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(54) DEVICE AND METHOD FOR OPENING CONTAINERS OF LIQUIDS

VORRICHTUNG UND VERFAHREN ZUR ÖFFNUNG VON FLÜSSIGKEITSBEHÄLTERN

DISPOSITIF ET MÉTHODE D'OUVERTURE DE RÉCIPIENTS DE LIQUIDE

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Description

FIELD OF THE INVENTION

[0001] The present invention concerns a device and relative method for opening or uncapping containers of liquids in accordance with the preamble of claim 1, respectively claim 7, for example, but not exclusively, feeding bottles, watering bottles or other containers or receptacles, for feeding animals. In particular, with the present invention, it is possible to open the containers in a simple and efficient way, in order to dispose them for washing and/or sterilization, for example, but not only, in an at least partly automated washing line.

BACKGROUND OF THE INVENTION

[0002] Machines are known, at least partly automated or manual, used for washing containers for liquids, for example, but not only, for feeding bottles, watering bottles or others, which can be used for feeding animals such as for example guinea pigs or rodents in laboratories or others.

[0003] It is known that, before washing, the containers are closed by means of lids or caps, the lids being shaped with a spout to allow the animal to take the liquid contained in the container, and that at the end of washing they must be supplied closed and refilled with new liquid.

[0004] Such washer machines are structured with several operating stations disposed in a line with respect to each other, among which there is a loading station of the closed containers, a station for removing the caps from the containers, or de-capping station, a washing station, a re-filling station and a closing station for closing the washed and re-filled containers, by means of the caps.

[0005] It is also known to dispose and group together a plurality of containers in suitable washing baskets or containers, provided with relative containing cells, so as to keep the containers in a desired disposition during all the operating steps of the machine.

[0006] It is also known to provide an individual treatment, or in non-ordered or nonhomogeneous groups of containers, for example in machines which are mainly manual and have a reduced capacity.

[0007] The lids are normally constrained with an airtight seal to the containers. In known solutions which provide the removal station, the closed containers are opened by removing the lids with an extractor.

[0008] In general, such known extractors, as for example in the patent application WO 2011045256 A1, published on 21.04.2011, in the name of the present Applicant, use an induced pneumatic action to remove the lid from the container and are provided with mechanical retaining members which actuate a radial gripping action on the lid in order to hold it in the extraction and transport steps.

[0009] However, such members, even though they are efficient to guarantee a correct gripping of the lid in the

steps specified above, need specific actuator mechanisms, both to define the gripping and also to release the lid, for example in order to return it to the relative baskets to be sent for washing.

[0010] These commands not only have their own planning and production costs, but can also malfunction, causing slow-downs or interruptions in operations, and so they require periodic maintenance and control interventions.

[0011] Moreover, the actuation to grip or release such actuator mechanisms requires specific commands and controls, with relative times and costs of programming and coordinating them with the other operating units and stations.

[0012] US 7,387,049 B1 discloses a device and a method in accordance with the preamble of claim 1, respectively claim 7.

[0013] Purpose of the present invention is to achieve a device and perfect a method which allow to open containers in a simple, efficient and economic way, which reduce to a minimum the overall execution times and which overcome the disadvantages of the known state of the art.

[0014] 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

[0015] The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

[0016] In accordance with the above purpose, an opening device according to the present invention is applied to a removal station which can be used, for example, in an at least partly automated machine, for the treatment of containers of liquids, in order to remove relative lids or caps, which have a spout for the liquid to emerge.

[0017] The invention is applied, advantageously but not exclusively, to simultaneously remove a plurality of lids of containers which are adjacent to each other, for example disposed in a basket or similar.

[0018] In particular the opening device comprises one or more removal members, each provided with an air passage pipe conformed so as to allow pressurized air to pass through it.

[0019] The air passage pipe is provided with at least a housing segment for at least part of the spout of the lid.

[0020] Moreover, the device comprises movement means operatively associated with the removal members in order to selectively move them at least between a first position, where the lid is removed from the neck of the container, and a second position where the lid is moved.

