

Device for supporting a plurality of flexible containers for liquid

TECHNICAL FIELD

The present invention relates to supports for a flexible container for liquids, for example a container adapted to be connected to an installation device for treating biological liquids.

BACKGROUND TECHNOLOGY

A source container containing a product to be treated may be connected to an inlet of a circuit of such an insulation, but containers containing a cleaning liquid such as sodium hydroxide (NaOH), a rinsing liquid such as pure water, or a buffer liquid such as a saline solution may also be connected.

In addition to a container for collecting the treated liquid, various other containers for collecting cleaning liquid, rinse liquid, or buffer liquid, or for collecting residue can be connected to an outlet.

Such containers, which are flexible, are already known. In particular, bags formed from one or two flexible films that are peripherally welded and containing at least one inlet/outlet connector are well known.

These disposable bags can be produced economically, and can achieve high-capacity up to several tens of liters.

SUMMARY OF THE INVENTION

PROBLEM TO BE RESOLVED BY THE INVENTION

However, these bags have a drawback for being difficult to use after being filled with liquid, particularly because of the high volume and weight associated with large deformation. This causes difficulty in handling the bag and transferring the liquid in the bag to piping.

An object of the present invention is to enable simple and convenient use of these containers.

MEANS FOR RESOLVING PROBLEMS

Therefore, the present invention provides a device for supporting a plurality of flexible containers for liquid, comprising:

- a plurality of baskets, each containing at least one of the flexible containers;
- 5 - a magazine receiving the baskets, that can adopt an operating configuration, wherein the baskets are disposed inclined one above the other, and each of the containers that are in a position where at least one connector is in the lower part thereof, comprising:
 - supporting means for the baskets, that can adopt a
 - 10 loading/unloading position where the supporting means are adapted such that each of the baskets can be loaded/unloaded along a horizontal path, and that can adopt an operating position where the supporting means are adapted to maintain each of the baskets in an inclined position to make the magazine adopt the operating configuration, and
 - 15 - means for driving the supporting means between the loading/unloading position and the operating position.

The device of the present invention can limit the handling to be performed for flexible containers. More specifically, the operator simply places each flexible container in a basket of the device, and then loads the basket with

20 the supporting means in the loading/unloading position horizontally into the magazine.

After all of the containers are loaded, the operator simply needs to actuate the driving means. Thereby, the support means is moved to the operating position, and therefore an angle is induced between the basket and

25 the flexible container, and at least one connector of each container is made to arrive in the lower part of the container.

As each container is inclined, air bubbles contained inside move toward the upper part of the container, and thus the risks of air being transferred into the circuit is eliminated or at least greatly reduced when the container is

30 connected to the circuit through a connector attached to the lower part thereof.

The device of the present invention is of course appropriate for flexible containers with small capacity, but is particularly advantageous with flexible containers that have high capacity.

Providing a plurality of baskets, each adapted to containing at least
5 one flexible container, enables the baskets to be easily handled due to stiffness.

The fact that loading the baskets containing the containers is performed horizontally enables use of a commercially lifting machine, for example, a simple lifting truck, to install (load) the baskets onto the supporting means or remove (unload) the baskets.

10 Finally, the baskets are disposed vertically in the operating condition of the magazine, so the device of the present invention procures a great reduction in the floor area occupied by the container in the zone of the installation. This is particularly advantageous when, as is generally the case when treating biopharmaceutical liquids, the installation is positioned in a zone
15 with controlled atmosphere where space is limited and very costly.

Features that are preferred as being favorable for simplicity and convenience of use of the device according to the present invention include:

- the supporting means comprise a pair of opposite runners adapted to slide and receive the basket, for each basket;
- 20 - the runners of each runner pair are pivotally mounted on support pillars opposite the magazine;
- the device comprises abutment means that limit pivoting of the runners for each pair of runners;
- the abutment means comprises at least one rod adapted to travel
25 in an oblong opening of the support pillars;
- each pair of runners comprises means for locking the basket in the magazine;
- the locking means comprises a latch that is mechanically linked to one of the runners of the pair of runners, and the latch is adapted to move in
30 conjunction with a positioning member of the basket;
- the driving means comprises mechanical linking means that rigidly links the pair of runners together and means for pivoting the pairs of runners;

