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(71) Applicant: **STEELCO SPA**
31039 Riese Pio X (IT)

(72) Inventor: **Zardini, Fabio**
31033 Castelfranco Veneto (TV) (IT)

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

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(54) **Apparatus and method for transporting lids for containers**

(57) Apparatus for transporting lids (13) for containers (12) from a unit (16) for supplying lids (13) toward a subsequent operating station (40), comprising a pick-up zone (14) configured to receive lids (13) from the supply unit (16) and a multiple pick-up device (29) provided with a plurality of gripping heads (30) to simultaneously pick up an organized group of lids (13) and configured to be movable above the supply unit (16) between a position in the pick-up zone (14) and a position at said subsequent operating station (40). The apparatus also comprises a

multiple positioning device (18) provided with a plurality of housing seatings (19) to each house individually one of the lids (13) of the organized group of lids (13), each housing seating (19) being configured to be vertically aligned with a corresponding one of the gripping heads (30) in the position in the pick-up zone (14) and a movement device (25) configured to move the organized group of lids (13) from the pick-up zone (14) toward the multiple positioning device (18) and to insert them in the housing seatings (19).

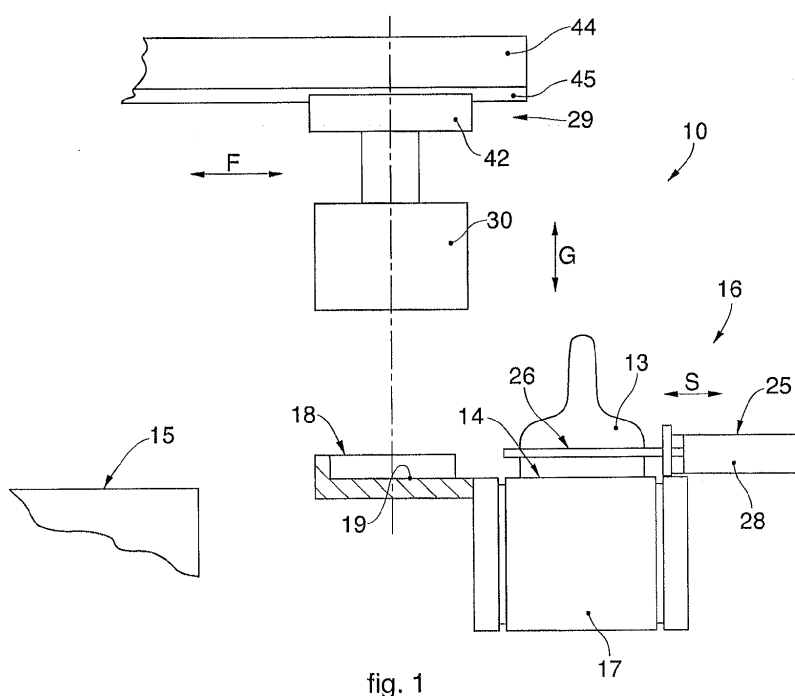


fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns an apparatus and corresponding method for transporting lids for containers, such as drinking bottles, feeding bottles, drinking troughs or other containers, or receptacles. In particular, the apparatus is applied, although not exclusively, in machines for treating containers and lids, such as a washing, drying and sterilizing machine.

BACKGROUND OF THE INVENTION

[0002] Machines used for washing containers for liquids, such as for example, but not only, drinking bottles, feeding bottles, drinking troughs or other receptacles are known, used for the nutrition of animals such as guinea pigs or laboratory rodents or other.

[0003] It is known that, before washing, the containers are closed with suitable lids or capsules; the lids are shaped with a lip to allow the animals to drink the liquid contained in the container and, at the end of washing, they must be supplied once again closed and refilled with another feeding liquid.

[0004] It is known to provide machines for washing the containers that comprise a plurality of operating stations disposed in line with each other. The machines can comprise a station for loading the closed containers, a station for removing the lids from the containers, or unlidding station, a washing station, a refilling station and a closing station to close the containers that have been washed and refilled, using said lids.

[0005] In known machines, the containers or the lids can be transferred between the operating stations either manually or in automated mode.

[0006] In the latter case it can be provided that the lids or the containers are transferred by transfer means such as conveyor belts, pick-up apparatuses, transport apparatuses or suchlike.

[0007] Within the field of such machines, the international patents WO-A-2010/125168, WO-A-2010/140042, WO-A-2010/140043, WO-A-2011/045256, WO-A-2011/138661 and WO-A-2011/158085 are known, all in the name of the present Applicant.

[0008] A device to simultaneously feed closing tops of containers is also known from FR-A-2.606.006.

[0009] Furthermore, from GB-A-2.280.428 a device to simultaneously seal containers using closing lids is known.

[0010] In particular, the international patent WO-A-2010/140048 in the name of the present Applicant is also known, which describes a machine for treating containers of liquids which provides automatic movement operations of the containers and lids.

[0011] This known machine comprises a loading station for the containers to be subjected to treatment, an unlidding station in which the lids are removed from each

of the containers, a washing station to subject the containers without lids to washing, and a reclosing station in which the washed containers are reclosed with the relative lids.

[0012] In particular, once they have been washed, the lids are transferred by means of transfer means toward a pick-up zone, where there is a multiple pick-up device which picks them up in organized groups for subsequent reclosing operations.

[0013] To this purpose it is desirable that there is a precise reciprocal positioning of the individual gripping heads of the multiple pick-up device and each of the lids of one specific organized group of lids to be picked up.

[0014] One purpose of the present invention is to produce a transport apparatus of lids which allows a precise positioning of the lids of the organized groups of lids to be picked up and which, therefore, reduces or prevents interference during the movement operations from one operating station to another of a treatment machine for containers.

[0015] Another purpose of the present invention is to produce a transport apparatus for lids which is simple and economical.

[0016] Another purpose of the present invention is to perfect a transport method which is reliable, repeatable and efficient.