[0021] According to a variant, each removal member also comprises retaining means associated elastically with the air passage pipe for at least part of the housing

segment and disposed in normal interference with the spout, in order to define a temporary elastic retention thereof, inside the housing segment.

[0022] The presence of the retaining means allows to elastically retain the lid constrained to the air passage pipe, after it has been removed from the neck of the container.

[0023] According to a characteristic feature of the present invention, the opening device comprises one or more extractor elements disposed in relatively sliding manner inside the air passage pipes of the relative removal members.

[0024] According to the invention, the movement means are configured so as to define a third position for the discharge of the removal members, in which the extractor elements are at least partly in the housing segment of the air passage pipe and effect an action of axial thrust on the spout of the lid, overcoming the elastic action exerted by the retaining means, until they bring it out from the air passage pipe.

[0025] In this way, exploiting the movement of the removal member imparted by the movement means, it is possible both to pick up, move and release the lids without needing dedicated auxiliary mechanisms for retaining and releasing them.

[0026] The present invention therefore achieves a reduction in production times and costs of the opening device, as well as the overall execution times, while still guaranteeing maximum efficiency in removing the lids from the containers.

[0027] Moreover, the solution according to the present invention is particularly advantageous both in at least partly automated machines, that is, the type able to automatically move the containers in baskets along relative automated movement belts, and also in manual plants where the stations are operatively separate and the containers are retained individually or in small groups, even not homogenous, and are then transported toward subsequent stations for washing, re-filling and recapping.

[0028] According to a variant, the movement means are directly associated with the removal members, while the extractor elements are in a fixed condition with respect to the removal members.

[0029] In this way, the removal members move by sliding with respect to the extractor elements, putting the latter in a condition to axially push the spouts of the lids provided into the air passage pipe.

[0030] According to a variant, the extractor element comprises at least a stem having sizes in the length of its action substantially equivalent at least to the housing segment.

[0031] In this variant, the extractor elements also act as a cut-off for the effective passage of pressurized air toward the outside of the air passage pipe.

[0032] In particular, when the removal member is in the third discharge position, the extractor element is in the housing segment, substantially preventing the passage of air from the pipe toward the outside.

[0033] On the contrary, when the removal member is in its first removal position, the extractor element is inside the pipe in a position so as not to interfere with the passage of air.

[0034] In this variant, the extractor element thus allows the pressurized air to pass through the air passage pipe, so as to allow the air to pass through the housing segment and then through the spout as far as inside the container, in order to increase the internal pressure thereof so as to determine a relative distancing movement between the lid and the container.

[0035] In this way, a jet of pressurized air is blown inside the container, in order to remove the lid; the blowing is effected in a simple, economic and efficient way so as to obtain, by reaction, a pressure force inside the container which determines a certain relative distancing between the lid and the container, which allows it to be removed.

[0036] According to another variant, the retaining means comprise one or two clamping elements disposed in cooperation with the housing segment of the relative removal member, so as to act radially against the spout of the lid.

[0037] According to another variant, each of the clamping elements cooperates with an elastic member conformed so as to automatically maintain the clamping element in an operative clamping condition, at the moment the removal member and the spout are coupled.

[0038] In this operative clamping condition the clamping member allows to retain the spout as soon as the latter is inserted inside the housing pipe, thus guaranteeing, from the very beginning, the correct retention thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] These and other characteristics of the present invention will become apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- fig. 1 is a schematic lateral view, partly sectioned, of a device for retaining the lids of containers of liquids according to the present invention, in a first operating condition;
- fig. 2 is a schematic lateral view, partly sectioned, of the retaining device in fig. 1, in a second operating condition;
- fig. 3 is a schematic lateral view, partly sectioned, of the retaining device in fig. 1, in a third operating condition.

[0040] To facilitate comprehension, the same reference numbers have been used where possible, to identify identical common elements in the drawings.

DETAILED DESCRIPTION OF A PREFERENTIAL FORM OF EMBODIMENT

[0041] With reference to the attached drawings, an opening device 10 according to the present invention can be used for the treatment of feeding bottles 12, to feed small animals, such as guinea pigs, mice, hamsters and others, used for example in pharmaceutical research laboratories.