- the mechanical linking means comprises two metal bars disposed in the support pillars such that upper parts thereof are linked by a bridging member;
- the pivoting means comprises a reduction transmission and a
5 rotation source;
 - the rotation source comprises a crank;
 - the ratio of the reduction transmission is such when the crank rotates seven times, the supporting means pivots approximately 20°;
 - the magazine comprises a horizontal chassis mounted on wheels;
 - 10 - the horizontal chassis is partially recessed to permit travel of a basket travelling from the loading/unloading position to the operating position;
 - each basket comprises a frame adapted to move in conjunction with the supporting means and a grid adapted so as to support the flexible container;
 - 15 - each basket (10) comprises a retaining hook adapted to move in conjunction with a handle of the flexible container, wherein the retaining hook is rigidly attached to the frame;
 - each basket comprises a first retaining hook adapted to move in conjunction with a handle of the flexible container, wherein the first retaining
20 hook is rigidly attached to the frame; each basket further comprises a second retaining hook connected by a hinge to the first retaining hook and adapted to move in conjunction with the handle of the flexible container; and/or
 - the grid comprises a recessed part located on the opposite side from the retaining hook in order to accommodate the connector of the flexible
25 container.

Next, disclosure of the present invention is continued with a detailed description of an embodiment presented below as an explanatory non-limiting example, while referring to the accompanying drawings.

30 BRIEF DESCRIPTION OF THE DRAWINGS

- Figure 1 is a perspective view of a device according to the invention where each of the baskets contain a flexible container filled with liquid, and the magazine is in an operating form;
- Figure 2 is a perspective view of one of the flexible containers in
5 Figure 1;
- Figure 3 is a perspective view of a basket of the device in Figure 1;
- Figure 4 is a perspective view from another angle of the rear part of the basket in Figure 3;
- 10 - Figure 5 is a front view of the basket in Figure 3 and Figure 4;
- Figure 6 is a perspective view of the magazine of the device in Figure 1 with supporting means in the loading/unloading position;
- Figure 7 is a perspective view from another viewing angle of the magazine of Figure 6 where supporting means are in the operating position;
- 15 - Figure 8 is a perspective view of a basket containing a flexible container, and resting on the arms of the fork of a lifting truck;
- Figure 9 is a perspective view of the device of Figure 1 where supporting means occupy the loading/unloading position thereof, and the baskets are loaded into the magazine;
- 20 - Figure 10 is a side view of the device in Figure 1 where the outer surface of the magazine has been removed in order to show driving means of supporting means; and
- Figure 11 is an enlarged perspective view of a portion of the rear surface of the basket in Figure 3 that is loaded into the magazine of the device
25 according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A device 50 illustrated in Figure 1 contains a magazine 60 and a plurality of superposed baskets 10, (six baskets 10 herein) each containing a
30 disposable flexible bag 1 filled with biological liquid.

Next, the disposable flexible bag 1 is described in detail by Figure 2.

Herein, the bag 1 having a capacity of 50 liters is made from at least one PureFlex™ flexible film 2 produced by the present applicant. This is a co-extruded film containing four layers. These four layers are, in order from the inside to the outside, a layer of ultra low density polyethylene (ULDPE) forming the material for contact with the liquid; a copolymer layer of ethylene and vinyl alcohol (EVOH) forming a barrier to gases; a copolymer layer of ethylene and vinyl acetate (EVA); and a layer of ultra low density polyethylene (ULDPE) forming the outer layer.

As describe below, the device 50 can use bags with a capacity different than 50 liters, such as 10 or 20 liters for example. Naturally, the device 50 can use a bag made from a film other than PureFlex™ film, such as a HyQ® CX5-14 film manufactured by Hyclone Industries or Platinum UltraPack film manufactured by Lonza.

The bag 1 demarcates a closed internal volume, herein generally rectangular solid, and contains a plurality of connectors 3 at one end part thereof.

The bag 1 contains a handle 7 on the opposite side from the connectors 3 and two oblique weld beads 9 located on both sides of the connectors 3 in the corners on the back. The oblique weld bead 9 facilitate the liquid to flow towards the connectors and avoid a residual volume of that liquid remaining in the corners thereof.

