processing of bottles or similar containers in the beverage industry, for example, it is necessary to provide sufficient lubrication for any bearings that are present, i.e. to provide them with a sufficient supply of a suitable lubricant (grease). Only by means of reliable lubrication is it possible to reliably prevent major damage to or even total failure of the equipment.

[0007] This supply of lubricant can be provided either manually or automatically by means of a central lubrication system, although lubrication systems of this type are complex and expensive because of the need for distributors,

control elements, lubrication lines etc. It is also frequently difficult to prevent the leakage or escape of excess lubricant that can cause contamination of the equipment. Such lubricant leaks and escapes are undesirable in many applications and are even prohibited in others. This problem can of course be resolved by a grease return, but that has the additional disadvantage of requiring additional construction that entails additional expense.

[0008] The concept of a "machine for the handling and/or processing of bottles or similar containers" as used in the present application refers in very general terms to a machine that can be used, for example, in plants in the food and/or beverage industry for the cleaning, filling, inspection, capping and labeling of bottles or other containers as well as for the packing and emptying of containers. Machines of this type include but are not limited to cleaning machines, rinsers, fillers, inspectors, cappers, packers and unpackers.

OBJECT OR OBJECTS

[0009] The object is to describe a long-term lubrication system which can be constructed economically and guarantees reliable long-term lubrication of the at least one bearing of the respective bearing arrangement.

[0010] The above-discussed embodiments of the present invention will be described further hereinbelow. When the word "invention" or "embodiment of the invention" is used in this specification, the word "invention" or "embodiment of the invention" includes "inventions" or "embodiments of the invention", that is the plural of "invention" or "embodiment of the invention". By stating "invention" or "embodiment of the invention", the Applicant does not in any way admit that the present application does not include more than one patentably and non-obviously distinct invention, and maintains that this application may include more than one patentably and non-obviously distinct invention. The Applicant hereby asserts that the disclosure of this application may include more than one invention, and, in the event that there is more than one invention, that these inventions may be patentable and non-obvious one with respect to the other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present application teaches a long-term lubrication system as disclosed herein below. Developments of the embodiments are also disclosed herein below.

[0012] The present application is explained in greater detail below on the basis of the accompanying illustration which shows a simplified illustration in partial section of a long-term lubrication system and the bearing of a shaft of a machine for the handling and/or processing of bottles or similar containers.

[0013] FIG. 1A is a schematic illustration of a container filling plant in accordance with one possible embodiment;

[0014] FIG. 1B is a box diagram showing the process of unpacking bottles at an unpacking station;

[0015] FIG. 1 shows a simplified illustration in partial section of a long-term lubrication system and the bearing of a shaft of a machine for the handling and/or processing of bottles or similar containers.

**DESCRIPTION OF EMBODIMENT OR
EMBODIMENTS**

[0016] FIG. 1A shows schematically the main components of one possible embodiment example of a system for

filling containers, specifically, a beverage bottling plant for filling bottles B with at least one liquid beverage, in accordance with at least one possible embodiment, in which system or plant could possibly be utilized at least one aspect, or several aspects, of the embodiments disclosed herein.

[0017] FIG. 1A shows a rinsing arrangement or rinsing station 101, to which the containers, namely bottles B, are fed in the direction of travel as indicated by the arrow A1, by a first conveyer arrangement 103, which can be a linear conveyor or a combination of a linear conveyor and a starwheel. Downstream of the rinsing arrangement or rinsing station 101, in the direction of travel as indicated by the arrow A1, the rinsed bottles B are transported to a beverage filling machine 105 by a second conveyer arrangement 104 that is formed, for example, by one or more starwheels that introduce bottles B into the beverage filling machine 105.

[0018] The beverage filling machine 105 shown is of a revolving or rotary design, with a rotor 105', which revolves around a central, vertical machine axis. The rotor 105' is designed to receive and hold the bottles B for filling at a plurality of filling positions 113 located about the periphery of the rotor 105'. At each of the filling positions 103 is located a filling arrangement 114 having at least one filling device, element, apparatus, or valve. The filling arrangements 114 are designed to introduce a predetermined volume or amount of liquid beverage into the interior of the bottles B to a predetermined or desired level.

[0019] The filling arrangements 114 receive the liquid beverage material from a toroidal or annular vessel 117, in which a supply of liquid beverage material is stored under pressure by a gas. The toroidal vessel 117 is a component, for example, of the revolving rotor 105'. The toroidal vessel 117 can be connected by means of a rotary coupling or a coupling that permits rotation. The toroidal vessel 117 is also connected to at least one external reservoir or supply of liquid beverage material by a conduit or supply line. In the embodiment shown in FIG. 1A, there are two external supply reservoirs 123 and 124, each of which is configured to store either the same liquid beverage product or different products. These reservoirs 123, 124 are connected to the toroidal or annular vessel 117 by corresponding supply lines, conduits, or arrangements 121 and 122. The external supply reservoirs 123, 124 could be in the form of simple storage tanks, or in the form of liquid beverage product mixers, in at least one possible embodiment.

[0020] As well as the more typical filling machines having one toroidal vessel, it is possible that in at least one possible embodiment there could be a second toroidal or annular vessel which contains a second product. In this case, each filling arrangement 114 could be connected by separate connections to each of the two toroidal vessels and have two individually-controllable fluid or control valves, so that in each bottle B, the first product or the second product can be filled by means of an appropriate control of the filling product or fluid valves.

[0021] Downstream of the beverage filling machine 105, in the direction of travel of the bottles B, there can be a beverage bottle closing arrangement or closing station 106 which closes or caps the bottles B. The beverage bottle closing arrangement or closing station 106 can be connected by a third conveyer arrangement 107 to a beverage bottle labeling arrangement or labeling station 108. The third

conveyor arrangement may be formed, for example, by a plurality of starwheels, or may also include a linear conveyor device.

[0022] In the illustrated embodiment, the beverage bottle labeling arrangement or labeling station 108 has at least one labeling unit, device, or module, for applying labels to bottles B. In the embodiment shown, the labeling arrangement 108 has three output conveyer arrangement: a first output conveyer arrangement 109, a second output conveyer arrangement 110, and a third output conveyer arrangement 111, all of which convey filled, closed, and labeled bottles B to different locations.

[0023] The first output conveyer arrangement 109, in the embodiment shown, is designed to convey bottles B that are filled with a first type of liquid beverage supplied by, for example, the supply reservoir 123. The second output conveyer arrangement 110, in the embodiment shown, is designed to convey bottles B that are filled with a second type of liquid beverage supplied by, for example, the supply reservoir 124. The third output conveyer arrangement 111, in the embodiment shown, is designed to convey incorrectly labeled bottles B. To further explain, the labeling arrangement 108 can comprise at least one beverage bottle inspection or monitoring device that inspects or monitors the location of labels on the bottles B to determine if the labels have been correctly placed or aligned on the bottles B. The third output conveyer arrangement 111 removes any bottles B which have been incorrectly labeled as determined by the inspecting device.

[0024] The beverage bottling plant can be controlled by a central control arrangement 112, which could be, for example, computerized control system that monitors and controls the operation of the various stations and mechanisms of the beverage bottling plant.

[0025] FIG. 1A further shows an unpacking machine 200 for unpacking bottles to be filled according to one possible embodiment. After leaving the unpacking machine 200, bottles travel to the rinsing station 101 to be rinsed. The rinsing station 101 comprises a bearing 101A. After bottles have been rinsed, they are transported to an inspection station 250 to check for the presence of any residual alien substances. After being inspected, bottles are next transported to the filling machine 105 to be filled with a liquid beverage. The filling machine 105 comprises a bearing 105A. Once bottles have been filled, they continue to the bottle closing station 106 to have bottle caps or tops added to seal the bottles. The bottle closing station 106 comprises bearings 106A. Once the bottles have been sealed at the closing station 106, they travel to the labeling station 108 to have labels applied. The labeling station 108 comprises a bearing 108A. After being labeled, bottles travel to a packing station 300 to be packed in boxes for transport.