[0017] The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0018] The present invention is set forth and characterized in the independent claim, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0019] According to some forms of embodiment of the present invention, an apparatus for transporting lids for containers comprises a unit for supplying lids and is configured to transport the lids from the supply unit toward a subsequent operating station.

[0020] The apparatus also comprises a pick-up zone configured to receive lids from the supply unit and multiple pick-up device provided with a plurality of gripping heads in order to simultaneously pick up an organized group of lids and configured to be movable above the supply unit, between a position in the pick-up zone and a position at the subsequent operating station.

[0021] According to some forms of embodiment, the apparatus also comprises:

- a multiple positioning device provided with a plurality of housing seatings each of which is configured to receive inside it and house individually a corresponding one of the lids of said organized group of lids, each of the housing seatings being configured to be vertically aligned with a corresponding one of the

gripping heads in the position in the pick-up zone; each of the housing seatings being open at the upper part and being provided with a lateral aperture for the insertion of a lid, and being configured so that an insertion path of a corresponding lid from the pick-up zone in a corresponding housing seating is tangential to the housing seatings, parallel to a common or parallel lying plane between the pick-up zone and the multiple positioning device, and

- a movement device configured to move the organized group of lids in a movement direction from the pick-up zone toward the multiple positioning device and to insert them in the housing seatings.

[0022] In some forms of embodiment, the supply unit is configured to feed the lids in a direction of advance transverse to the direction of movement of the lids defined by the movement device.

[0023] In this way it is possible to obtain a precise and repetitive positioning of the lids so as to make them always available in the same position for the subsequent pick-up by the gripping heads.

[0024] With the present invention problems of interference between parts of the gripping heads and the lids themselves are therefore avoided, and thus damages or manual interventions of an operator to re-establish the correct functioning conditions of the treatment machine are avoided.

[0025] Some forms of embodiment also concern a re-closing station of containers using lids that comprises the apparatus for transporting lids for containers as described above.

[0026] Some forms of embodiment also concern a machine for treating containers and lids that comprises the re-closing station.

[0027] The present invention also concerns a method for transporting lids for containers that comprises: supplying the lids using a unit for supplying lids in a direction of advance and transporting the lids from the unit for supplying lids toward a subsequent operating station. In particular the transport provides the simultaneous pick-up of an organized group of lids, aligned in a direction of advance defined by the supply unit, by a plurality of gripping heads in a position in a pick-up zone, and the delivery of the organized group of lids in a position at the subsequent operating station.

[0028] Some forms of embodiment provide the simultaneous movement, in a direction of movement transverse to the direction of advance, of the organized group of lids or the sequential movement of each of the lids of the organized group of lids, from the pick-up zone to housing seatings of a multiple positioning device. Each of the housing seatings receives inside it and houses individually a corresponding one of the lids, so that the lids are both aligned in a direction parallel to the direction of advance, and also aligned to the gripping heads. Typically, the lids can be moved from the pick-up zone laterally, that is, in a transverse direction of movement with

respect to the direction of advance.

[0029] In some forms of embodiment, the lids are inserted into the corresponding housing seatings along an insertion path tangential to the housing seatings, parallel to a common or parallel lying plane between pick-up zone and multiple positioning device.

[0030] In particular, housing seatings of a multiple positioning device can be provided, which can receive the lids that are moved and can be aligned horizontally in a direction parallel to a direction in which the gripping heads are disposed in the position in the pick-up zone. Moreover, each of the housing seatings can be aligned vertically to a corresponding gripping head in the position in the pick-up zone.

[0031] Some forms of embodiment also concern a method for reclosing the containers using lids that comprises the method for transporting containers as described above.

[0032] Moreover, some forms of embodiment also concern a method for treating containers and lids that comprises the method for re-closing containers using lids as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic representation of a transport apparatus for lids for containers according to one form of embodiment of the present invention;
- fig. 2 is a schematic representation of a transport apparatus according to the present invention associated with a treatment machine;
- fig. 3 is a perspective view of a portion of the apparatus according to the present invention, in a first operating condition;
- fig. 4 is a plan view of a detail of the apparatus according to the present invention;
- fig. 5 is a perspective view of a part of the apparatus in fig. 3 in a second operating condition;
- fig. 6 is a perspective view of a part of the apparatus in fig. 3 in a third operating condition.

[0034] To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings.

DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

[0035] With reference to the attached drawings, some forms of embodiment of a transport apparatus 10 according to the present invention are described, which is usable for transporting lids 13 from a unit 16 for supplying lids

13 to another operating station.

[0036] The supply unit 16 is configured to define a direction of advance D of the lids 13, which is typically a linear or longitudinal direction.

[0037] For example, an operating station can be a re-closing station 40 (fig. 2) configured to close containers 12 at the top with the lids 13, typically after both the containers 12 and the lids 13 have been washed and dried, with the provision that, generally, the containers 12 are also re-filled, for example with feeding liquid.

[0038] The re-closing station 40 can be part of a machine 11 for treating, washing and re-filling containers 12 and corresponding lids 13. The machine 11 generally receives the dirty containers 12 with their lids 13 on. The containers 12 have their lids removed and are washed, dried and re-filled, while the lids 13, once separated from the containers 12, are also washed and dried, then to be used once again to re-close the cleaned and re-filled containers.

[0039] Typically, for example during the treatment cycle in the machine 11, the containers 12 are contained in racks 41, inside which a plurality of suitable individual housings are provided in which the containers 12 are disposed according to a desired positioning pattern in "n" rows and "m" columns. For example, both the value "n" and the value "m" can be an integer greater than or equal to two. For example, a positioning pattern of the containers 12 in a rack 41 can be three rows by six columns, abbreviated 3x6, as shown in fig.2 for example, or 3x5, or 3x4, or even 4x6, or 4x5 or other positioning patterns.

[0040] The containers 12 can be feeding bottles or suchlike to feed small animals, such as guinea pigs, mice, hamsters and others, for example used in pharmaceutical research laboratories. The lids 13 are generally all the same shape and size.