Next, the baskets 10 is described by Figure 3 and Figure 5. The basket 10 contains a frame 11, a plurality of cross-members 12, a grid 19, two positioning members 30, 31 and two retaining hooks 35 and 40 that are each provided to cooperate with the handle of a container of the bag 1.

The frame 11 with a rectangular outline contains a front bar 11a, a rear bar 11b and two lateral bars 11c, 11d. Herein, these bars are formed from one or more metal tubes of a square cross section, and the ends thereof are welded end to end.

In the illustrated embodiment, positioning members 30, 31 are formed by two metal fingers with a length herein equal to the width of the lateral bars 11c, 11d of the frame 11.

The fingers 30, 31 extend parallel to the front and rear bars 11a, 11b, and are each welded to the upper surface of corresponding lateral bars 11c, 11d in the rear part of the basket 10.

As described later in detail, the fingers 30, 31 are adapted to each to
 5 cooperate with a corresponding abutment of the magazine 60, and each finger 31 is adapted to cooperate with a corresponding locking latch 80 disposed on the magazine 60.

The retaining hook 35 that is produced from metal wire formed by bending is located in the central part of the rear bar 11b of the frame 11. The
 10 retaining hook 35 is provided to receive the handle of a large capacity (50 liter) container such as the bag 1 and the like.

The hook 35 (Figure 4) contains a straight section 36 and two right-angle elbow sections 37, 38 that were similarly prepared from a single wire.

Each of the right-angle elbow sections 37, 38 are oriented along a
 15 plane perpendicular to straight section 36, and joins to an end thereof by branches 37a, 38a.

The branches 37b, 38b of sections 37, 38 are fastened by welding to the lower surface of the rear bar 11b of the frame 11 such that the branches 37a, 38a project transversely to the plane of frame 11 on the opposite side of
 20 the grid 19.

The retaining hook 40 that is similarly produced from metal wire formed by bending is connected by hinge to the hook 35. The retaining hook 40 is formed to receive the handle of a container with a capacity that is smaller than the bag 1 (herein, 10 liters).

25 The hook 40 contains a straight section 41 and two portions 42, 43 with a similar arrangement where the shape of one is a mirror image of the other.

Each of the portions 42, 43 contains an elongated section 44 of a J-shaped profile with one of end that connects to a straight pivot section 45.

30 The elongated section 44 is flat and contains a rounded base 46 with the ends connected to corresponding straight branches 47, 48.

As illustrated in Figure 4, the branch 47 is longer than the branch 48, and the two branches are generally parallel to each other.

The pivot section 45 is connected to the branch 47 on the opposite end thereof to the base 46, and extends transversely towards the plane formed
5 by the elongated section 44 with a J-shaped profile.

The two portions 42, 43 are herein prepared from a metal wire of the same length, and are joined by the straight section 41. More specifically, the opposite end of each branch 48 to the corresponding base 46 is connected to the straight section 41 such that the straight section 41 extends perpendicularly
10 to the planes of the sections 44 with a J-shaped profile. The pivot section 45 extend parallel to the straight section 41 towards the outside of the hook 40.

The hook 40 that has a smaller width than the width of the hook 35 is movably mounted on the hook 35, and the pivot sections 45 rests on the branches 37b, 38b of the right-angle elbow sections 37, 38 such that the hook
15 40 can freely swing.

Herein, four cross-members 12 (Figure 5) are formed from metal wires that were shaped by bending. The cross-members each contains a straight main section 13 provided to receive the grid 19, two lateral supports 14a, 14b with a J-shaped profile, and two straight sections 15 for fastening to
20 the frame 11 (Figure 4).

Each of the supports 14a, 14b with a J-shaped profile is planar, and contains a straight base 17 with ends that are connected to corresponding straight branches 16, 18.

As illustrated in Figure 5, the branch 16 is approximately two times
25 shorter than the base 17 and forms an angle β approximately 120° herein.

The branch 18 is approximately three times longer than the base 17 and forms an angle γ therewith, approximately 100° herein.

The two lateral supports 14a, 14b have a similar configuration where the shape of one is the mirror image of the other.

30 Herein, the two lateral supports 14a, 14b are made from a metal wire of the same length, and are joined by the main straight section 13. More specifically, the opposite end of each branch 16 to the corresponding base 17 is

connected to the main straight section 13 such that the lateral supports 14a, 14b and the main straight section 13 extend in the same plane. Furthermore, the main straight section 13 has the same orientation as the base 17.