[0026] FIG. 1B is a box diagram showing the process of unpacking bottles at an unpacking station 200, rinsing bottles at a rinsing station 101, inspecting bottles at an inspection station 250, filling bottles with a filling machine 105, closing bottles with a bottle closing machine 106, labeling bottles with a bottle labeling machine 108, and packing bottles at a bottle packing station 300, as described above according to one possible embodiment.

[0027] FIG. 1 shows the machine, which is designated 1 in general, for the handling and/or processing of bottles or

similar containers, for example the machine frame of a labeling machine, a filling machine, a capping machine, an inspector etc. On this machine frame **1**, of which the simplified illustration shows essentially only one horizontal lower frame element **2** and a support foot **3**, a shaft **5** with its axis in the vertical direction is rotationally mounted in a bearing arrangement **4** with a long-term lubrication system. In the illustrated embodiment, the shaft **5** is provided on its lower end which projects out of the bearing arrangement **4** with a gear wheel **6**, which can be used, for example, to drive the shaft **5**. On the upper end which also projects from the bearing arrangement **4**, an additional functional element, which in the illustrated exemplary embodiment is a disc **7** is fastened to the shaft **5**.

[0028] The bearing arrangement **4** comprises, among other things, an external bearing sleeve **8** which surrounds the shaft, and which in the illustrated exemplary embodiment extends over the major part of the length of the shaft **5**. A ring **10** is fastened to the lower end of the bearing sleeve **8**, fastened by means of a plurality of bolts **9** that are each oriented with their axes parallel to the axis of the shaft **5**, whereby the shaft **5** runs through said ring **10**. The ring **10** is held in a lower bearing **11** in a corresponding expanded portion of the interior of the bearing sleeve **8**. The bearing **11** can be realized, for example, in the form of a radial and axial bearing, and in the illustrated exemplary embodiment is formed by a suitable ball bearing.

[0029] In the upper portion of the bearing sleeve **8**, the shaft **5** is mounted in a bearing **12** which is also located in the bearing sleeve **8** and in the illustrated exemplary embodiment is realized in the form of a friction bearing. The annular space or gap **13** formed between the shaft **5** and the inner surface of the bearing sleeve is closed on the lower end of the bearing arrangement **4** or of the bearing sleeve **8** by a gasket **14** and on the upper end of the bearing arrangement **4** or of the bearing sleeve **8** by a gasket **15**.

[0030] To fasten the bearing sleeve **8** to the machine frame **1** or to the frame element **2**, on the upper side of this frame element **2** there is an external bearing mount **16**, into which the bearing sleeve **8** is inserted with a portion of its lower length, and in which the bearing sleeve **8** is anchored by threaded fasteners (bolts **17**) so that it projects upward with a portion of its length beyond the bearing mount **16**. The bearing mount **16** is held to the frame element **2** with bolts **18**.

[0031] In the illustrated exemplary embodiment, the gasket **14** which is also held by means of the bolts **9**, for example, is also supported against the end surface of the gear wheel **6** facing the bearing arrangement **4** or of the hub-like gear wheel carrier **6.1**.

[0032] To supply both bearings **11** and **12** with the appropriate quantity and quality of lubricant (e.g. grease), and for long-term lubrication, the annular gap **13**, in particular with a segment **13.1** above the bearing **11** and with a segment **13.2** above the bearing **12**, forms respective storage compartments to hold a supply of lubricant. To achieve a volume that is sufficient for the segment **13.2**, at this point the bearing sleeve **8** has a somewhat wider inside diameter or cross section.

[0033] To feed the viscous lubricant into the storage reservoir formed by the annular gap **13**, a lubricant duct **19**

is provided which runs with one segment **19.1** in the bearing sleeve **8** and with one segment **19.2** in the ring **10**. The segment **19.1** is formed by a boring, the longitudinal extension of which is oriented parallel to the axis of the shaft **5**. The lower end of the segment **19.1** makes a transition into the segment **19.2**, which is provided in the ring **10** and for its part ends in the annular gap **13** below the bearing **11**. The segment **19.2** is formed by a radial boring and an axial boring that emerges into said radial boring, whereby the radial boring is closed on its external end in the illustrated exemplary embodiment by the inside surface of the bearing mount **16** which is in contact with the external surface of the ring **10**.

[0034] The duct **19** ends on its end farther from the ring **10** at a grease nipple **20** which is freely accessible on the segment of the bearing sleeve **8** that projects out of the bearing mount **16**.

[0035] On the upper end of the annular gap **13** or of the segment **13.2**, a radial duct **21** is provided in the bearing sleeve **8**, which duct terminates on one end into the annular gap **13** and terminates on the other end at the external surface of the bearing sleeve **8**, where it is closed by a removable closing element **22** which in the illustrated exemplary embodiment is formed by a bolt.

[0036] The system is filled with the lubricant (grease) via the opened duct **21** and the grease nipple **20**, for example using a suitable lubricant gun or grease gun. By means of the duct **19**, the lubricant is injected in sufficient quantities from below into the storage reservoir formed by the annular gap **13** until it exits at the opened duct **21** and thus the entire space formed by the ducts **19**, **20**, **21** and the annular gap **13** is completely filled with lubricant. The amount of lubricant contained in the annular gap **13** is then sufficient for a reliable lubrication of the bearings **11** and **12** over a long period of time, for example over an operating time of one year or longer. The supply of lubricant is then checked at specified intervals. Any additional lubricant that may be required can then be refilled via the grease nipple **21** when the duct **21** is reopened. Any lubricant that escapes from the open duct **21** the first time the bearing arrangement **4** is filled with lubricant or on the occasion of the addition of lubricant can be easily collected.

[0037] Because the shaft **5** is oriented with its axis in the vertical direction, the annular space **13** is filled with lubricant (grease) via the duct **19** from bottom to top so that the lubricant in the annular gap **13** ascends the shaft **5** uniformly over its entire circumference, and thereby expels any air that may be present in the annular duct **13** via the opened duct **21**. Because the annular duct **13** extends over the majority of the length of the shaft **5**, the length of this annular duct **13** is also greater by a multiple than the diameter of the shaft **5**, for example by a factor of 6 to 8.

[0038] In one possible embodiment of a bottling plant, empty bottles enter the factory in palletized crates and are positioned onto the conveyor belt one by one. A fully-automated unpacking machine removes the bottles from the crates with suction cups and puts them onto another conveyor belt. The next machine removes the caps. Then the empty bottles are washed repeatedly in cleansing machines until they are thoroughly clean. Finally, an inspection machine examines the bottles for any damage and residual contamination. Refillable plastic bottles are furthermore led

along a so-called 'sniffer', a machine that effectively sniffs the air in each bottle to check the presence of any residual alien substances. Bottles thus identified as having contained alien substances are removed from the manufacturing process and destroyed.

[0039] In the bottling machine—a carousel-like turret—the bottles are filled at an enormous speed. The sealing machine then screws the caps onto the bottles, after which another machine checks whether the bottles are properly filled. Then the bottles are labeled, positioned into the crates and put on pallets. At this point the beverage is ready to be shipped to the customer.

[0040] Several of the machines or components of machines in one possible embodiment of a beverage bottling plant could comprise a bearing or bearing structure. For example, an unpacking station, a rinsing station, inspection station, a filling machine, a bottle closing machine, a bottle labeling machine, a bottle packing station, and a starwheel could possibly comprise a bearing or bearing structure.