[0041] In some forms of embodiment, the apparatus 10 can be configured to move at least one lid 13 from a pick-up zone 14, which can be fed by the supply unit 16 receiving the lids 13 in the direction of advance D, toward a delivery zone 15 at the re-closing station 40.

[0042] Fig. 2 is used to describe a plurality of forms of embodiment, which can all be combined with forms of embodiment described here, in which the apparatus 10 is configured to move a plurality of lids 13 at a time, in this case three lids 13. In particular, the apparatus 10 can comprise a mobile multiple pick-up device 29, which includes a plurality of gripping heads 30. The multiple pick-up device 29 is configured to pick up an organized group of lids 13 each time and render it available to the delivery zone 15.

[0043] The gripping heads 30 can be connected to, be incorporated or integrated with, or comprise mechanical treatment devices, suction devices operating under sub-atmospheric pressure, sucker devices, magnetic retaining devices, or similar devices with the function of retaining and subsequently selectively releasing the lids 13 during movement.

[0044] In some forms of embodiment it can be provided

that the multiple pick-up device 29 is also configured to re-close the containers 12 using the lids 13.

[0045] In possible implementations, the gripping heads 30 can be configured according to a pattern which repeats a part, for example a column formed by "n" housings, of the pattern of the housings of the racks 41.

[0046] The gripping heads 30 are configured to pick up and retain, essentially simultaneously, an organized group of lids 13 supplied by the supply unit 16.

[0047] In some forms of embodiment, the multiple pick-up device 29 can comprise a positioning slider 42 mounted cantilevered and able to slide transversely, in this case perpendicularly as indicated by the arrow F, with respect to the direction of advance D defined by the supply unit 16, which typically can be linear. Typically, the gripping heads 30 are installed on the positioning slider 42, facing downward so as to pick up the lids 13, advantageously in ordered groups, and to dispose them to close the containers 12. The positioning slider 42 thus moves the gripping heads 30 in a transverse direction, in this case perpendicular, to a direction of working X of the racks 41 in the washer machine 11, which is also transverse to the direction of advance D.

[0048] The gripping heads 30 are disposed with respect to each other as a function of the positioning pattern and the distances at which the containers 12 are disposed in the rack 41 and at which the lids 13 are kept.

[0049] The gripping heads 30 are selectively movable in a substantially vertical direction G by a corresponding actuator 43, so that they can be lowered or raised in order to pick up, support and position the lids 13 during the closing steps of the containers 12.

[0050] In this case the positioning slider 42 is mounted sliding on a bridge structure 44 by corresponding transverse linear guides 45, in this case perpendicular to the working direction X along the machine and also transverse to the direction of advance D. The selective movement of the positioning slider 42 is actuated by a mechanical actuator 46, in this case a screw, for example with recirculating balls, directly connected to the positioning slider 42.

[0051] In some forms of embodiment, the supply unit 16 can be a loading station provided to feed the lids 13 in organized groups, for example formed by two, three, four or even more than four lids 13, to the pick-up zone 14.

[0052] In some forms of embodiment the pick-up zone 14 is disposed immediately downstream of the supply unit 16 and can comprise a support plane for example.

[0053] In other forms of embodiment, for example those shown in figs. 1-3 and 5, 6, the supply unit 16 is provided with the pick-up zone 14.

[0054] In some forms of embodiment, the supply unit 16 can comprise a conveyor belt 17 for example, configured to transfer the lids 13 from a provisioning station, not shown in the drawings, toward the pick-up zone 14, in the direction of advance D. Consequently, the movement, by means of appropriate actuators, and the longitudinal development of the conveyor belt 17 can define

the direction of advance D. In possible implementations, the conveyor belt 17 can be provided with lateral containing walls 38 for the lids 13.

[0055] In other forms of embodiment the supply unit 16 can comprise transfer means such as a rotating drum, vibrating means, or other transfer means suitable to the purpose and adapted to define the direction of advance D.

[0056] In some forms of embodiment, between the pick-up zone 14 and the delivery zone 15 a multiple positioning device 18 can be interposed, configured to receive and position the organized groups of lids 13.

[0057] During the transport operations, the organized group of lids 13 to be transferred to the delivery zone 15 is disposed on each occasion in a precise manner, to be able to be picked up and transported by the multiple pick-up device 29.

[0058] The multiple positioning device 18 (figs. 3 and 4) is provided with a plurality of housing or positioning seatings 19, in each of which a lid 13 can be positioned in a controlled manner.

[0059] The housing seatings 19 are all the same shape, mating with that of the lids 13, so as to accommodate them precisely inside.

[0060] We maintain that the housing seatings 19 allow a precise and repetitive positioning of the organized groups of lids 13 and therefore prevent interference which could be generated between the gripping heads 30 and the lids 13.

[0061] Each of the housing seatings 19 can have a plan size slightly bigger, for example at least 1%, optionally at least 2% or even at least 5%, to a maximum of 10%, optionally to a maximum of 7%, than the plan size of each of the lids 13.

[0062] The housing seatings 19 are made in accordance with the positioning pattern of the gripping heads 30 as described above. In this way, when the multiple pick-up device 29 is positioned above the multiple positioning device 18, the housing seatings 19 are aligned axially, that is, aligned vertically as can be seen in fig. 1, with the gripping heads 30. Consequently, the groups of lids 13 that are positioned on each occasion in the housing seatings 19 are also aligned vertically with the gripping heads 30. Moreover, as explained in detail hereafter, the lids 13 positioned with precision in the housing seatings 19 are also aligned, typically horizontally, in a direction P parallel to the direction of advance D.

[0063] In forms of embodiment described using figs. 3-6, the multiple positioning device 18 comprises a support platform 20, for example prismatic in shape. The housing seatings 19 can be provided in the support platform 20, according to the pre-defined pattern. In possible implementations, the housing seatings 19 are made lowered, that is, they are made as hollows or cavities, open at the upper part and partly laterally, in the thickness of the support platform 20.