5 The two straight sections 15 for fastening are similar, and have approximately the same length as the bases 17 of the lateral supports 14a, 14b. These are connected to the opposite end of each of the branches 18 to the corresponding base 17, and extend facing each other transversely towards the plane formed by the lateral supports 14a, 14b and the main straight section 13.

10 The grid 19 contains a metal framework 20, a plurality of longitudinal metal bars 21, 22, and a transverse metal bar 23.

The metal framework 20 contains a front bar 24, a rear bar 25 and two straight lateral bars 26, 27. Herein, these bars 24, 25, 26 and 27 are formed from one or more metal wires that were shaped by bending, and the ends thereof are welded end to end.

15 The front 24 and the rear bar 25 each contain a main section 24a, 25a, and the ends thereof respectively connect to two other straight sections 24b, 25b at the same angle α (Figure 3), herein approximately 120° .

20 These bars 24 and 25 only differ by main sections thereof, the main section 25a of the rear bar is straight, but the main section 24 of the front bar 24 has a re-entrant portion 28 at the central part thereof. The re-entrant part 28 is provided to accommodate the connectors of the bag such that the end pieces of the connectors are in the plane of the grid 19, thereby allowing all of the liquid in the bag to be drained.

25 The transverse bars 23 are similar to the rear bar 25, and therefore contain a main straight section 23a. Both ends therefore respectively connect to two other straight sections 23b with the same angle α . The bars 23 are disposed parallel to the bar 25, and the ends thereof are connected by welding to the side bars 26, 27 or the framework 20.

30 The longitudinal bars 21 are similar to the lateral bars 26, 27, differing simply by having a greater cross-sectional area. The two bars that extend symmetrically on both side of the main straight sections 23a and 25a are

welded from below to the sections 23b, 24b and 25b of the transverse bars 23, the front bar 24 and the rear bar 25.

The longitudinal bars 22 are similar to the lateral bars 26, 27, differing simply by having a smaller cross-sectional area. The bars 22 are
 5 disposed at regularly intervals along the main straight sections 23a, 24b and 25a of the transverse bars 23, the front bar 24, and the rear bar 25, and the front bar 22 is welded to these from below.

When assembling the basket 10, the cross-members 12 are fastened to the frame 11 by welding straight sections 15 for fastening onto the lower
 10 surface of the lateral bars 11c, 11d (in order to avoid any risk of piercing the bag 1 disposed in the basket 10 by a free end of one of the straight sections 15 for fastening). As illustrated in Figure 3, the four cross-members 12 are mounted parallel to each other and disposed at regular intervals along the lateral bars 11c, 11d.

15 The grid 19 is positioned on the cross-members 12 (Figure 5) such that the longitudinal bars 22 and the lateral bars 26, 27 respectively rest on the main straight sections 13 and on the branches 18 of the supports 14a, 14b with a J-shaped profile, and such that the three transverse bars 23 and the rear bar 25 are disposed facing the main straight sections 13.

20 Herein, fastening of the grid 19 and cross-members 12 is achieved by welding points between the transverse 23 and the rear bar 25, and the main straight sections 13 of the cross-members 12.

Next, the magazine 60 is described by Figure 6 and Figure 7.

The magazine 60 contains a horizontal chassis 61, and a gantry 62
 25 formed by two hollow lateral support pillars 63, 64 that extend facing each other and that are joined by a horizontal roof wall 65 is attached thereon.

The chassis 61 contains two tubular metal cross members 66, 67 opposite each other, and a rectangular platform 68 of sheet metal welded between the two cross members 66, 67.

30 The platform 68 only connects the rear parts of the cross members 66, 67, such that the front half of the chassis 61 is recessed. The platform 68

also has two cut-outs 68a at the ends thereof in order to drain the liquid that may deposit on the platform in case of leaking of the bag 1 for example.

In order to facilitate the movement of the magazine 60 within the installation area, chassis 61 is mounted on wheels 70, and two arcuate handles
5 71, 72 are fastened to the longitudinal edges of each of the support pillars 63, 64.