[0041] Some examples of packers and unpackers in beverage bottling plants which may possibly be utilized or adapted for use in at least one possible embodiment are produced by Applicant, KHS Maschinen-und Anlagenbau AG, Juchostrasse 20, D-44143 Dortmund, Federal Republic of Germany: Two models of the fully automatic INNOPACK cyclic packer product line are available: CT and GT. Both are ideal for packing or unpacking bottles, jars, cans, multi packs-in plastic crates, carton, or trays. The cyclic packer's extremely efficient operation achieves high packing performance while requiring a minimum amount of space (INNOPACK CT: 500 to 1,900 packagings per hour, INNOPACK GT: 1,000 to 7,000 module crates per hour). Two INNOPACK CT models are available: the short stroke machine (packing movement) for plastic crate processing and the long stroke version (Packing movement) for folding box processing. Multipacker: the fully automatic operation of the INNOPACK GTM multipacker is used for combined packing of bulk containers in plastic crates and cartons or for placing multipacks in plastic crates, cartons, and trays. An outstanding feature of this machine is its horizontally moveable gripper traverse. Packing heads can be equipped as required with a gripping hook system, a vacuum gripping system, or a packing bell system, as well as a horizontally operating swivelling system. Rotary packer: the INNOPACK CR rotary packer is a continuously operating packing and unpacking machine designed for packing plastic crates or cartons (2,400 to 8,100 module crates per hour). It is capable of handling a multitude of tasks and its complex equipment makes it usable in all capacity ranges throughout the beverage industry. Two basic models of the rotary packer are available: size 1 for single and double-track crate conveyors, size 2 exclusively for double-track crate conveyors.

[0042] Some examples of inspecting equipment in beverage bottling plants which may possibly be utilized or adapted for use in at least one possible embodiment are produced by Applicant: Inspection technology (INNOCHECK): empty bottle inspectors: the INNOCHECK LF product line from KHS offers a wide variety of state-of-the-art devices and machines for inspecting returnable glass or PET packaging. Capacities range from 36,000 to 72,000 bottles per hour. High-tech camera technology and tried and tested sensory testing systems,

among others, are implemented for the following methods of inspection: bottle height checking, sealing surface, IR residual liquids check, inner side walls, camera base. Foreign substance inspectors: the INNOCHECK FS is a highly dependable foreign substance inspector for inspecting PET multi-use bottles against contamination with taste and health affecting materials. The inspector has a low error return rate and a strong recognition rate and is resistant to parameter changes such as temperature fluctuation, air humidity and unclean air. The INNOCHECK FS operates with a velocity of 50,000 bottles per hour. The filling level checking system: the INNOCHECK FT 50 filling level checking system is available for checking the filling level of bottles and cans. Password-protected recording 20 different types of containers is part of the standard equipment as well as production statistics, counter readings for overfilling or underfilling, and diagnostic functions. The INNOCHECK FT 50 is easy to operate and features dependable filling level detection and a standardized link to reject systems. Crate checking: the INNOCHECK program offers various solutions for checking and detecting defective cartons, containers in cartons, shrink-wrap packaging, and plastic or metal closures. The simple and clearly arranged method of operation guarantees trouble-free machine performance for a multitude of applications.

[0043] Some examples of cleaning technology in beverage bottling plants which may possibly be utilized or adapted for use in at least one possible embodiment are produced by Applicant: Cleaning technology (INNOCLEAN), namely, single-end bottle washers of which there are three versions of the INNOCLEAN single-end bottle washer. The machines offered range from the lowest capacity (INNOCLEAN EC) with an output of 10,000 bottles per hour, the mid-capacity of 10,000 to 30,000 bottles per hour (INNOCLEAN EK), to machines with capacities for 150,000 bottles per hour (INNOCLEAN EE+INNOCLEAN EM, also available as multiple bath versions). All models have been designed for washing returnable and non-returnable glass and PET bottles. Double-end bottle washers: the INNOCLEAN DM double-end, multiple-bath bottle washer is designed for the mid to high capacity range of up to 150,000 bottles per hour. This machine fulfills the highest possible bottle requirements by consistently separating the impurities from the clean bottle discharge. Very long treatment periods can be achieved by combining a series of various types of caustic baths. The INNOCLEAN DM is available in various overall heights. The INNOCLEAN DMT product line machines are double-end bottle washers with modified automation. Crate washers: the INNOCLEAN KW is a fully automatic washing system for plastic crates. Made entirely of stainless steel, single or two-vat versions are available of these single and double-track machines. Capacities range from 500 to 10,000 crates per hour. Crates are washed by two optional types of high-pressure spraying: 1. hot water and follow-up spraying, 2. caustic spraying, hot water and follow-up spraying.

[0044] Some examples of filling machines in beverage bottling plants which may possibly be utilized or adapted for use in at least one possible embodiment are produced by Applicant: Filling technology (INNOFILL) comprising: overpressure fillers—KHS offers several overpressure fillers: (INNOFILL EM, ER, EV, DR) equipped with mechanical and computer-controlled filling valves for filling carbonated beverages, particularly soft drinks and mineral water, in

glass and plastic containers. A special feature of the INNO-FILL EV is the volumetric recording of the filling volume using electromagnetic inductive flowmetering (MID). Capacities range from 5,000 to 80,000 bottles per hour, depending on the type of machine and the container to be filled. Normal pressure fillers: the KHS product program includes the INNOFILL NR double-chamber normal pressure bottle fillers. Equipped with computer-controlled filling valves, this filler is ideal for filling beverages in glass and plastic containers. The INNOFILL NR is capable of filling 6,000 to 70,000 0.7-liter bottles per hour. Can fillers: the INNOFILL product line for can filling is particularly suitable for filling beer, soft drinks, mixed beverages (carbonated and non-carbonated) as well as pulp and non-pulp juices (also hot filling). The complex filler program guarantees high performance standards and offers a host of engineering highlights, for instance, pressure-less filling of non-carbonated products. Or the extremely fast central filling level correction which can also be optionally used automatically during production operation. Particularly worthy of note are the filling temperatures; the approximate temperature for beer is 16 degrees Celsius, 20 degrees Celsius for soft drinks, and 85 degrees Celsius for juices. Rinsers: the KHS INNOFILL program includes two rinsers for single or double rinsing or blowing out of glass and plastic containers of various sizes and shapes. The EMZ/ZM rinser is a universal mechanical rinser with a capacity range from 10,000 to 75,000 bottles per hour. The universal computer-controlled triple-chamber DR rinser has the same capacity range. KHS offers the fully automatic DW can rinser designed for rinsing empty cans, which, depending on the configuration, is capable of outputs from 18,000 to 160,000 cans per hour.

[0045] The present application has been explained above with reference to one possible exemplary embodiment. It goes without saying that numerous modifications, variations and additions can be made without thereby going beyond the scope of the teaching of the present application.

[0046] The present application relates to a bearing arrangement with long-term lubrication system for the shaft of a machine for the handling and/or processing of bottles or similar containers, with a bearing sleeve that surrounds the shaft over at least a portion of its length, with at least one bearing in a bearing interior that is formed between the shaft and an interior surface of the bearing sleeve, which bearing interior is closed by at least two gaskets that are offset from each other in the axial direction of the shaft and holds a lubricant is characterized by at least one first duct for the feed of the lubricant, which duct ends in the vicinity of the at least one bearing, and by means of a second segment of the bearing interior formed between the at least one bearing and a gasket for the ventilation of said space.