[0042] Such feeding bottles 12 are normally closed at the top by means of relative lids 11 or caps, made of metal and shaped to define a spout 11a from which the animal drinks the liquid contained therein.

[0043] In this case, each feeding bottle 12 has a closing neck 14 onto which a washer (not shown) is annularly and externally disposed, able to define the hydraulic seal of the closure, once the lid 11 is closed on the feeding bottle 12.

[0044] In particular, the opening device 10 according to the present invention allows to open the feeding bottles 12 in a simple and almost completely automated way, in order to prepare them for subsequent washing and re-filling steps, actuated by a machine for the treatment of feeding bottles 12, not shown and to which the device 10 is operatively associated.

[0045] It is not excluded that the device 10 can equally be applied also to a single station for removing the lids 11, not necessarily integrated in an automated machine.

[0046] The feeding bottles 12 can be operatively disposed inside the relative containing baskets, which are typically provided with a plurality of cells having a desired orderly disposition, for example in rows or columns.

[0047] Each cell is conformed to accommodate a relative feeding bottle 12 and to keep it angularly constrained and in a determinate orderly position with respect to the other feeding bottles 12.

[0048] The opening device 10 can be mounted suspended on a bridge structure, not shown, and if the bottles are fed in baskets, can also consist of a plurality of elements geometrically disposed in a coherent manner with the disposition of the feeding bottles 12 in the baskets.

[0049] In this case, the opening device 10 comprises a removal head 15 of the pneumatic type suitable to be brought into cooperation with the relative spout 11a of the lid 11, in order to selectively blow pressurized air inside the feeding bottle 12 and cause an at least partial release of the lid 11 from the neck 14 of the feeding bottle 12.

[0050] The removal head 15 can also be selectively moved in a substantially vertical direction by means of a relative actuator 16, only shown schematized in the attached drawings, so as to be able to be lowered and lifted with respect to the feeding bottle 12 on which it acts, with a linear movement, at least during the course of removing the lids 11.

[0051] In this conformation, the actuator 16 defines a first removal position (fig. 1), a second movement position (fig. 2) and a third discharge position (fig. 3), which

will be explained in more detail hereafter.

[0052] The removal head 15 is provided singly or in groups and acts on the spouts 11a of the lids 11 according to the positioning plan of the feeding bottles 12.

[0053] The removal head 15 has a substantially cylindrical conformation and comprises an air passage pipe 17 inside it, having a conformation and size correlated to the spouts 11a of the lids 11.

[0054] In particular, each air passage pipe 17 is open toward the outside through an entrance 17a with a bigger diameter, and comprises a housing segment 18 of a reduced diameter able to house part of the spout 11a with precision.

[0055] Air under pressure is blown through the air passage pipe 17 by means of a feed pipe 40 connected to a pressurized gas source (not shown).

[0056] The air under pressure, through the housing segment 18 and the spout 11a, reaches the inside of the feeding bottle 12, so as to increase the pressure inside the latter until it determines, by power of reaction, the lifting of the lid 11 at least to above the washer of the neck 14.

[0057] Each removal head 15 also comprises an extractor stem 30, disposed sliding inside the air passage pipe 17, and having sizes substantially equivalent to those of the housing segment 18.

[0058] In particular the extractor stem 30 is mounted fixed on the opening device 10, so that the removal head 15 slides along the extractor stem 30 during the movements imparted by the actuator 16.

[0059] In this conformation, the extractor stem 30 also acts as a cut-off element for the air emerging through the air passage pipe 17.

[0060] Indeed, depending on the reciprocal position of the removal head 15 and the extractor stem 30, the latter cooperates, or not, with the housing segment 18, so as to obstruct, or not, the air emerging through the air passage pipe 17.

[0061] The opening device 10 is also provided with a retaining member 24, of the gripper type, in order to temporarily retain the spout 11a inside the air passage pipe 17 during and after the opening operation.

[0062] In this case, the retaining member 24 comprises two pins 27 mounted sliding radially to the housing segment 18, in relative transverse holes made on the lateral wall of the removal head 15, and are maintained in a normal condition of interference with the housing segment 18 by an elastic ring 26.