The magazine 60 also contains a plurality of pairs of opposite runners 75a, 75b that are disposed at regular interval along the lateral support pillars 63, 64, and each of the pairs 75 are provided for inserting and
10 withdrawing by horizontal sliding of the basket 10. In the embodiment illustrated herein, six pairs of runners 75a, 75b are used.

Each runner 75a is formed from a panel 76, and one of the surfaces thereof has a groove 77 along the entire length thereof and close on longitudinal edge. The width of the grove 77 is very slightly greater than the thickness of the
15 lateral bars 11c, 11d of the basket 10. In the embodiment illustrated herein, the panel 76 is rectangular.

Each of the runners 75a also contains a locking latch 80 that is adapted to cooperate with the finger 31 of the basket 10 at the rear end thereof. This is described below in more detail.

20 The runners 75b are similar to the runners 75a, differing therefrom only in the absence of the locking latch 80.

The runners 75a (and respectively 75b) are pivotally mounted on the support pillars 63 (and respectively 64), and the opposite surface thereof from the groove 77 is rotated towards the inner surface of the support pillar 63 (and
25 respectively 64).

The magazine 60 further contains driving means (which is described below in detail) that may be activated by a crank 83 (Figure 7) projecting from the outer face of the lateral support pillar 63. This enables all the pairs 75 of the runners 75a, 75b to be pivoted simultaneously to move:

30 - from a loading/unloading position (Figure 9) where each pair 75 of the runners 75a, 75b is horizontal to enable insertion and withdrawal of the basket 10 by horizontal sliding; and

- to an operating position where each pair 75 of the runners 75a, 75b is inclined to the horizontal at an angle σ (Figure 7), herein 20° .

From the perspective of an observer positioned facing the support pillar 63 having the crank 83, the pivoting of the pairs of runners 75 is performed
 5 counterclockwise, such that the rear of the runners 75a, 75b is raised relative to the front part thereof.

Loading of the bags 1 filled with liquid is performed in the following manner.

First, for each of the bags 1 to connect to the circuit, the operator
 10 takes the basket 10 and places the basket 10 near the bag 1 such that the front surface of the basket 10 faces the end of the bag 1 where the handle 7 is positioned (the opposite end from the connectors 3).

Next, the operator proceeds with loading the bag 1 into the basket 10 by sliding the basket 10 over the grid 19 using the handle 7 until the inlet/outlet
 15 connectors 3 are positioned above the rectangular re-entrant portion 28 of the grid 19. Next, the operator releases the handle 7, and introduces the free end of the retaining hook 35 into the same handle (Figure 8) in order to avoid sliding of the bag 1 when the basket 10 is in an inclined position.

Loading of a bag with a smaller capacity (10 liters) is similarly
 20 performed, and the only difference is that the free end of the hook 40 (and not of the hook 35) is inserted into the handle of the bag.

For each of the baskets 10 where the bag is disposed, the operator uses one's own arm or brings a lifting truck near the basket 10. In this case, the operator performs the following operations:

- 25 - positioning the arms 100 of the fork 101 of the lifting truck to face the rear side of the basket 10;
- inserting the arms 100 under the basket 10 while progressively sliding the arms over four straight sections 13 of the cross members 12 (Figure 8). Next, positioning the outer edges of the arms 100 against the branch 16 of
 30 the two supports 14a, 14b with a J-shaped profile, such that the basket 10 is fastened in the transverse direction thereof;

- raising the basket 10 using the arms 100, and placing the basket 10 to face a corresponding pair 75 of horizontally oriented runners 75a, 75b;

- furthermore, using the arm 100, inserting by sliding the lateral bars 11c, 11d of the frame 11 of the basket 10 into the grooves 77 of the pair 75 of the runners 75a, 75b until the fingers 30, 31 come into contact with the rear end of the runners 75a, 75b, Next, the locking latch 80 cooperates with the finger 31 and lock the basket 10 on the pair 75; and

- withdrawing the arms 100 from the basket 10.

After loading all six baskets 10 (or only baskets where a bag is disposed) into the magazine 60 (Figure 9), the operator turns the crank 83 and simultaneously pivots all the pairs 75 of the runners 75a, 75b so as to incline the baskets 10 at an angle σ (herein 20°) relative to the horizontal (Figure 1 and Figure 10).

When the magazine must be moved between the location of loading and the location of installing, performing the movement with the runners in a loading/unloading position (horizontal) is favorable.