[0047] One feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a beverage bottling plant for filling beverage bottles with liquid beverage material; said beverage bottling plant comprising: a plurality of rotary machines, comprising at least a rotary beverage bottle filling machine and a rotary beverage bottle closing machine; said beverage bottle filling machine being configured and disposed to fill beverage bottles with liquid beverage material; said beverage bottle filling machine comprising: a plurality of beverage bottle filling elements for filling beverage bottles with

liquid beverage material; each of said plurality of beverage bottle filling elements comprising a container carrier being configured and disposed to receive and hold bottles to be filled; each of said plurality of beverage bottle filling elements being configured and disposed to dispense liquid beverage material into bottles to be filled; at least one liquid reservoir being configured to hold a liquid to be bottled; at least one supply line being configured and disposed to connect said at least one liquid reservoir to said beverage bottle filling machine to supply liquid beverage material to said beverage bottle filling machine; a first beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles into said beverage bottle filling machine; said first beverage bottle filling machine conveyer arrangement comprising a star wheel structure; a second beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles out of said beverage bottle filling machine; said second beverage bottle filling machine conveyer arrangement comprising a star wheel structure; at least one of said plurality of rotary machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of rotary machines; said bearing arrangement comprising: a shaft being disposed vertically; a sleeve being configured and disposed to encircle at least a portion of said shaft; an annular space being disposed between said sleeve and said shaft; said annular space being configured to hold a lubricant material; a lower gasket being configured and disposed to close the lower portion of said annular space; an upper gasket being configured and disposed to close the upper portion of said annular space; at least two bearings being disposed in said annular space, between said shaft and said sleeve; said at least two bearings comprising a lower bearing being disposed in the lower portion of said sleeve and an upper bearing being disposed in the upper portion of said sleeve; said lower bearing being closer to said lower gasket than said upper bearing, and said upper bearing being closer to said upper gasket than said lower bearing; said annular space extending from said lower bearing to said upper gasket; said annular space being configured to permit movement of lubricant material from adjacent said lower bearing to adjacent said upper gasket; a bearing arrangement lubrication system; said bearing arrangement lubrication system comprising: a lower lubrication duct being disposed in the lower portion of said sleeve; said lower lubrication duct comprising a vertical duct portion being disposed to run parallel to said shaft and a horizontal duct portion being disposed perpendicularly to said vertical duct portion and being disposed to operatively connect to said annular space; said lower lubrication duct being disposed adjacent said at least one bearing; a lubricant inlet being configured and disposed to permit a lubricant material to be introduced into said lower lubrication duct; said lower lubrication duct extending from said lubricant inlet to said lower bearing; said lower lubrication duct being configured and disposed to permit the flow of a lubricant material into said annular space; an upper lubrication duct being disposed in the upper portion of said sleeve; said upper lubrication duct being disposed perpendicularly to said annular space, and being disposed to operatively connect to said annular space; a removable closing element being configured and disposed to seal said upper lubrication duct; said upper lubrication duct extending from said removable closing element to said upper gasket; said removable closing

element being configured to permit the flow of air out of said upper lubrication duct upon the introduction of a lubricant material into said lubrication system; said bottling plant further comprising a beverage bottle closing machine being configured and disposed to close tops of filled beverage bottles and comprising: a rotor; a rotatable vertical machine column; said rotor being connected to said vertical machine column to permit rotation of said rotor about said vertical machine column; a plurality of closing devices disposed on the periphery of said rotor; each of said plurality of closing devices comprising a container carrier being configured and disposed to receive and hold filled bottles; each of said plurality of closing devices being configured and disposed to place closures on bottles upon bottles being filled; a first beverage bottle closing machine conveyor arrangement being configured and disposed to move bottles into said beverage bottle closing machine; said first beverage bottle closing machine conveyor arrangement comprising a star wheel structure; a second beverage bottle closing machine conveyor arrangement being configured and disposed to move bottles out of said beverage bottle closing machine; said second beverage bottle closing machine conveyor arrangement comprising a star wheel structure.

[0048] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a container filling plant for filling containers with liquid beverage material; said container filling plant comprising: a plurality of machines, comprising at least a container filling machine and a container closing machine; said container filling machine being configured and disposed to fill containers with liquid beverage material; said container filling machine comprising: a rotor; a plurality of container filling elements for filling containers with liquid beverage material; each of said plurality of container filling elements comprising a container carrier being configured and disposed to receive and hold containers to be filled; each of said plurality of container filling elements being configured and disposed to dispense liquid beverage material into containers to be filled; at least one liquid reservoir being configured to hold a liquid for filling; at least one supply channel being configured and disposed to connect said at least one liquid reservoir to said container filling machine to supply liquid beverage material to said container filling machine; a first container filling machine conveyer arrangement being configured and disposed to move containers into said container filling machine; a second container filling machine conveyer arrangement being configured and disposed to move containers out of said container filling machine; at least one of said plurality of machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of machines; said bearing arrangement comprising: a shaft; a sleeve being configured and disposed to envelop at least a portion of said shaft; an annular space being disposed between said sleeve and said shaft; said annular space being configured to hold a lubricant material; a first gasket being configured and disposed to close a first portion of said annular space; a second gasket being configured and disposed to close a second portion of said annular space; at least two bearings being disposed in said annular space, between said shaft and said sleeve; said at least two bearings comprising a first bearing being disposed in a first portion of said sleeve and a second bearing being disposed in a second portion of said sleeve; said first bearing being closer to said first gasket than

said second bearing, and said second bearing being closer to said second gasket than said first bearing; said annular space extending from said first bearing to said second gasket; said annular space being configured to permit movement of lubricant material from adjacent said first bearing to adjacent said second gasket; a bearing arrangement lubrication system; said bearing arrangement lubrication system comprising: a first lubrication duct being disposed in a first portion of said sleeve; said first lubrication duct comprising a first duct portion being disposed to run parallel to said shaft and a second duct portion being disposed transverse to said first duct portion and being disposed to operatively connect to said annular space; said first lubrication duct being disposed adjacent said at least one bearing; said first lubrication duct extending from said lubricant inlet to said first bearing; said first lubrication duct extending from said lubricant inlet to said at least one bearing; a lubricant inlet being configured and disposed to permit a lubricant material to be introduced into said first lubrication duct; said first lubrication duct being configured and disposed to permit the flow of a lubricant material into said annular space; a second lubrication duct being disposed in a second portion of said sleeve; said second lubrication duct being disposed transverse to said annular space, and being disposed to operatively connect to said annular space; said second lubrication duct extending from said removable closing element to said second gasket; a removable closing element being configured and disposed to seal said second lubrication duct; said removable closing element being configured to permit the flow of air out of said second lubrication duct upon the introduction of a lubricant material into said lubrication system; said container filling plant further comprising a container closing machine being configured and disposed to close tops of filled containers; said container closing machine comprising: a rotor; a rotatable machine column; said rotor being connected to said machine column to permit rotation of said rotor about said machine column; a plurality of closing devices disposed on said rotor; each of said plurality of closing devices comprising a container carrier being configured and disposed to receive and hold filled containers; each of said plurality of closing devices being configured and disposed to place closures on containers upon containers being filled; a first container closing machine conveyor arrangement being configured and disposed to move containers into said container closing machine; and a second container closing machine conveyor arrangement being configured and disposed to move containers out of said container closing machine.