[0063] In this way, the spout 11a which penetrates into the housing segment elastically widens the pins 27 which, due to the effect of the elastic ring 26, press radially on the spout 11a, holding it elastically inside the air passage pipe 17.

[0064] In this case the removal head 15 comprises a damping spring 20 which allows to absorb possible axial impacts between the end of the removal head 15 and the lid 11 of the feeding bottle, so as not to ruin the latter.

[0065] The opening device 10 according to the present

invention functions as follows.

[0066] Once the feeding bottle 12 has reached its desired positioning under the relative removal head 15, the linear actuator 16 is activated in order to determine a linear approach movement to bring the removal head 15 into the first removal position (fig. 1), in which the spout 11a of the feeding bottle 12 penetrates inside the air passage pipe 17 and is elastically held by the retaining member 24 inside the housing segment 18.

[0067] In this first position, the extractor stem 30 is inside the air passage pipe 17 in a condition of non-cooperation with the housing segment 18. This determines the passage of pressurized air inside the feeding bottle 12 through the spout 11a, until the pressure inside overcomes the sealing force of the washer on the neck 14 and causes the lid 11 to be lifted and released from the feeding bottle 12.

[0068] After opening, the removal head 15 is lifted with respect to the feeding bottle 12 into the second movement position (fig. 2), by means of the actuator 16, taking the lid 11 with it thanks to the elastic hold exerted by the pins 27 on the relative spout 11a.

[0069] A further lifting movement of the removal head 15 by the actuator 16 brings the removal head 15 into its third discharge position (fig. 3).

[0070] In this position the extractor stem 30 cooperates with the housing segment 18 and exerts an axial thrust on the end of the spout 11a.

[0071] The axial thrust exerted by the extractor stem 30 is greater than the radial elastic action of the pins 27, so as to thrust the spout 11a outside the air passage pipe 17, so as to release the lid 11 which, for example, falls onto a tray opportunely positioned under the removal head 15, and which is then moved toward a washing and sterilization station for the lids 11.

[0072] It is clear that modifications and/or additions of parts or steps may be made to the opening device 10 and the relative method as described heretofore, without departing from the field and scope of the present invention.

[0073] For example, it comes within the field of the present invention to provide that a relative linear actuator is associated to each extractor stem 30, in order to impart to each extractor stem 30 a linear movement independent of that of the removal head 15.

[0074] It also comes within the field of the present invention to provide that instead of the mechanical extractor stem 30, there is an extractor element of the fluid-dynamic type, for example pneumatic, which actuates an axial thrust on the spout 11a, in order to release the lid 11 from the air passage pipe 17.

[0075] It is also clear that, although the present invention has been described with reference to some specific examples, a person of skill in the art shall certainly be able to achieve many other equivalent forms of opening device and method for containers of liquids, having the characteristics as set forth in the claims and hence all coming within the field of protection defined thereby.

Claims

1. Device for opening containers (12) of liquids, to remove lids (11) from the relative containers (12), said lids (11) being conformed so as to define a spout (11a) to allow the liquid to emerge from the container (12), said device comprising at least

- one or more removal members (15) each provided with an air passage pipe (17) associable with said spout (11a) and provided with at least a housing segment (18) for at least part of said spout (11a); and

- movement means (16) operatively associated with said removal members (15) to move them selectively at least between a first position for the removal of said lids (11) from the container (12), and a second position to move the lids (11);

characterized in that it also comprises one or more extractor elements (30) disposed in a relatively sliding manner inside said air passage pipes (17) of the relative removal members (15), and **in that** said movement means (16) are configured so as to define a third position for the discharge of said removal members (15), in which said extractor elements (30) are at least partly in said housing segment (18) and effect an action of axial thrust on said spout (11a), until said lid (11) is removed from its association with said air passage pipe (17).

2. Device as in claim 1, **characterized in that** the movement means comprise an actuator (16) directly associated with the removal members (15), while the extractor elements (30) are in a fixed condition with respect to said removal members (15).