In this inclined position, the magazine 60 occupies the operating position. In the operating position, the baskets 10 are disposed in an inclined position one above the other with the inlet/outlet connectors 3 of the bags 1 in the lower part and pointing towards the floor, such that air bubbles rise in the direction of the handles 7.

Therefore, after connecting the bags 1 to an installation for treating biological liquid, draining the biological liquid contained in the bags 1 can be performed without risk, or at least with very little risk of introducing air into the tubes of the installation.

After draining is completed, the operator proceeds to unload the bags 1.

The operator starts by turning the handle 83 in the opposite direction, and brings all the pairs 75 of the runners 75a, 75b (and therefore, the baskets 10) into a loading/unloading position (Figure 9).

Next, the operator unlocks the baskets 10 from the pairs 75 by moving the latch 80, and withdraws the baskets 10 from the magazine 60 by hand (because the bag 1 is empty, use of a lift is no longer required).

Finally, after removing in advance the handles 8 from the retaining
5 hooks 35, the operator removes the empty bags 1 from the baskets 10 and then disposes the bags.

Below, certain aspects of the shape of the magazine 60 are examined, and the advantages are better understood in the light of the description that was provided for the loading method according to the present
10 invention.

The vertical interval between the two pairs 75 of the runners 75a, 75b of the magazine 60 depends on the volume of the container of the largest capacity that can be inserted into the basket 10. In this example, the container is a 50 liters bag.

15 More specifically, the interval is predetermined, but in the operating configuration of the magazine 60, a bag such as 1 that is filled with liquid and contained in the basket 10 is on the same plane as the grid 19 of the basket 10 that is positioned directly thereabove (Figure 10), thereby minimizing the height to the ground of the magazine 60.

20 The angle of inclination σ of the pairs 75 of the runners 75a, 75b is also optimized. More specifically, it is clear that when the angle σ is greater, the risk of transferring air bubbles into the circuit is lower, but the height from the ground of the magazine 60 increases.

In the preferred embodiment illustrated in the drawings, the value of
25 the angle σ is 20° . However, this inclination can significantly limit the risk of introducing air without excessively increasing the height above the ground of the magazine 60. Thereby, the magazine can pass beneath a standard door frame (2 meters) in order to enable displacement from one room to another and to facilitate unlocking and then withdrawal by hand of the baskets 10 after
30 draining the bags 1.

The recess of the front half of the chassis 61 of the magazine 60 also contributes to the optimization of the height thereof above the ground by

enabling positioning of the first pair 75 of the runners 75a, 75b near the chassis 61. Therefore, when pivoting the pairs 75, the front of the basket 10 that is supported by the first pair 75 enters the hollow of the chassis 61 and is positioned as close as possible to the ground (Figure 10).

5 Next, a description is provided in more detail of the means for driving the pairs 75 of the runners 75a, 75b between the loading/unloading position and the operating position, using Figure 10.

10 The six runners 75a are rigidly linked to one end of a first corresponding metal rod 84 that are adapted to pivot. Each of the rods 84 passes through a circular opening provided in an inner wall 85 of the lateral support pillar 63 and contains at the opposite end thereof from the runner 75a a screw thread that in conjunction with a nut prevents withdrawal of the metal rods 84 after assembly.

15 The inner wall 85 of the lateral support pillar 63 has an oblong opening 88 with a circle arc form at the height of each rod 84 and behind on the back side, as illustrated in the dashed line in Figure 10.

20 A flat vertical bar 89 that is approximately the same length as the support pillar 63 but that is much narrower is disposed along the inner wall 85 of the support pillar 63. The vertical bar 89 contains six circular openings 90 that are distributed across the height thereof, have the same intervals between the rods 84, and where the diameter of the circular openings 90 matches the width of the oblong openings 88.

25 The six runners 75a are also rigidly linked to one end of a second corresponding metal rod 91 behind the rods 84. Each of the rods 91 passes through the oblong opening 88 from the runner 75a, and then a circular opening 90 of the flat vertical bar 89, and contains at the opposite end thereof from the runner 75a a screw thread with a nut to prevent withdrawal of the rods 91 after assembly.