[0049] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a beverage bottling plant for filling beverage bottles with liquid beverage material; said beverage bottling plant comprising: a plurality of rotary machines, comprising at least a rotary beverage bottle filling machine and a rotary beverage bottle closing machine; said beverage bottle filling machine being configured and disposed to fill beverage bottles with liquid beverage material; said beverage bottle filling machine comprising: a plurality of beverage bottle filling elements for filling beverage bottles with liquid beverage material; each of said plurality of beverage bottle filling elements comprising a container carrier being configured and disposed to receive and hold bottles to be filled; each of said plurality of beverage bottle filling elements being configured and disposed to dispense

liquid beverage material into bottles to be filled; at least one liquid reservoir being configured to hold a liquid to be bottled; at least one supply line being configured and disposed to connect said at least one liquid reservoir to said beverage bottle filling machine to supply liquid beverage material to said beverage bottle filling machine; a first beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles into said beverage bottle filling machine; said first beverage bottle filling machine conveyer arrangement comprising a star wheel structure; a second beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles out of said beverage bottle filling machine; said second beverage bottle filling machine conveyer arrangement comprising a star wheel structure; at least one of said plurality of machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of machines; said bearing arrangement comprising: a shaft being disposed vertically; a sleeve being configured and disposed to encircle at least a portion of said shaft; an annular space being disposed between said sleeve and said shaft; said annular space being configured to hold a lubricant material; a lower gasket being configured and disposed to close the lower portion of said annular space; an upper gasket being configured and disposed to close the upper portion of said annular space; at least two bearings being disposed in said annular space, between said shaft and said sleeve; said at least two bearings comprising a lower bearing being disposed in the lower portion of said sleeve and an upper bearing being disposed in the upper portion of said sleeve; said lower bearing being closer to said lower gasket than said upper bearing, and said upper bearing being closer to said upper gasket than said lower bearing; said annular space extending from said lower bearing to said upper gasket; said annular space being configured to permit movement of lubricant material from adjacent said lower bearing to adjacent said upper gasket; a long-term lubrication system in a bearing arrangement for a shaft of a machine for the handling and/or processing of bottles or similar containers, comprising: a bearing sleeve that surrounds the shaft over at least a portion of its length; at least one bearing in a bearing interior that is formed between the shaft and an interior surface of the bearing sleeve; which bearing interior is closed by at least two gaskets that are offset from each other in the axial direction of the shaft, and holds a lubricant, for example grease for the at least one bearing; wherein at least one first duct for the feed of the lubricant, which duct ends in the vicinity of the at least one bearing, and by means on a second segment of the bearing interior formed between the at least one bearing and a gasket, for the ventilation of said space.

[0050] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system in a bearing arrangement for a shaft of a machine for the handling and/or processing of bottles or similar containers, with a bearing sleeve that surrounds the shaft over at least a portion of its length, with at least one bearing in a bearing interior that is formed between the shaft and an interior surface of the bearing sleeve, which bearing interior is closed by at least two gaskets that are offset from each other in the axial direction of the shaft, and holds a lubricant, for example grease for the at least one bearing, characterized by at least one first duct for the feed of the lubricant, which duct

ends in the vicinity of the at least one bearing, and by means on a second segment of the bearing interior (13) formed between the at least one bearing and a gasket, for the ventilation of said space.

[0051] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the at least one first duct ends at a segment of the bearing interior formed between the at least one bearing and a first gasket.

[0052] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by at least two bearings that are offset from each other in the axial direction of the shaft in the bearing sleeve or in the bearing interior.

[0053] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the at least one first duct ends in the bearing interior in a segment between the first gasket and the bearing that is downstream of said gasket in the axial direction, and that the means for ventilation are provided between the second gasket and the bearing immediately downstream of said gasket in the axial direction of the shaft.

[0054] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the means for the ventilation are formed by at least one closable second duct.

[0055] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the means for ventilation are provided on a level that is above, in the vertical direction, the level at which the at least one first duct empties into the bearing interior.

[0056] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the shaft is oriented with its axis in the vertical direction, and that the first duct empties into the bearing interior below the at least one bearing.

[0057] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the at least one first duct extends with a partial segment in the bearing sleeve, preferably in the direction of the axis of the shaft.

[0058] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by a retaining ring to hole the at least one bearing, whereby the at least one first duct extends with at least a partial segment in said ring and empties into the bearing interior at a ring interior surface that surrounds the shaft.

[0059] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system,

characterized by the fact that the at least one first duct empties at the outer surface of the bearing arrangement or of the bearing sleeve at a lubricant or filling opening.

[0060] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the lubricant or filling opening is formed by a grease nipple.

[0061] Still another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that a bearing mount is provided on the machine frame to hold the bearing sleeve over a portion of its length, and that the lubrication or filling opening is located on a segment of the bearing sleeve that projects out of the bearing mount.

[0062] A further feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the bearing interior extends over the majority of the length of the shaft, for example at least 60% of the total length of the shaft.

[0063] Another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the bearing interior extends in the axial direction of the shaft over a length which is greater by a multiple than the diameter of the shaft, for example greater than the diameter of the shaft by a factor of 6 to 8.

[0064] Yet another feature or aspect of an embodiment is believed at the time of the filing of this patent application to possibly reside broadly in a long-term lubrication system, characterized by the fact that the bearing interior is an annular chamber.

[0065] The components disclosed in the various publications, disclosed or incorporated by reference herein, may possibly be used in possible embodiments of the present invention, as well as equivalents thereof.

[0066] Some examples of bottling systems, which may be used or adapted for use in at least one possible embodiment of the present may be found in the following U.S. patents assigned to the Assignee herein, namely: U.S. Pat. No. 4,911,285; No. 4,944,830; No. 4,950,350; No. 4,976,803; No. 4,981,547; No. 5,004,518; No. 5,017,261; No. 5,062,917; No. 5,062,918; No. 5,075,123; No. 5,078,826; No. 5,087,317; No. 5,110,402; No. 5,129,984; No. 5,167,755; No. 5,174,851; No. 5,185,053; No. 5,217,538; No. 5,227,005; No. 5,413,153; No. 5,558,138; No. 5,634,500; No. 5,713,403; No. 6,276,113; No. 6,213,169; No. 6,189,578; No. 6,192,946; No. 6,374,575; No. 6,365,054; No. 6,619,016; No. 6,474,368; No. 6,494,238; No. 6,470,922; and No. 6,463,964.

[0067] The purpose of the statements about the technical field is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the technical field is believed, at the time of the filing of this patent application, to adequately describe the technical field of this patent application. However, the description of the technical field may not be completely applicable to the

claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the technical field are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0068] Some examples of methods and apparatuses for closing bottles and containers and their components that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present may possibly be found in the following U.S. patents: U.S. Pat. No. 5,398,485 issued to Osifchin on Mar. 21, 1995; U.S. Pat. No. 5,402,623 issued to Ahlers on Apr. 4, 1995; U.S. Pat. No. 5,419,094 issued to Vander Bush, Jr. et al. on May 30, 1995; U.S. Pat. No. 5,425,402 issued to Pringle on Jun. 20, 1995; U.S. Pat. No. 5,447,246 issued to Finke on Sep. 5, 1995; and U.S. Pat. No. 5,449,080 issued to Finke on Sep. 12, 1995.

[0069] The appended drawings in their entirety, including all dimensions, proportions and/or shapes in at least one embodiment of the invention, are accurate and are hereby included by reference into this specification.

[0070] Some examples of computer systems that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: U.S. Pat. No. 5,416,480 issued to Roach et al. on May 16, 1995; U.S. Pat. No. 5,479,355 issued to Hyduke on Dec. 26, 1995; U.S. Pat. No. 5,481,730 issued to Brown et al. on Jan. 2, 1996; U.S. Pat. No. 5,805,094 issued to Roach et al. on Sep. 8, 1998; U.S. Pat. No. 5,881,227 issued to Atkinson et al. on Mar. 9, 1999; and U.S. Pat. No. 6,072,462 issued to Moshovich on Jun. 6, 2000.