[0064] As we said, the housing seatings 19 made in the support platform 20 have shape and sizes mating

with the plan shape and sizes of the lids 13.

[0065] Each of the housing seatings 19 has a lateral aperture 23 (fig. 4) for the insertion of a lid 13. Each aperture 23 is made laterally so that the insertion travel of the lid 13 from the pick-up zone 14 occurs tangentially, parallel to a common or parallel lying plane between pick-up zone 14 and multiple positioning device 18.

[0066] Each aperture 23 has an amplitude configured to allow the passage through it of one of the lids 13, essentially without interference.

[0067] Each of the housing seatings 19 is also open at the upper part, so that the lid 13 positioned in it can be extracted in the direction of extraction G (figs. 1, 2 and 6) transverse, for example perpendicular, to the common or parallel lying plane between pick-up zone 14 and multiple positioning device 18. As we said, this extraction can be carried out by means of the gripping heads 30 described above that are vertically mobile.

[0068] In forms of embodiment described with reference to fig. 4, the housing seatings 19 are delimited at the lower part by a bottom wall 22 (fig. 4) and laterally by a lateral abutment wall 21 which has the aperture 23 through which it is possible to insert a lid 13.

[0069] The lids 13 abut in a stable and precise manner against the abutment wall 21 of each housing seating 19 during use.

[0070] The bottom wall 22 of each of the housing seatings 19 is suitable to support the lids 13.

[0071] The bottom wall 22 can be disposed, during use, substantially coplanar to the pick-up zone 14 or, in other forms of embodiment, a little lower than it, for example a few millimeters lower.

[0072] In some forms of embodiment, the support platform 20 has an external perimeter edge 24 which is shaped to define the apertures 23 of the housing seatings 19. The support platform 20 is disposed, during use, with the apertures 23 facing toward the supply device 16, for example toward the conveyor belt 17.

[0073] In possible implementations, each of the housing seatings 19 has a portion shaped as a lead-in 39, which can for example delimit each aperture 23 laterally, and which can facilitate the separation of the lids 13 and the insertion of the latter into the housing seatings 19.

[0074] In forms of embodiment described using figs. 3, 5 and 6, the multiple positioning device 18 can be disposed laterally adjacent to the conveyor belt 17, or parallel to the direction of transport of the lids 13 in the direction of advance D. In this way, the housing seatings 19 are disposed in the direction P parallel to the direction of advance D of the lids 13.

[0075] With reference to forms of embodiment described for example using figs. 3, 5 and 6, the apparatus 10 can comprise a movement device 25, for example using linear translation, suitable to move the lids 13 made available near the pick-up zone 14 toward the multiple positioning device 18 and in a movement direction S. In particular, the movement device 25 can be configured to simultaneously engage all the lids 13 of an organized

group of lids 13 which is supplied, for example at the pick-up zone 14, and to move them simultaneously toward the multiple positioning device 18, causing the insertion of each of the lids 13 into the respective housing seatings 19.

[0076] The movement device 25 can be disposed in correspondence to the pick-up zone 14 and on the opposite side with respect to that where there is the multiple positioning device 18.

[0077] In particular, the movement device 25 is provided to translate the lids 13 from the pick-up zone 14 toward the housing seatings 19.

[0078] During the movement of the lids 13 it can be provided that these translate remaining in contact at least with the pick-up zone 14 and/or the bottom wall 22 of the housing seatings 19. During this operation the lids 13 are inserted through the apertures 23 in order to be positioned stably and in abutment against the abutment wall 21 of each housing seating 19.

[0079] In possible forms of embodiment, the movement device 25 comprises a thruster element 26 to thrust the lids 13 received in the pick-up zone 14 toward the multiple positioning device 18.

[0080] In possible forms of embodiment, described for example with reference to figs. 1, 3, 5 and 6, the thruster element 26 is disposed above the transfer surface of the conveyor belt 17. The thruster element 26 has a length suitable to allow the transfer of the lids 13, in particular an organized group of lids 13.

[0081] The thruster element 26 can comprise a fork 27, or similar U-shaped element; its prongs 27a, 27b are disposed laterally and substantially parallel to the longitudinal development of the conveyor belt 17 to define a concavity 27c facing toward the lids 13 arriving from the supply unit 16.

[0082] The concavity 27c of the fork 27 has sizes such as to allow the lids 13 that are to be moved to the multiple positioning device 18 to be inserted and contained inside it, in particular an organized group of lids 13 each time.

[0083] In still other forms of embodiment, the thruster element 26 can comprise a bar disposed parallel to the conveyor belt 17, a buffer or similar component which has the function of thrusting the lids 13.

[0084] The movement device 25 can also include an actuator 28 provided to move the thruster element 26, and determine the movement of the lids 13.

[0085] The activation of the actuator 28 determines the movement of the thruster element 26 from the pick-up zone 14, in which it is in its inactive condition, toward the multiple positioning device 18 in which it delivers the lids 13.

[0086] The actuator 28 can be chosen from a group comprising at least one of either a linear actuator, a pneumatic actuator, an electric actuator, a hydraulic actuator, crank-rod mechanisms, or similar means suitable to determine a translation of the thruster element 26.

[0087] The apparatus 10 according to the present invention can also comprise an optical acquisition unit 31

provided to control the movements to which the lids 13 are subjected.

[0088] In one form of embodiment, for example the one shown in figs. 3, 5 and 6, the optical acquisition unit 31 comprises at least one first detection device 32. The first detection device 32 is disposed between the supply unit 16 and the pick-up zone 14, and is suitable to control the movement of the lids 13 toward the pick-up zone 14.

[0089] The first detection device 32 can have the function of counting the number of lids 13 which are transferred on each occasion to the pick-up zone 14.

[0090] The optical acquisition unit 31 can also comprise at least one second detection device 36, in this case two second detection devices 36, configured to detect the presence and possibly the correct positioning or alignment of the lids 13 in the housing seatings 19 of the multiple positioning device 18.