30 Thereby, each of the runner 75a is fastened to the first rod 84 that may pivot, and to the second rod 91 that travels in the oblong opening 88 of the inner wall 85 of the support pillar 63. The form of the oblong opening 88

determines the maximum inclination σ , herein 20° , that the runner 75a can take relative to the horizontal.

The vertical bar 89 enables mechanical linking of all six runners 75a such that the runners 75a can simultaneously pivot at the same angle of inclination.

The mechanical linking means that enables simultaneous pivoting of the runners 75b to be obtained relative to the lateral support pillar 64 are identical to means described above for the lateral support pillar 63 and the six runners 75a.

The flat vertical bar 89 of the support pillar 63 and the equivalent thereof of the support pillar 64 are hingingly linked at the top by a bridging member 92. The bridging member 92 contains two brackets 92a hingingly mounted respectively to the tops of the support pillar 63 and 64.

Thereby, the six pairs 75 of the runners 75a and 75b are mechanically linked and all pivot simultaneously at the same angle of inclination.

The crank 83 that enables the pivoting to be performed is fastened to a first end of a shaft 86 that is freely mounted to rotate on the inner wall 85 of the lateral support pillar 63. The input shaft 86 is linked through an angle transmission and a reduction transmission 87 (herein, containing a set of cog wheels and an endless screw) to one of the rods 84 (herein, second rod from the ground). Therefore, this rod is slightly longer than the other rods 84 in order to pass through the reduction transmission 87.

The reduction ratio is such that when the operator turns the handle 83 seven revolutions, the pairs 75 of the runners 75a, 75b pivot by approximately 20° .

Next, a description is provided in more detail for a locking latch 80 that is adapted to cooperate with the finger 31 of the basket 10, using Figure 11.

The locking latch 80 contains a roof wall 93 having a rectangular outline and a lateral wall 94 extending perpendicularly to the wall 93 along one of the longitudinal edges thereof.

The first end 95 of the lateral 94 is pivotally mounted around a rotational shaft 96 on the inner surface of the runner 75a in the vicinity of the upper rear corner thereof.

5 The second end 97 of the lateral wall 94 has a profile that is inclined from top to bottom and from the rear to the front.

The lateral wall 94 contains between the two ends 95 and 97 thereof on the opposed side from the roof wall 93, a cut-out 98 that partially conforms to the cross-section of the finger 31.

10 The latch 80 also contains a prop 99 that extends through the roof wall 93 and perpendicularly thereto, in the direction of the cut-out 98 (where the head can only be seen in Figure 11).

A compression spring (not illustrated in Figure 11) is further fastened between the roof wall 93 and the longitudinal edge of the runners 75a in order to permanently bias the latch 80 towards the runner 75a until the free end of the
15 propeller 99 rests on the longitudinal edge of the runner 75a (the roof wall 93 is parallel to the longitudinal edge as illustrated in Figure 11).

Next, the operation of the locking latch 80 is described.

When the basket 10 is inserted into the pair 75 of runners 75a, 75b, the finger 31 approaches the latch 80 until coming into contact with an edge 97
20 thereof having an inclined profile.

The force exerted by the finger 31 towards the front of the magazine 60 on the inclined profile makes the end 97 pivot upward around the shaft 96, such that the finger 31 can continue moving until coming into abutment against the rear end of the runner 75a.

25 As soon as the finger 31 moves past the inclined profile, the latch 80 is returned downward by the spring, and then the cut-out 98 locks the finger 31, and thereby the basket 10.

In variations of the device according to the present invention that are not illustrated:

30 - the supporting means contains a single inclinable plate provided with fastening straps, baskets are stacked on top of each other on the plate in a

horizontal position, and the baskets are strapped to each other on the plate that is then inclined;

- the baskets are formed from solid metal, plastic or another material; and/ or are shaped differently such as a bin for example;

5 - the magazine contains at least one reader of electronic labels that are intended to be bonded to the containers and that bear information relating to the nature of the containers (volume, nature of the liquid, and the like.); and the readers use a technology that is both wireless and contact free (for example, RFID: radio frequency identification), and after reading, convey the
10 information collected and possibly other information (for example, the angle of inclination of the containers relative to the horizontal and position thereof in the magazine), to a display that is present on the magazine and/or towards an automatic controller/computer that is external to the magazine;