[0071] The background information is believed, at the time of the filing of this patent application, to adequately provide background information for this patent application. However, the background information may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the background information are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0072] Some examples of apparatus and methods of sterilizing or cleaning containers that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: U.S. Pat. No. 5,092,356 issued to Grot on Mar. 3, 1992; U.S. Pat. No. 5,320,144 issued to Ahlers on Jun. 14, 1994; U.S. Pat. No. 5,533,552 issued to Ahlers on Jul. 9, 1996; U.S. Pat. No. 5,558,135 issued to Kronseder et al. on Sep. 24, 1996; and U.S. Pat. No. 5,896,899 issued to Schlitz on Apr. 27, 1999.

[0073] All, or substantially all, of the components and methods of the various embodiments may be used with at least one embodiment or all of the embodiments, if more than one embodiment is described herein.

[0074] Some examples of labeling machines which may possibly be utilized in at least one possible embodiment may possibly be found in the following U.S. patents: U.S. Pat.

No. 6,634,400, entitled "Labeling machine;" U.S. Pat. No. 6,561,246, entitled "Labeling machine capable of precise attachment of a label to different sizes of containers;" U.S. Pat. No. 6,550,512, entitled "Labeling machine capable of preventing erroneous attachment of labels on containers;" U.S. Pat. No. 6,543,514, entitled "In-line continuous feed sleeve labeling machine and method;" U.S. Pat. No. 6,378,587, entitled "Cylindrical container labeling machine;" U.S. Pat. No. 6,328,086, entitled "Labeling machine;" U.S. Pat. No. 6,315,021, entitled "Labeling machine;" U.S. Pat. No. 6,263,940, entitled "In-line continuous feed sleeve labeling machine and method;" U.S. Pat. No. 6,199,614, entitled "High speed labeling machine having a constant tension driving system;" U.S. Pat. No. 6,167,935, entitled "Labeling machine;" U.S. Pat. No. 6,066,223, entitled "Labeling machine and method;" U.S. Pat. No. 6,050,319, entitled "Non-round container labeling machine and method;" and U.S. Pat. No. 6,045,616, entitled "Adhesive station and labeling machine."

[0075] The purpose of the statements about the object or objects is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The description of the object or objects is believed, at the time of the filing of this patent application, to adequately describe the object or objects of this patent application. However, the description of the object or objects may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the object or objects are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0076] Some examples of starwheels which may possibly be utilized or adapted for use in at least one possible embodiment may possibly be found in the following U.S. patents: U.S. Pat. No. 5,613,593, entitled "Container handling starwheel;" U.S. Pat. No. 5,029,695, entitled "Improved starwheel;" U.S. Pat. No. 4,124,112, entitled "Odd-shaped container indexing starwheel;" and U.S. Pat. No. 4,084,686, entitled "Starwheel control in a system for conveying containers."

[0077] All of the patents, patent applications and publications recited herein, and in the Declaration attached hereto, are hereby incorporated by reference as if set forth in their entirety herein.

[0078] The Innopack packaging machine, manufactured by KHS Maschinen und Anlagenbau AG, is an example of a packaging machine which may possibly be utilized or adapted for use in at least one possible embodiment. Some other examples of packaging machines which may possibly be utilized or adapted for use in at least one possible embodiment may possibly be found in the following U.S. patents: U.S. Pat. No. 4,964,260, entitled "Packaging machine for cardboard boxes and process for packaging articles in cardboard boxes;" U.S. Pat. No. 4,785,610, entitled "Automatic machine for packaging products of different kinds in boxes;" U.S. Pat. No. 5,265,398, entitled "Automatic counting and boxing machine;" U.S. Pat. No. 5,943,847, entitled "Packaging machine for multi-packs;" U.S. Pat. No. 5,937,620, entitled "Packaging machine for

multi-packs;" U.S. Pat. No. 5,711,137, entitled "Packaging machine and method of packaging articles;" and U.S. Pat. No. 5,706,633, entitled "Packaging machine and method of packaging articles."

[0079] The summary is believed, at the time of the filing of this patent application, to adequately summarize this patent application. However, portions or all of the information contained in the summary may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the summary are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0080] It will be understood that the examples of patents, published patent applications, and other documents which are included in this application and which are referred to in paragraphs which state "Some examples of . . . which may possibly be used in at least one possible embodiment of the present application . . ." may possibly not be used or useable in any one or more embodiments of the application.

[0081] The sentence immediately above relates to patents, published patent applications and other documents either incorporated by reference or not incorporated by reference.

[0082] The corresponding foreign patent publication applications, namely, Federal Republic of Germany Patent Application No. 10 2004 040 633.2, filed on Aug. 21, 2004, having inventor Herbert Bernhard, and DE-OS 10 2004 040 633.2 and DE-PS 10 2004 040 633.2, are hereby incorporated by reference as if set forth in their entirety herein for the purpose of correcting and explaining any possible misinterpretations of the English translation thereof. In addition, the published equivalents of the above corresponding foreign and international patent publication applications, and other equivalents or corresponding applications, if any, in corresponding cases in the Federal Republic of Germany and elsewhere, and the references and documents cited in any of the documents cited herein, such as the patents, patent applications and publications, are hereby incorporated by reference as if set forth in their entirety herein.

[0083] All of the references and documents, cited in any of the documents cited herein, are hereby incorporated by reference as if set forth in their entirety herein. All of the documents cited herein, referred to in the immediately preceding sentence, include all of the patents, patent applications and publications cited anywhere in the present application.

[0084] The description of the embodiment or embodiments is believed, at the time of the filing of this patent application, to adequately describe the embodiment or embodiments of this patent application. However, portions of the description of the embodiment or embodiments may not be completely applicable to the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, any statements made relating to the embodiment or embodiments are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0085] The details in the patents, patent applications and publications may be considered to be incorporable, at applicant's option, into the claims during prosecution as further limitations in the claims to patentably distinguish any amended claims from any applied prior art.

[0086] Some examples of filling machines that utilize electronic control devices to control various portions of a filling or bottling process and that may possibly be utilized or possibly adapted for use in at least one possible embodiment of the present application may possibly be found in the following U.S. patents: U.S. Pat. No. 4,821,921 issued to Cartwright et al. on Apr. 18, 1989; U.S. Pat. No. 5,056,511 issued to Ronge on Oct. 15, 1991; U.S. Pat. No. 5,273,082 issued to Paasche et al. on Dec. 28, 1993; and U.S. Pat. No. 5,301,488 issued to Ruhl et al. on Apr. 12, 1994.

[0087] The purpose of the title of this patent application is generally to enable the Patent and Trademark Office and the public to determine quickly, from a cursory inspection, the nature of this patent application. The title is believed, at the time of the filing of this patent application, to adequately reflect the general nature of this patent application. However, the title may not be completely applicable to the technical field, the object or objects, the summary, the description of the embodiment or embodiments, and the claims as originally filed in this patent application, as amended during prosecution of this patent application, and as ultimately allowed in any patent issuing from this patent application. Therefore, the title is not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0088] The abstract of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b):

[0089] A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading "Abstract of the Disclosure." The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims.

Therefore, any statements made relating to the abstract are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

[0090] The embodiments of the invention described herein above in the context of the preferred embodiments are not to be taken as limiting the embodiments of the invention to all of the provided details thereof, since modifications and variations thereof may be made without departing from the spirit and scope of the embodiments of the invention.