[0091] Forms of embodiment of the present invention can provide that the first 32 and the second detection device or devices 36 are chosen from a group comprising at least one of either a video camera, a light emitter, a laser emitter, an encoder or a photo-diode.

[0092] In some forms of embodiment it can be provided that, before the pick-up zone 14, the supply unit 16 is provided with a blocking device 33 with the function of selectively blocking the advance of more lids 13 toward the pick-up zone 14. The blocking device 33 allows the passage of a determinate number of lids 13, possibly counted by the first detection device 32, toward the pick-up zone 14. The number of lids 13 that are allowed to pass can correspond to the number of housing seatings 19 provided in the multiple positioning device 18.

[0093] In some forms of embodiment it can be provided that the blocking device 33 comprises a pin 34 able to be selectively actuated by an actuator 35 which disposes it transverse to the direction of advance D of the lids 13.

[0094] In the forms of embodiment in figs. 3, 5 and 6 two blocking devices 33 are provided, disposed on opposite sides with respect to the conveyor belt 17.

[0095] In the form of embodiment in fig.5 it is also provided that the apparatus 10 comprises a delimiting element 37 with the function of delimiting the pick-up zone 14 and therefore the containing space for the lids 13.

[0096] The delimiting element 37 is conformed as a plate and is disposed transverse to the direction of advance D of the lids 13. In this way, the lids 13, advancing from the supply unit 16 toward the pick-up zone 14, are blocked as soon as they come up against the delimiting element 37. The delimiting element 37 is disposed in a suitable position to allow the subsequent insertion of the lids 13 into the housing seatings 19.

[0097] More specifically, the delimiting element 37 is positioned in correspondence to the last aperture 23 present on the multiple positioning device 18, evaluated with respect to the direction of advance of the lids 13.

[0098] The functioning of the apparatus 10 will now be described with reference to figs. 1-6.

[0099] The lids 13 are made to move forward by means

of the conveyor belt 17, in a direction of advance D, and toward the pick-up zone 14 which is contained in the conveyor belt 17 or possibly separated from it.

[0100] The first detection device 32 counts the number of lids 13 passing in the pick-up zone 14. The blocking device 33 is activated to block the progress of more lids 13, once the predetermined number of lids 13 has been reached,

[0101] The lids 13 advancing in the pick-up zone 14, for example due to the thrusting effect of the other lids 13, or the effect of the conveyor belt 17 itself, are blocked by the delimiting element 37.

[0102] Both the blocking device 33 and the delimiting element 37 avoid a direct control on the drive, that is, the activation/de-activation, of the conveyor belt 17, which during the pick-up operations can be made to advance continuously.

[0103] The lids 13 are then moved by the movement device 25 from the pick-up zone 14 toward the multiple positioning device 18. During the transfer, the lids 13 are inserted into the housing seatings 19 where the pick-up device 29 provides to pick them up to make them available to the delivery zone 15, typically for the purpose of re-closing or re-lidding the containers 12 once these have been washed, dried and re-filled.

Claims

1. Apparatus for transporting lids (13) for containers (12) comprising a unit (16) for supplying lids (13), said apparatus being configured to transport said lids (13) from the supply unit (16) toward a subsequent operating station (40), said apparatus comprising a pick-up zone (14) configured to receive lids (13) from the supply unit (16) and a multiple pick-up device (29) provided with a plurality of gripping heads (30) to simultaneously pick up an organized group of lids (13) and configured to be movable above the supply unit (16) between a position in the pick-up zone (14) and a position at said subsequent operating station (40), **characterized in that** said apparatus comprises:

- a multiple positioning device (18) provided with a plurality of housing seatings (19) each of which is configured to receive inside it and house individually a corresponding one of said lids (13) of said organized group of lids (13), each of said housing seatings (19) being configured to be vertically aligned with a corresponding one of the gripping heads (30) in the position in the pick-up zone (14), each of said housing seatings (19) being open at the upper part and being provided with a lateral aperture (23) for the insertion of a lid (13), configured so that an insertion path of a corresponding lid (13) from the pick-up zone (14) to a corresponding housing seating (19) is

tangential, parallel to a common lying plane or parallel between the pick-up zone (14) and multiple positioning device (18),

- a movement device (25) configured to move said organized group of lids (13) in a movement direction (S), from said pick-up zone (14) toward the multiple positioning device (18) and to insert them in said housing seatings (19), said supply unit (16) being configured to feed said lids (13) in a direction of advance (D) transverse to said direction of movement (S) of said lids (13) defined by said movement device (25).

2. Apparatus as in claim 1, **characterized in that** the multiple positioning device (18) comprises a support platform (20) in which said housing seatings (19) are provided.
3. Apparatus as in claim 2, **characterized in that** said support platform (20) has an external perimeter edge (24) which is shaped to define the apertures (23) of the housing seatings (19).
4. Apparatus as in claim 2 or 3, **characterized in that** said support platform (20) is disposed, during use, with the apertures (23) facing toward the supply device (16).
5. Apparatus as in any claim hereinbefore, **characterized in that** the housing seatings (19) are delimited at the lower part by a bottom wall (22) which functions as a support for the lid (13) and laterally by a lateral abutment wall (21) which functions as an abutment for the lid (13) and which has a corresponding aperture (23) through which a lid (13) is inserted.
6. Apparatus as in any claim hereinbefore, **characterized in that** each of the housing seatings (19) has a portion shaped as a lead-in (39), configured to delimit each aperture (23) laterally, and to facilitate the separation of the lids (13) and the insertion of the lids (13) in the housing seatings (19).
7. Apparatus as in any claim hereinbefore, **characterized in that** said pick-up zone (14) and said multiple positioning device (18) have a common lying plane.
8. Apparatus as in any claim hereinbefore, **characterized in that** said multiple positioning device (18) is adjacent to said pick-up zone (14).
9. Apparatus as in any claim hereinbefore, **characterized in that** said supply unit (16) of said lids (13) comprises said pick-up zone (14).
10. Apparatus as in any claim hereinbefore, **characterized in that** said movement device (25) comprises a thruster element (26) to thrust at least one of said

lids (13) from the pick-up zone (14) toward the multiple positioning device (18) **and in that** said thruster element (26) comprises a fork (27) with a concavity (27c) facing toward the lids (13) arriving from said supply unit (16) and is configured to receive said organized group of lids (13). 5