- locking of the baskets to the magazine is achieved by positioning
15 members that are different from the fingers 31, and for example pins each disposed on a runner and containing a metal rod at one of the ends thereof, each pin adapted to move in conjunction with a detent disposed on the frame of the basket;

- in each runner, the region of the groove that is in contact with the
20 baskets is an interchangeable part subject to wears and is manufactured from plastic material of an acetal for example;

- the source of rotation is other than a crank such as an electric motor for example;

- the angle of inclination of the runners is different from 20° such as
25 10° and 45° for example;

- the number of the pairs of the runners and of the baskets is different such as from two to ten for example;

- each basket contains a cover to protect the flexible bag thereof;

- each basket contains a movable double retaining hook with a
30 marine anchor profile (or two separate moveable hooks) that are hinged to the fastened hook to cooperate with the handles of the bags with different capacities (for example, 10 and 20 liters); and/or

18a

- the pivot sections of the moveable retaining hook are curved around the branches of the fastened hook resting thereon.

Numerous other variants are possible based on the situation, and therefore, it is to be noted that that the present invention is not limited to the
5 embodiments described above.

CLAIMS

1. A device for supporting a plurality of flexible containers (1) for liquid; comprising:

- a plurality of baskets (10), each adapted to contain at least one of the flexible containers (1); and

- a magazine (60) for receiving the baskets (10), able to adopt an operating configuration in which the baskets (10) are inclined one above the other, with each container (1) in a position where at least one connector (3) is in the lower part thereof, comprising:

- supporting means (75) for the baskets (10), able to adopt a loading/unloading position such that each of the baskets (10) can be loaded/unloaded along a horizontal path, and able to adopt an operating position where the supporting means are adapted to maintain each of the baskets (10) in an inclined position while the magazine (60) adopts the operating configuration, and

- means (83, 87, 89, 91) for driving the supporting means (75) between the loading/unloading position and the operating position.

2. The device according to claim 1, wherein the supporting means comprise a pair (75) of opposite runners (75a, 75b) adapted to slide and receive the basket (10), for each basket (10).

3. The device according to claim 2, wherein the runners (75a, 75b) of each runner pair (75) are pivotally mounted on support pillars (63, 64) opposite the magazine (60).

4. The device according to claim 3, further comprising abutment means (88, 91) for limiting the pivoting of the runners (75a, 75b).

5. The device according to claim 4, wherein the abutment means comprises at least one rod (91) adapted to travel in an oblong opening (88) of the support pillars (63, 64).

6. The device according to any one of claims 2 through 5, wherein the pair (75) of runners (75a, 75b) comprise means for locking (80) the basket (10) in the magazine (60).

7. The device according to claim 6, wherein the locking means comprises a latch (80) that is mechanically linked to one of the runners (75a) of the pair of runners (75), and the latch (80) is adapted to move in conjunction with a positioning member (31) of the basket (10).

8. The device according to any one of claims 3 through 7, wherein the drive means comprises means for mechanical linkage (89, 91) rigidly linking the pair (75) of runners (75a, 75b) together and means for pivoting (83, 87) the pair (75) of runners (75a, 75b).

9. The device according to claim 8, wherein the mechanical linking means comprises two metal bars (89) disposed in the support pillars (63, 64) such that upper parts thereof are linked by a bridging member (92).

10. The device according to claim 8 or 9, wherein the pivoting means comprises a reduction transmission (87) and a rotation source (83).

11. The device according to any one of claims 1 through 10, wherein the magazine (60) comprises a horizontal chassis (61) mounted on wheels (70).

12. The device according to claim 11, wherein the horizontal chassis (61) is partially recessed to permit travel of a basket (10) traveling from the loading/unloading position to the operating position.

13. The device according to any one of claims 1 through 12, wherein each basket (10) comprises a frame (11) adapted to move in conjunction with the supporting means (75) and a grid (19) adapted so as to support the flexible container (1).

14. The device according to claim 13, wherein each basket (10) comprises a retaining hook (35) adapted to move in conjunction with a handle (7) of the flexible container (1), wherein the retaining hook (35) is rigidly attached to the frame (11).

15. The device according to claim 14, wherein the grid (19) comprises a recessed part (28) located on the opposite side from the retaining

hook (35) in order to accommodate the connector (3) of the flexible container (1).