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(54) **FLEXIBLE PACKAGE FOR A DETERGENT OR CLEANING LIQUID AND RELATED FORMING AND PACKAGING METHOD**

(57) A flexible package for a detergent or cleaning liquid of the type comprising at least three flexible walls, a first frontal rectangular wall, a second rear rectangular wall and a third bottom rectangular wall which can be folded in half on itself for making the flexible package flat when it is empty, the at least three flexible walls are heat-welded together for containing the detergent or cleaning liquid, the flexible package also includes an outlet duct heat-welded to the flexible package itself, for dispensing the detergent or cleaning liquid.

The flexible package includes an opening/closing valve equipped with at least one opening/closing lever for dosing the detergent or cleaning liquid, in addition the outlet duct is heat-welded to the first frontal rectangular wall in proximity of a lower side of the same for allowing a complete outflow of the detergent or cleaning liquid from the outlet duct, moreover, the opening/closing valve is coupled with the outlet duct for dosing the detergent or cleaning liquid.

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Description

[0001] The present invention refers to a package for a detergent or cleaning liquid, such as in particular an household or personal care liquid, and to a related forming and packaging method.

[0002] Known methods of packaging detergent or cleaning liquids involve placing them in a flexible refill bag having three walls heat-welded together to form a bag with a substantially triangular side profile.

[0003] The refill bags, for example of liquid hand soap, are used to refill a package of liquid hand soap equipped with a pump, therefore the refill bags are used exclusively to reduce the cost and weight of the packaging aimed at using the same rigid package of a liquid product of the same type several times.

[0004] The bags include three walls, a frontal wall, a rear wall and a bottom wall, made of flexible plastic sheets respectively.

[0005] The first frontal wall and the second rear wall are welded together only along the two side ends (left and right) and are also connected by a bottom wall which is heat-welded to said first frontal wall and to said second rear wall.

[0006] In particular said bottom wall comprises a frontal side and a rear side which are heat-welded to said frontal wall and to said rear wall respectively, further said bottom wall includes a left side and a right side each of which is heat-welded at the same time to said first frontal wall and to said second rear wall.

[0007] Said bag includes a beveled upper corner in which an outlet pipe is inserted and heat-welded on which a threaded cap is screwed.

[0008] In addition said bag is provided with a resealable screw cap which is screwed onto an outlet duct which is heat-welded at a beveled upper corner of said bag.

[0009] Also on the side opposite to said outlet duct, said bag is optionally provided with a through hole which makes a vertical handle which is made in a heat-welded portion of said frontal wall, wherein said handle extends vertically and is made on a side opposite to that of the cap for grasping and tilting the bag to pouring the detergent or cleaning liquid and also for handling said bag.

[0010] These bags are typically filled vertically because the upper side of said first frontal wall and second back wall is not fully heat-welded for allowing the insertion of a duct for the introduction of said detergent or cleaning liquid and also for allowing the outflow of a part of the air present inside the flexible bag.

[0011] Another disadvantage is that said flexible bags are not completely filled but are only filled slightly more than half of the capacity of the same, in order to prevent that after unscrewing the cap, said liquid may accidentally leak from said flexible bag, in particular in the case of a compression exerted with one hand on said first frontal wall and on said second rear wall.

[0012] Consequently by using flexible bags it is not possible to fully use the containment capacity of the same.

[0013] In fact, by filling a flexible bag more, even a lower pressure exerted on said first frontal wall and on said second rear wall would lead to the unwanted accidental rising and leakage of said detergent liquid from said outlet duct.

[0014] Besides internally to said flexible bag there is a lot of air present, and also said detergent or cleaning product contains a lot of water therefore it is necessary to add a large amount of preservatives and bactericidal agents to prevent oxidation and proliferation of bacteria inside said flexible bag for a given period of time.

[0015] A purpose of the present invention is to make a package for a detergent or cleaning liquid and a related forming and packaging method that allow to prevent an unwanted leakage of the liquid during the use of the flexible package and that allow at the same time to maximize the containment capacity of said flexible package.

[0016] Another purpose is to make a package for a detergent or cleaning liquid and a related forming and packaging method that allow to reduce the surface and volume necessary for the storage and transport of the flexible package containing the detergent or cleaning liquid.

[0017] Another purpose is to make a package for a detergent or cleaning liquid and a related forming and packaging method that allow the use of natural ingredients and that allow to reduce the percentage of preservatives and bactericidal agents necessary to prevent oxidation and the proliferation of bacteria within said flexible bag for a given period of time.

[0018] Further purpose is to have a package for a detergent or cleaning liquid and a related forming and packaging method that are economically advantageous.

[0019] These purposes according to the present invention are achieved by making a package for a detergent or cleaning liquid and a related forming and packaging method as set out in claim 1 and 10.

[0020] Further features of the invention are highlighted by the following claims.

[0021] The features and advantages of a package for a detergent or cleaning liquid and a related forming and packaging method according to the present invention will be more evident from the following description, which is illustrative and not limiting.