3. Device as in claim 1 or 2, **characterized in that** the extractor element comprises at least a stem (30) having sizes substantially equivalent at least to the housing segment (18).

4. Device as in any claim hereinbefore, **characterized in that** it comprises retaining means (24) elastically associated with said air passage pipe (17) for at least part of the housing segment (18) and disposed in normal interference with said spout (11a), to define a temporary elastic retention thereof inside said housing segment (18).

5. Device as in claim 4, **characterized in that** the retaining means (24) comprise one or more clamping elements (27) disposed in cooperation with the housing segment (18) of the relative removal member, so as to act radially against the spout (11a).

6. Device as in claim 5, **characterized in that** each of the clamping elements (27) cooperates with an elas-

tic member (26) conformed so as to automatically maintain the relative clamping element (27) in an operative clamping condition, at the moment of coupling of the removal member (15) and the spout (11a).

7. Method for opening containers (12) of liquids, to remove lids (11) from the relative containers (12), said lids (11) being conformed so as to define a spout (11a) to allow the liquid to emerge from the container (12), said method comprising at least:

- a removal step, in which said spout (11a) is removed from the container (12), by means of one or more removal members (15) each provided with an air passage pipe (17) associable with said spout (11a) and provided with at least a housing segment (18) for at least part of said spout (11a); and
- a movement step in which movement means (16) operatively associated with said removal members (15) are selectively moved at least between a first position for the removal of said lids (11) from the container (12), and a second position to move the lids (11);

characterized in that it provides an extraction step in which one or more extractor elements (30) are provided, disposed in a relatively sliding manner inside said air passage pipes (17) of the relative removal members (15), and in which said movement means (16) define a third position for the discharge of said removal members (15), in which third position said extractor elements (30) are at least partly in said housing segment (18) and effect an action of axial thrust on said spout (11a), until said lid (11) is removed from its association with said air passage pipe (17).

Patentansprüche

1. Vorrichtung zum Öffnen von Behältern (12) für Flüssigkeiten, um Deckel (11) von den jeweiligen Behältern (12) zu entfernen, wobei die Deckel (11) so angepasst sind, dass sie eine Tülle (11a) definieren, um es zu ermöglichen, dass die Flüssigkeit aus dem Behälter (12) gelangen kann, wobei die Vorrichtung wenigstens umfasst

- eines oder mehrere Entfernelemente (15), die jeweils mit einem Luftdurchlasskanal (17) versehen sind, der mit der Tülle (11a) verbindbar und mit wenigstens einem Gehäuseabschnitt (18) für wenigstens einen Teil der Tülle (11a) versehen ist; und
- Bewegungsmittel (16), die funktionsmäßig den Entfernelementen (15) zugeordnet sind, um sie

selektiv wenigstens zwischen einer ersten Position zur Entfernung der Deckel (11) von dem Behälter (12) und einer zweiten Position zum Bewegen der Deckel (11) zu bewegen;

dadurch gekennzeichnet, dass sie auch ein oder mehrere Ausziehelemente (30) umfasst, die auf relativ gleitende Weise im Inneren der Luftdurchlasskanäle (17) der jeweiligen Entfernelemente (15) angeordnet sind, und dass die Bewegungsmittel (16) so eingerichtet sind, dass sie eine dritte Position für das Abführen der Entfernelemente (15) definieren, in der sich die Ausziehelemente (30) wenigstens teilweise in dem Gehäuseabschnitt (18) befinden und eine axiale Druckwirkung auf die Tülle (11a) ausüben, bis der Deckel (11) aus der Verbindung mit dem Luftdurchlasskanal (17) entfernt ist.

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Bewegungsmittel einen Stellantrieb (16) umfassen, der den Entfernelementen (15) direkt zugeordnet ist, während die Ausziehelemente (30) sich in einem festgestellten Zustand in Bezug auf die Entfernelemente (15) befinden.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Ausziehelement wenigstens einen Schaft (30) mit Abmessungen umfasst, die im Wesentlichen entsprechend wenigstens dem Gehäuseabschnitt (18) sind.