11. Apparatus as in any claim hereinbefore, **characterized in that**, before the pick-up zone (14), said supply unit (16) is provided with a blocking device (33) to block the advance of said lids (13). 10

12. Apparatus as in any claim hereinbefore, **characterized in that** the multiple pick-up device (29) comprises a positioning slider (42) mounted cantilevered and able to slide transversely with respect to said direction of advance (D) defined by the supply unit (16) and configured to move the gripping heads (30) in a direction transverse to said direction of advance (D). 15 20

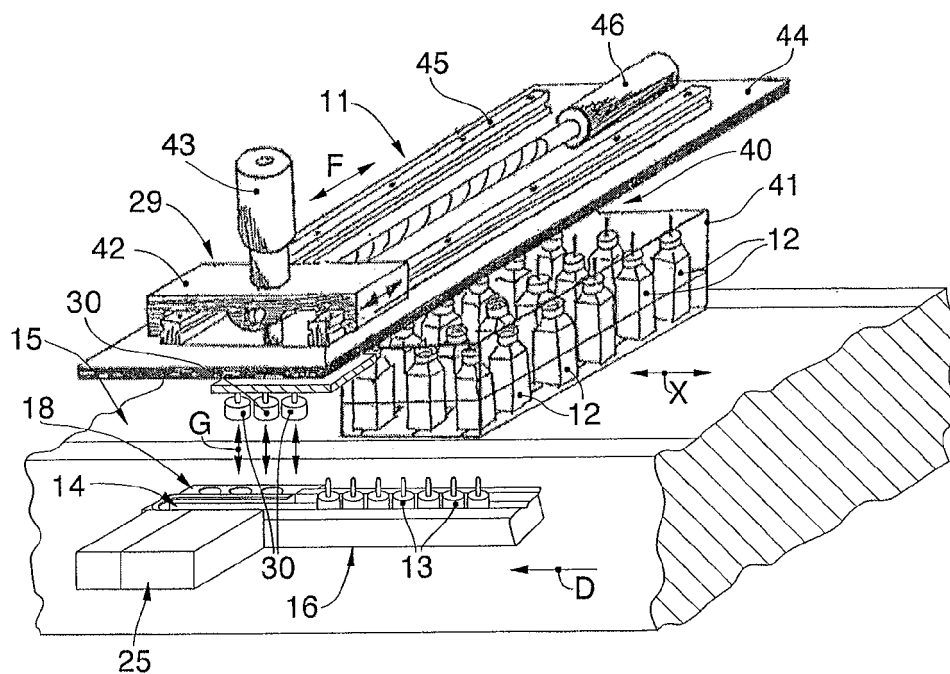
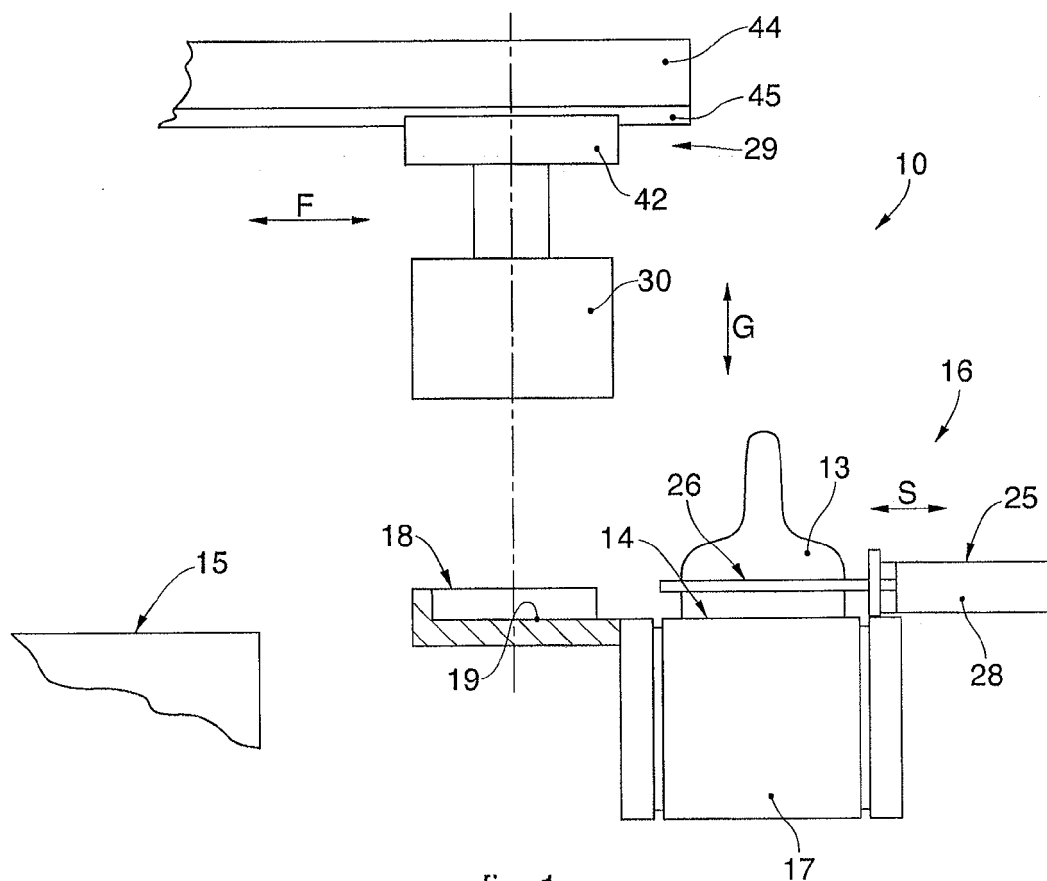
13. Apparatus as in claim 12, **characterized in that** said gripping heads (30) are installed on the positioning slider (42), facing downward, in order to pick up the lids (13) and dispose them to close the containers (12). 25