[0022] According to the present invention, a flexible package for a detergent or cleaning liquid, such as in particular a household care or personal care liquid, is provided.

[0023] Said flexible package is of a type comprising at least three flexible walls, such as a first frontal rectangular wall, a second rear rectangular wall and a third bottom rectangular wall which is foldable in half on itself for making said flexible package flat when it is empty, said at least three flexible walls being heat-welded together for containing said detergent or cleaning liquid.

[0024] In particular said flexible package, preferably filled with said detergent or cleaning liquid, is self-sup-

porting, that is, it is able to remain vertical if placed with said third bottom rectangular wall on a support surface, thanks to said third bottom rectangular wall and in particular to a lower side of said first frontal rectangular wall and to a lower side of said second rear rectangular wall that collaborate with each other for keep said flexible package vertical.

[0025] Preferably said flexible package with at least three walls is therefore self-supporting and does not require an external container such as a containment box for maintaining a vertical configuration.

[0026] Said flexible package also includes an outlet duct heat-welded to said flexible package for dispensing said detergent or cleaning liquid.

[0027] According to the present invention said flexible package includes an opening/closing valve equipped with at least one opening/closing lever for dispensing said detergent liquid or detergent, besides said outlet duct, preferably horizontal, is heat-welded to said first frontal rectangular wall in proximity of a lower side of the same for allowing a complete outflow of said detergent or cleaning liquid from said outlet duct, further said opening/closing valve is coupled with said outlet duct for dispensing said detergent or cleaning liquid in particular by keeping said flexible package resting on a support surface or hanged on a hook or a water tap.

[0028] Instead of as a refill package for filling a rigid container, according to the present invention said flexible package is therefore to be used as a final package also for dispensing and using of said detergent or cleaning liquid, and also allows to solve a first purpose of the present invention.

[0029] In particular, said opening/closing valve includes a second outlet duct oriented downwards for facilitating the outflow of said liquid into a container or onto a user's hand.

[0030] Preferably said opening/closing valve is coupled with said outlet duct by means of a pressure coupling in particular of the male/female type which is preferably realized internally within said outlet duct and externally to a tubular portion of an external body of said opening/closing valve with which said opening/closing valve is equipped.

[0031] Preferably said outlet duct is an externally flanged collar and it is internally corrugated, in which it is inserted and coupled under pressure, in particular with a snap coupling, an externally corrugated tubular portion of an external body of said opening/closing valve, which is in particular also heat-welded to the same.

[0032] Preferably said opening/closing valve is coupled with said outlet duct by means of a threaded coupling in particular of the male/female type which is preferably realized internally within said outlet duct and externally to a tubular portion of an external body of said opening/closing valve with which it is equipped; preferably said outlet duct is an externally flanged collar and is internally threaded, into which is screwed, in particular with a watertight thread, an externally threaded tubular portion of an externally threaded body of said opening/closing valve, for reusing several times said opening/closing valve with a plurality of flexible packages.

[0033] Preferably said flexible package includes a flexible closing tongue which is preferably heat-welded at a free end of said outlet duct for keeping said flexible package closed and unaltered before use, and furthermore said flexible closing tongue is removable for screwing said opening/closing valve or for press-fitting said opening/closing valve.

[0034] In particular said outlet duct preferably horizontal protrudes externally with respect to said first frontal rectangular wall between 0.5 and 1 cm.

[0035] In particular said opening/closing valve protrudes externally with respect to said first frontal rectangular wall between 1.5 cm and 3.5 cm.

[0036] Further preferably said outlet duct includes a first internal flange which is heat-welded internally to said first frontal rectangular wall, and also includes at least a second external flange, in particular at least two external flanges, preferably for supporting said flexible package, in particular for emptying said flexible package from the air, and for filling said flexible package with said detergent or cleaning liquid, in particular for inserting an inert gas and for temporarily closing said outlet duct from the inside, and at the same time for inserting said opening /closing valve under pressure within said outlet duct.

[0037] In particular said preferably horizontal outlet duct is heat-welded to said first frontal rectangular wall in a substantially central position of the same, preferably in proximity of said third bottom rectangular wall in particular so as to present a lower part of said outlet duct substantially tangent to a lower side of said first frontal rectangular wall in order for allowing a complete outflow of said detergent product or liquid detergent.

[0038] In particular said third bottom rectangular wall comprises a frontal side and a rear side which are heat-welded to said first frontal rectangular wall and to said second rear rectangular wall respectively, and said third bottom rectangular wall includes a left side and a right side, each of which is heat-welded at the same time as said first frontal rectangular wall and said second rear rectangular wall.

[0039] In particular said first frontal rectangular wall and said second rear rectangular wall have the same dimensions and are superimposed on each other so that corresponding edges are coincident, said third bottom rectangular wall is foldable in half on itself so that two edges of each left and right side of the same are superimposed, said folded third bottom rectangular wall is inserted between said first frontal rectangular wall and said second rear rectangular wall in such a way that the frontal and rear sides of said folded third bottom rectangular wall coincide with the lower side of said first frontal rectangular wall and with the lower side of that second rectangular wall, and also are heat-welded together a perimeter of said first frontal rectangular wall, a perimeter of said second rear rectangular wall, and a perimeter of said folded

third bottom rectangular wall.