4. Vorrichtung nach einem beliebigen vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** sie Haltemittel (24) umfasst, die dem Luftdurchlasskanal (17) für wenigstens einen Teil des Gehäuseabschnitts (18) elastisch zugeordnet und in normalem Eingriff mit der Tülle (11a) angeordnet sind, um deren zeitweiliges elastisches Halten im Inneren des Gehäuseabschnitts (18) zu definieren.

5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, dass** die Haltemittel (24) ein oder mehrere Klemmelemente (27) umfassen, die zusammenwirkend mit dem Gehäuseabschnitt (18) des jeweiligen Entfernelements angeordnet sind, um radial gegen die Tülle (11a) zu wirken.

6. Vorrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** jedes der Klemmelemente (27) mit einem elastischen Element (26) zusammenwirkt, das angepasst ist, um das jeweilige Klemmelement (27) im Zeitpunkt des Kuppelns des Entfernelements (15) und der Tülle (11a) automatisch in einem funktionsmäßigen Klemmzustand zu halten.

7. Verfahren zum Öffnen von Behältern (12) für Flüssigkeiten, um Deckel (11) von den jeweiligen Behältern (12) zu entfernen, wobei die Deckel (11) so an-

gepasst sind, dass sie eine Tülle (11a) definieren, um es zu ermöglichen, dass die Flüssigkeit aus dem Behälter (12) gelangen kann, wobei das Verfahren wenigstens umfasst:

- einen Entfernsschritt, bei dem die Tülle (11a) von dem Behälter (12) mittels eines oder mehrerer Entfernelemente (15) entfernt wird, die jeweils mit einem Luftdurchlasskanal (17) versehen sind, der mit der Tülle (11a) verbindbar und mit wenigstens einem Gehäuseabschnitt (18) für wenigstens einen Teil der Tülle (11a) versehen ist; und
- einen Bewegungsschritt (16), bei dem die funktionsmäßig den Entfernelementen (15) zugeordneten Bewegungselemente (16) wenigstens zwischen einer ersten Position zur Entfernung der Deckel (11) von dem Behälter (12) und einer zweiten Position zum Bewegen der Deckel (11) selektiv bewegt werden;

dadurch gekennzeichnet, dass es einen Ausziehschritt umfasst, bei dem ein oder mehrere Ausziehelemente (30) vorgesehen werden, die auf relativ gleitende Weise im Inneren der Luftdurchlasskanäle (17) der jeweiligen Entfernelemente (15) angeordnet sind, und bei dem die Bewegungsmittel (16) eine dritte Position für das Abführen der Entfernelemente (15) definieren, in welcher dritten Position sich die Ausziehelemente (30) wenigstens teilweise in dem Gehäuseabschnitt (18) befinden und eine axiale Druckwirkung auf die Tülle (11a) ausüben, bis der Deckel (11) aus der Verbindung mit dem Luftdurchlasskanal (17) entfernt wird.

Revendications

1. Dispositif pour ouvrir des récipients (12) pour liquides, pour retirer des couvercles (11) de leur conteneur respectif (12), lesdits couvercles (11) étant conformés de manière à créer un bec verseur (11a) afin de permettre au liquide de sortir du récipient (12), ledit dispositif comprenant au moins

- un ou plusieurs organe de retrait (15) pourvus chacun d'un tube de passage d'air (17) pouvant être associé avec ledit bec verseur (11a) et pourvu d'au moins un segment de logement (18) pour au moins une partie dudit bec verseur (11a); et
- des moyens de déplacement (16) opérationnellement associés avec lesdits organes de retrait (15) pour déplacer ceux-ci sélectivement au moins entre une première position pour le retrait desdits couvercles (11) du récipient (12) et une deuxième position pour déplacer les couvercles (11);

caractérisé en ce qu'il comprend également un ou plusieurs éléments d'extraction (30) disposés d'une manière relativement coulissante à l'intérieur desdits tubes de passage d'air (17) des organes de retrait respectifs (15), **et en ce que** lesdits moyens de déplacement (16) sont configurés de manière à créer une troisième position pour l'évacuation desdits organes de retrait (15), lesdits éléments d'extraction (30) étant au moins partiellement dans ledit segment de logement (18) et effectuant une action de poussée axiale sur ledit bec verseur (11a), jusqu'à ce que ledit couvercle (11) soit retiré de son association avec ledit tube de passage d'air (17).