14. Apparatus as in claim 12 or 13, **characterized in that** the positioning slider (42) is mounted sliding on a bridge structure (44) by means of corresponding linear guides (45) transverse to the direction of advance (D), **in that** a mechanical actuator (46) is provided directly connected to the positioning slider (42) and configured for the selective movement of the positioning slider (42), **and in that** an actuator (43) is provided configured to selectively move said gripping heads, by lowering them and lifting them, in a substantially vertical direction (G), so as to pick up, support and position the lids (13) during the closing steps of the containers (12). 30 35 40

15. Method to transport lids (13) for containers (12) comprising:

- supplying said lids by means of a unit (16) for supplying lids (13) in a direction of advance (D), 45
 - transporting said lids (13) from the unit (16) for supplying lids (13) toward a subsequent operating station (40), providing at least to simultaneously pick up an organized group of lids (13) aligned in a direction of advance (D) defined by the supply unit (16), using a plurality of gripping heads (30) in a position in a pick-up zone (14), and to deliver said lids (13) to a position at said subsequent operating station (40), 50 55
- characterized in that** it provides:
- to move the lids (13) in a direction of movement (S) transverse to the direction of advance (D)

from said pick-up zone (14) to housing seatings (19) of a multiple positioning device (18), each of the housing seatings (19) receiving inside it and housing individually a corresponding one of said lids (13), so that said lids (13) are both aligned in a direction (P) parallel to the direction of advance (D), and also aligned with the gripping heads (30), said housing seatings (19) being aligned with the gripping heads (30) in the position in the pick-up zone (14), wherein said lids (13) are inserted into the corresponding housing seatings (19) in an insertion path tangential to said housing seatings (19), parallel to a common or parallel lying plane between the pick-up zone (14) and the multiple positioning device (18).