AT LEAST PARTIAL LIST OF TERMS

- [0091] 1 Machine frame
- [0092] 2 Machine element
- [0093] 3 Support foot
- [0094] 4 Bearing arrangement
- [0095] 5 Shaft

- [0096] 6 Gear wheel
- [0097] 7 Disc
- [0098] 8 Bearing sleeve
- [0099] 9 Bolt
- [0100] 10 Ring
- [0101] 11, 12 Bearing
- [0102] 13 Annular gap
- [0103] 13.1, 13.2 Segment of the annular gap
- [0104] 14, 15 Gasket
- [0105] 16 Bearing mount
- [0106] 17, 18 Bolt
- [0107] 19 Lubricant or grease duct
- [0108] 19.1, 19.2 Segment of the lubricant or grease duct
- [0109] 20 Grease nipple
- [0110] 21 Duct
- [0111] 22 Closing element

What is claimed is:

1. A beverage bottling plant for filling beverage bottles with liquid beverage material;

said beverage bottling plant comprising:

a plurality of rotary machines, comprising at least a rotary beverage bottle filling machine and a rotary beverage bottle closing machine;

said beverage bottle filling machine being configured and disposed to fill beverage bottles with liquid beverage material;

said beverage bottle filling machine comprising:

a plurality of beverage bottle filling elements for filling beverage bottles with liquid beverage material;

each of said plurality of beverage bottle filling elements comprising a container carrier being configured and disposed to receive and hold bottles to be filled;

each of said plurality of beverage bottle filling elements being configured and disposed to dispense liquid beverage material into bottles to be filled;

at least one liquid reservoir being configured to hold a liquid to be bottled;

at least one supply line being configured and disposed to connect said at least one liquid reservoir to said beverage bottle filling machine to supply liquid beverage material to said beverage bottle filling machine;

a first beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles into said beverage bottle filling machine;

said first beverage bottle filling machine conveyer arrangement comprising a star wheel structure;

- a second beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles out of said beverage bottle filling machine;
- said second beverage bottle filling machine conveyer arrangement comprising a star wheel structure;
- at least one of said plurality of rotary machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of rotary machines;
- said bearing arrangement comprising:
 - a shaft being disposed vertically;
 - a sleeve being configured and disposed to encircle at least a portion of said shaft;
 - an annular space being disposed between said sleeve and said shaft;
 - said annular space being configured to hold a lubricant material;
 - a lower gasket being configured and disposed to close the lower portion of said annular space;
 - an upper gasket being configured and disposed to close the upper portion of said annular space;
 - at least two bearings being disposed in said annular space, between said shaft and said sleeve;
 - said at least two bearings comprising a lower bearing being disposed in the lower portion of said sleeve and an upper bearing being disposed in the upper portion of said sleeve;
 - said lower bearing being closer to said lower gasket than said upper bearing, and said upper bearing being closer to said upper gasket than said lower bearing;
 - said annular space extending from said lower bearing to said upper gasket;
 - said annular space being configured to permit movement of lubricant material from adjacent said lower bearing to adjacent said upper gasket;
 - a bearing arrangement lubrication system;
 - said bearing arrangement lubrication system comprising:
 - a lower lubrication duct being disposed in the lower portion of said sleeve;
 - said lower lubrication duct comprising a vertical duct portion being disposed to run parallel to said shaft and a horizontal duct portion being disposed perpendicularly to said vertical duct portion and being disposed to operatively connect to said annular space;
 - said lower lubrication duct being disposed adjacent said at least one bearing;
 - a lubricant inlet being configured and disposed to permit a lubricant material to be introduced into said lower lubrication duct;
 - said lower lubrication duct extending from said lubricant inlet to said lower bearing;
 - said lower lubrication duct being configured and disposed to permit the flow of a lubricant material into said annular space;
 - an upper lubrication duct being disposed in the upper portion of said sleeve;
 - said upper lubrication duct being disposed perpendicularly to said annular space, and being disposed to operatively connect to said annular space;
 - a removable closing element being configured and disposed to seal said upper lubrication duct;
 - said upper lubrication duct extending from said removable closing element to said upper gasket;
 - said removable closing element being configured to permit the flow of air out of said upper lubrication duct upon the introduction of a lubricant material into said lubrication system;
- said bottling plant further comprising a beverage bottle closing machine being configured and disposed to close tops of filled beverage bottles and comprising:
 - a rotor;
 - a rotatable vertical machine column;
 - said rotor being connected to said vertical machine column to permit rotation of said rotor about said vertical machine column;
 - a plurality of closing devices disposed on the periphery of said rotor;
 - each of said plurality of closing devices comprising a container carrier being configured and disposed to receive and hold filled bottles;
 - each of said plurality of closing devices being configured and disposed to place closures on bottles upon bottles being filled;
 - a first beverage bottle closing machine conveyer arrangement being configured and disposed to move bottles into said beverage bottle closing machine;
 - said first beverage bottle closing machine conveyer arrangement comprising a star wheel structure;
 - a second beverage bottle closing machine conveyer arrangement being configured and disposed to move bottles out of said beverage bottle closing machine;
 - said second beverage bottle closing machine conveyer arrangement comprising a star wheel structure.
- 2.** A container filling plant for filling containers with liquid beverage material;
 - said container filling plant comprising:
 - a plurality of machines, comprising at least a container filling machine and a container closing machine;
 - said container filling machine being configured and disposed to fill containers with liquid beverage material;

said container filling machine comprising:

- a rotor;
- a plurality of container filling elements for filling containers with liquid beverage material;
- each of said plurality of container filling elements comprising a container carrier being configured and disposed to receive and hold containers to be filled;
- each of said plurality of container filling elements being configured and disposed to dispense liquid beverage material into containers to be filled;
- at least one liquid reservoir being configured to hold a liquid for filling;
- at least one supply channel being configured and disposed to connect said at least one liquid reservoir to said container filling machine to supply liquid beverage material to said container filling machine;
- a first container filling machine conveyer arrangement being configured and disposed to move containers into said container filling machine;
- a second container filling machine conveyer arrangement being configured and disposed to move containers out of said container filling machine;
- at least one of said plurality of machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of machines;

said bearing arrangement comprising:

- a shaft;
- a sleeve being configured and disposed to envelop at least a portion of said shaft;
- an annular space being disposed between said sleeve and said shaft;
- said annular space being configured to hold a lubricant material;
- a first gasket being configured and disposed to close a first portion of said annular space;
- a second gasket being configured and disposed to close a second portion of said annular space;
- at least two bearings being disposed in said annular space, between said shaft and said sleeve;
- said at least two bearings comprising a first bearing being disposed in a first portion of said sleeve and a second bearing being disposed in a second portion of said sleeve;
- said first bearing being closer to said first gasket than said second bearing, and said second bearing being closer to said second gasket than said first bearing;
- said annular space extending from said first bearing to said second gasket;
- said annular space being configured to permit movement of lubricant material from adjacent said first bearing to adjacent said second gasket;

a bearing arrangement lubrication system;

said bearing arrangement lubrication system comprising:

- a first lubrication duct being disposed in a first portion of said sleeve;
 - said first lubrication duct comprising a first duct portion being disposed to run parallel to said shaft and a second duct portion being disposed transverse to said first duct portion and being disposed to operatively connect to said annular space;
 - said first lubrication duct being disposed adjacent said at least one bearing;
 - said first lubrication duct extending from said lubricant inlet to said first bearing;
 - said first lubrication duct extending from said lubricant inlet to said at least one bearing;
 - a lubricant inlet being configured and disposed to permit a lubricant material to be introduced into said first lubrication duct;
 - said first lubrication duct being configured and disposed to permit the flow of a lubricant material into said annular space;
 - a second lubrication duct being disposed in a second portion of said sleeve;
 - said second lubrication duct being disposed transverse to said annular space, and being disposed to operatively connect to said annular space;
 - said second lubrication duct extending from said removable closing element to said second gasket;
 - a removable closing element being configured and disposed to seal said second lubrication duct;
 - said removable closing element being configured to permit the flow of air out of said second lubrication duct upon the introduction of a lubricant material into said lubrication system;
- said container filling plant further comprising a container closing machine being configured and disposed to close tops of filled containers;
- said container closing machine comprising:
- a rotor;
 - a rotatable machine column;
 - said rotor being connected to said machine column to permit rotation of said rotor about said machine column;
 - a plurality of closing devices disposed on said rotor;
 - each of said plurality of closing devices comprising a container carrier being configured and disposed to receive and hold filled containers;
 - each of said plurality of closing devices being configured and disposed to place closures on containers upon containers being filled;