2. Dispositif selon la revendication 1, **caractérisé en ce que** les moyens de déplacement comprennent un organe d'actionnement (16) directement associé avec les organes de retrait (15), tandis que les éléments d'extraction (30) sont à l'état fixe par rapport auxdits organes de retrait (15).

3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** l'élément d'extraction comprend au moins une tige (30) ayant une taille sensiblement équivalente au moins au segment de logement (18).

4. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** comprend des moyens de rétention (24) associés élastiquement avec ledit tube de passage d'air (17) pour au moins une partie dudit segment de logement (18) et disposé en interférence normale avec ledit bec verseur (11a), pour créer une rétention élastique temporaire de celui-ci à l'intérieur dudit logement de segment (18).

5. Dispositif selon la revendication 4, **caractérisé en ce que** les moyens de rétention (24) comprennent un ou plusieurs éléments de fixation (27) disposés en coopération avec le segment de logement (18) de l'organe de retrait respectif, de façon à agir radialement contre le bec verseur (11a).

6. Dispositif selon la revendication 5, **caractérisé en ce que** chacun des éléments de fixation (27) coopère avec un organe élastique (26) conforme de manière à maintenir automatiquement l'élément de fixation respectif (27) dans un état de fixation opérationnel, au moment du couplage de l'organe de retrait (15) et du bec verseur (11a).

7. Procédé d'ouverture de récipients (12) de liquides, pour retirer des couvercles (11) de leur récipient respectif (12), lesdits couvercles (11) étant conformés de manière à créer un bec verseur (11a) pour permettre au liquide de sortir du récipient (12), ce procédé comprenant au moins :

- une étape de retrait, au cours de laquelle ledit bec verseur (11a) est retiré du récipient (12), au moyen d'un ou plusieurs organes de retrait (15) pourvus chacun d'un tube de passage d'air (17) pouvant être associé avec ledit bec verseur (11a) et pourvu d'au moins un segment de logement (18) pour au moins une partie dudit bec verseur (11a) ; et 5
- une étape de déplacement au cours de laquelle des moyens de déplacement (16) associés opérationnellement avec lesdits éléments de retrait (15) sont déplacés sélectivement au moins entre une première position pour le retrait desdits couvercles (11) du récipient (12) et une deuxième position pour déplacer les couvercles (11) ; 10 15

caractérisé en ce qu'il est prévu une étape d'extraction au cours de laquelle un ou plusieurs éléments d'extraction (33) sont prévus, disposés d'une manière relativement coulissante à l'intérieur desdits tubes de passage d'air (17) des organes de retrait respectifs (15), et au cours de laquelle lesdits moyens de déplacement (16) créent une troisième position pour l'évacuation desdits organes de retrait (15), dans laquelle troisième position lesdits éléments d'extraction (30) sont au moins partiellement dans ledit segment de logement (18) et effectuent une action de poussée axiale sur ledit bec verseur (11a), jusqu'à ce que le couvercle (11) soit retiré de son association avec ledit tube de passage d'air (17). 20 25 30