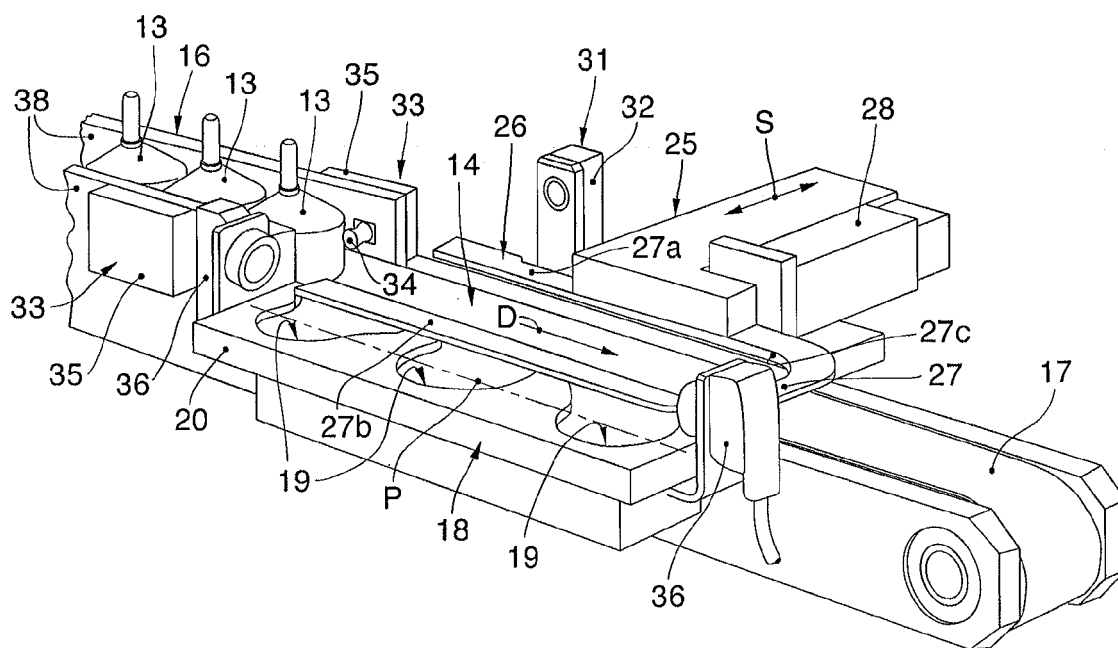


fig. 3

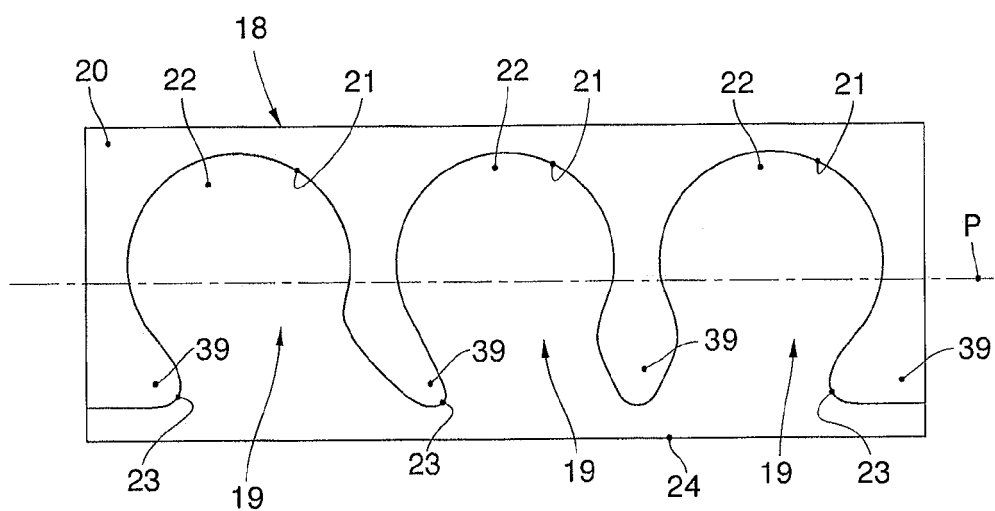


fig. 4

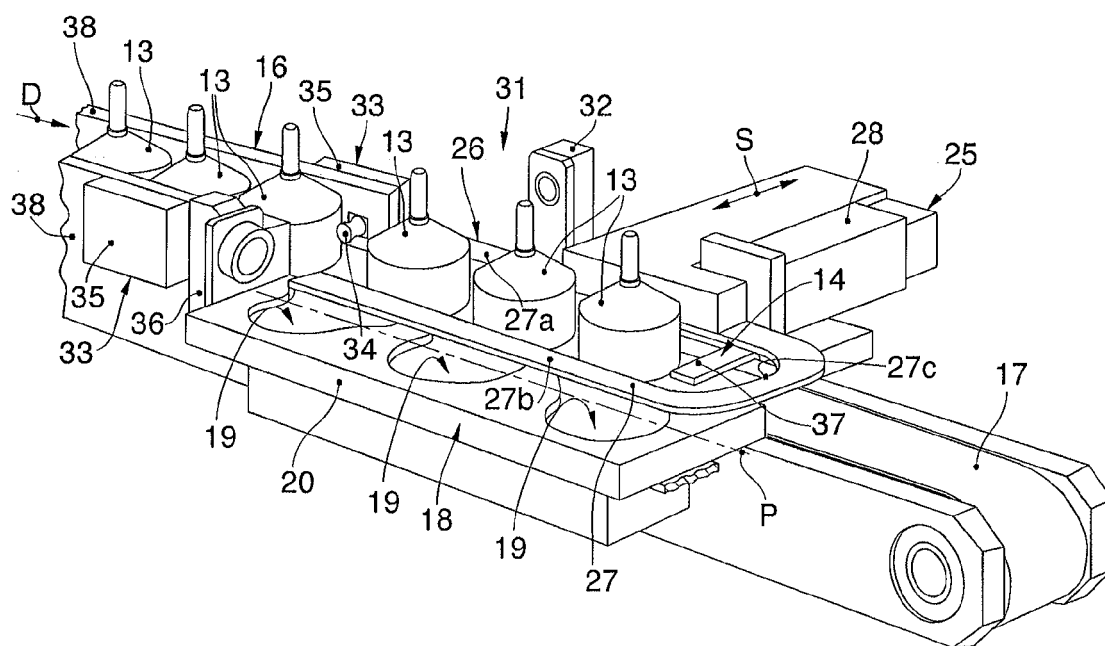


fig. 5

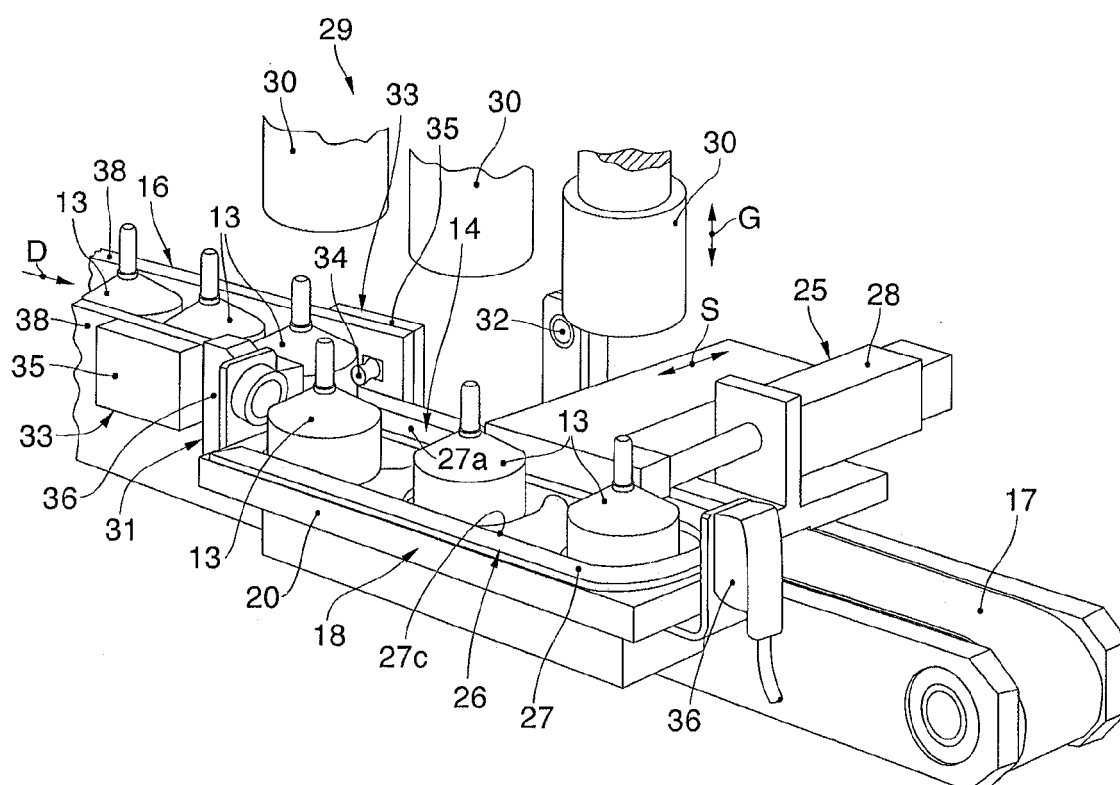


fig. 6



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Place of search The Hague		Date of completion of the search 21 March 2014	Examiner van der Zee, Willem
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EUROPEAN SEARCH REPORT

Application Number
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