- a first container closing machine conveyor arrangement being configured and disposed to move containers into said container closing machine; and
- a second container closing machine conveyor arrangement being configured and disposed to move containers out of said container closing machine.
3. The container filling plant according to claim 2, wherein the at least one first duct ends at a segment of the annular space formed between the at least one bearing and a first gasket.
4. The container filling plant according to claim 3, comprising at least two bearings that are offset from each other in the axial direction of the shaft in the bearing sleeve or in the annular space.
5. The container filling plant according to claim 4, wherein the at least one first duct ends in the annular space in a segment between the first gasket and the bearing that is downstream of said gasket in the axial direction, and that the means for ventilation are provided between the second gasket and the bearing immediately downstream of said gasket in the axial direction of the shaft.
6. The container filling plant according to claim 5, wherein the means for the ventilation are formed by at least one closable second duct.
7. The container filling plant according to claim 6, wherein the means for ventilation are provided on a level that is above, in the vertical direction, the level at which the at least one first duct empties into the annular space.
8. The container filling plant according to claim 7, wherein the shaft is oriented with its axis in the vertical direction, and that the first duct empties into the annular space below the at least one bearing.
9. The container filling plant according to claim 8, wherein the at least one first duct extends with a partial segment in the bearing sleeve, preferably in the direction of the axis of the shaft.
10. The container filling plant according to claim 9, comprising a retaining ring to hold the at least one bearing, whereby the at least one first duct extends with at least a partial segment in said ring and empties into the annular space at a ring interior surface that surrounds the shaft.
11. The container filling plant according to claim 10, wherein the at least one first duct empties at the outer surface of the bearing arrangement or of the bearing sleeve at a lubricant or filling opening.
12. The container filling plant according to claim 11, wherein the lubricant or filling opening is formed by a grease nipple.
13. The container filling plant according to claim 12, wherein a bearing mount is provided on the machine frame to hold the bearing sleeve over a portion of its length, and that the lubrication or filling opening is located on a segment of the bearing sleeve that projects out of the bearing mount.
14. The container filling plant according to claim 13, wherein the annular space extends over the majority of the length of the shaft, for example at least 60% of the total length of the shaft.
15. The container filling plant according to claim 14, wherein:
- the annular space extends in the axial direction of the shaft over a length which is greater by a multiple than the

- diameter of the shaft, for example greater than the diameter of the shaft by a factor of 6 to 8; and
- the annular space is an annular chamber.
16. A beverage bottling plant for filling beverage bottles with liquid beverage material;
- said beverage bottling plant comprising:
- a plurality of rotary machines, comprising at least a rotary beverage bottle filling machine and a rotary beverage bottle closing machine;
- said beverage bottle filling machine being configured and disposed to fill beverage bottles with liquid beverage material;
- said beverage bottle filling machine comprising:
- a plurality of beverage bottle filling elements for filling beverage bottles with liquid beverage material;
- each of said plurality of beverage bottle filling elements comprising a container carrier being configured and disposed to receive and hold bottles to be filled;
- each of said plurality of beverage bottle filling elements being configured and disposed to dispense liquid beverage material into bottles to be filled;
- at least one liquid reservoir being configured to hold a liquid to be bottled;
- at least one supply line being configured and disposed to connect said at least one liquid reservoir to said beverage bottle filling machine to supply liquid beverage material to said beverage bottle filling machine;
- a first beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles into said beverage bottle filling machine;
- said first beverage bottle filling machine conveyer arrangement comprising a star wheel structure;
- a second beverage bottle filling machine conveyer arrangement being configured and disposed to move beverage bottles out of said beverage bottle filling machine;
- said second beverage bottle filling machine conveyer arrangement comprising a star wheel structure;
- at least one of said plurality of machines comprising a bearing arrangement being configured to permit rotation of said rotor in at least one of said plurality of machines;
- said bearing arrangement comprising:
- a shaft being disposed vertically;
- a sleeve being configured and disposed to encircle at least a portion of said shaft;
- an annular space being disposed between said sleeve and said shaft;
- said annular space being configured to hold a lubricant material;
- a lower gasket being configured and disposed to close the lower portion of said annular space;

an upper gasket being configured and disposed to close the upper portion of said annular space;

at least two bearings being disposed in said annular space, between said shaft and said sleeve;

said at least two bearings comprising a lower bearing being disposed in the lower portion of said sleeve and an upper bearing being disposed in the upper portion of said sleeve;

said lower bearing being closer to said lower gasket than said upper bearing, and said upper bearing being closer to said upper gasket than said lower bearing;

said annular space extending from said lower bearing to said upper gasket;

said annular space being configured to permit movement of lubricant material from adjacent said lower bearing to adjacent said upper gasket;

a long-term lubrication system in a bearing arrangement for a shaft of a machine for the handling and/or processing of bottles or similar containers, comprising:

a bearing sleeve that surrounds the shaft over at least a portion of its length;

at least one bearing in an annular space that is formed between the shaft and an interior surface of the bearing sleeve;

which annular space is closed by at least two gaskets that are offset from each other in the axial direction of the shaft, and holds a lubricant, for example grease for the at least one bearing;

wherein at least one first duct for the feed of the lubricant, which duct ends in the vicinity of the at least one bearing, and by means on a second segment of the annular space formed between the at least one bearing and a gasket, for the ventilation of said space.

17. The beverage bottling plant according to claim 16, wherein:

the at least one first duct ends at a segment of the annular space formed between the at least one bearing and a first gasket;

at least two bearings are offset from each other in the axial direction of the shaft in the bearing sleeve or in the annular space; and

the at least one first duct ends in the annular space in a segment between the first gasket and the bearing that is

downstream of said gasket in the axial direction, and that the means for ventilation are provided between the second gasket and the bearing immediately downstream of said gasket in the axial direction of the shaft.

18. The beverage bottling plant according to claim 17, wherein:

the means for the ventilation are formed by at least one closable second duct;

the means for ventilation are provided on a level that is above, in the vertical direction, the level at which the at least one first duct empties into the annular space; and

the shaft is oriented with its axis in the vertical direction, and that the first duct empties into the annular space below the at least one bearing.

19. The beverage bottling plant according to claim 18, wherein:

the at least one first duct extends with a partial segment in the bearing sleeve, preferably in the direction of the axis of the shaft;

a retaining ring holes the at least one bearing, whereby the at least one first duct extends with at least a partial segment in said ring and empties into the annular space at a ring interior surface that surrounds the shaft;

the at least one first duct empties at the outer surface of the bearing arrangement or of the bearing sleeve at a lubricant or filling opening; and

the lubricant or filling opening is formed by a grease nipple.

20. The beverage bottling plant according to claim 19, wherein:

a bearing mount is provided on the machine frame to hold the bearing sleeve over a portion of its length, and that the lubrication or filling opening is located on a segment of the bearing sleeve that projects out of the bearing mount;

the annular space extends over the majority of the length of the shaft, for example at least 60% of the total length of the shaft;

the annular space extends in the axial direction of the shaft over a length which is greater by a multiple than the diameter of the shaft, for example greater than the diameter of the shaft by a factor of 6 to 8; and

the annular space is an annular chamber.

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