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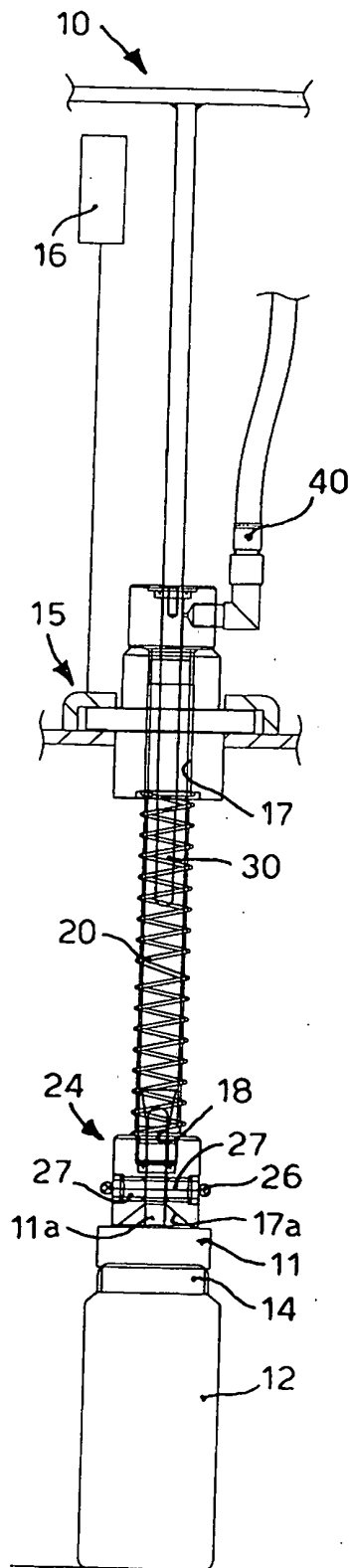


fig. 1

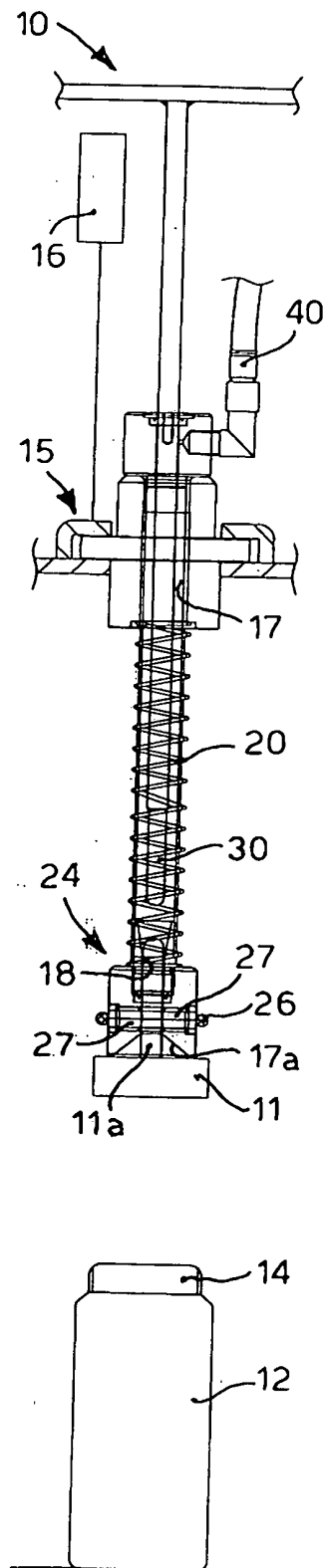


fig. 2

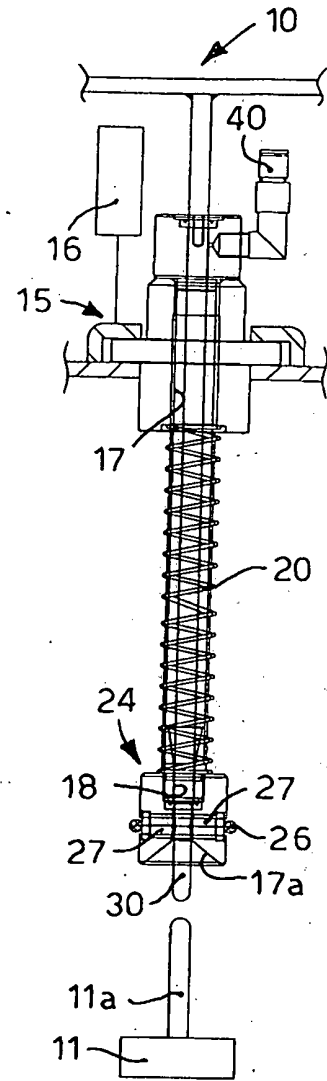


fig. 3

REFERENCES CITED IN THE DESCRIPTION

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