[0040] Preferably said opening/closing valve includes an external body, an inlet duct internal to said external body, a second outlet duct preferably vertical in which is inserted a first element made of an elastic polymeric material chosen between silicone or other elastic plastic material having a sealing function, and also includes a second polymeric closing element of said second outlet duct which is made in one single piece with said at least one opening/closing lever and is slidable, preferably vertically, within said external body for moving away from an outlet section of said second outlet duct following an actuation of said at least one opening/closing lever for opening said second outlet duct for dispensing said detergent or cleaning liquid.

[0041] Preferably said at least one opening/closing lever is external to said external body and is also inserted into a corresponding hole made within said external body for being integral to said second polymeric closing element, said at least one opening/closing lever is operable to vertically lift said second polymeric closure element by reaction with said hole for opening said second outlet duct for dispensing said detergent or cleaning liquid.

[0042] Advantageously this allows to easily recycle said flexible package as it is made only with plastic materials including said opening/closing valve.

[0043] Preferably said opening/closing valve also includes an annular closure element equipped with a gasket which is pressed by elastic means against said outlet duct for keeping said outlet duct normally closed; further preferably said at least one opening/closing lever includes an proximal end internal to said opening/closing valve which is interposed between said outlet duct and said annular closure element for moving the same away from said outlet duct for opening said opening/closing valve and for allowing the dispensing of said detergent or cleaning liquid.

[0044] Alternatively preferably said elastic means include a retaining spring preferably made of metal in particular galvanized or stainless steel, which is connected to a shutter and to said at least one opening/closing lever for closing said outlet duct of said flexible package.

[0045] Preferably said opening/closing valve is normally kept closed by a closing spring that keeps said opening/closing valve closed, and also said at least one opening/closing lever when actuated allows to counteract the force of said closing spring for opening said valve and for dispensing said detergent or cleaning liquid.

[0046] Preferably said opening/closing valve includes an externally corrugated and preferably horizontal sleeve, which is insertable by pressure within said outlet duct of said flexible package.

[0047] Preferably said flexible package includes a dosing tap which is coupled with said opening/closing valve and in particular which is integrated with the same.

[0048] Preferably said flexible package include a plastic seal which is removable before use, and which prevents the actuation of at least one opening/closing lever preventing an accidental opening of said opening/closing valve, and also preferably said opening/closing valve includes a flexible closing tongue and includes a second outlet duct preferably vertical for dosing said detergent or cleaning liquid, wherein said second outlet duct includes a free end to which said removable flexible tongue is heat-welded for keeping said flexible package closed and unaltered.

[0049] Preferably said flexible package includes at least one handle or at least one handling hole which is made in proximity of an upper side of said first frontal rectangular wall in a substantially central position for keeping said flexible package vertical, in particular preventing it from tilting to one side, in particular when said at least a handle, or said at least one handling hole, is hooked to a hook or to a water tap, and for attaching said flexible package to a hook or to a water tap.

[0050] In particular said at least one handle or said at least one handling hole are also used to hook at least one flexible package to a hook or to a water tap.

[0051] Preferably said at least one handle or said at least one handling hole extends horizontally and it is in particular "I" shaped.

[0052] Advantageously said flexible package allows to easily dose said detergent or cleaning liquid, for example by placing it on a plane of a washing machine so that said opening/closing valve is protruding from said plane and positioned above an open drawer for the detergent of the washing machine itself, also by means of an actuation of said at least one opening/closing lever it is possible to pour into said drawer said detergent or cleaning liquid.

[0053] Similarly it is possible to place said flexible package on a support surface in such a way that said opening/closing valve is protruding from it, and it is also possible an actuation of said at least one opening/closing lever for dosing, for example, a hand detergent liquid on a hand positioned under said opening/closing valve.

[0054] The same is possible by hanging said flexible package by inserting said at least one handle or handling hole on a hook or on a water tap.

[0055] Preferably said flexible package includes a fourth upper rectangular wall which is heat-welded to said first frontal rectangular wall and to said second rear rectangular wall at a predetermined distance from an upper side of each of them.

[0056] In particular said fourth upper rectangular wall comprises a frontal side and a rear side which are respectively heat-welded to said first frontal rectangular wall and to said second rear rectangular wall, further said fourth upper rectangular wall includes a left side and a right side each of which is respectively heat-welded at the same time to said first frontal rectangular wall and to said second rear rectangular wall.

[0057] Preferably said at least one handle or said at least one handling hole are . two coaxial handles, or two coaxial handling holes, preferably horizontal and in particular shaped to "I", each of which is made respectively

in proximity of an upper side of said first frontal rectangular wall in a substantially central position and in proximity of an upper side of said second rear rectangular wall in a substantially central position.

[0058] Preferably said flexible package includes an internal volume which is at least at 90%, in particular at least 95%, filled with said detergent or cleaning liquid and also a remaining portion of said internal volume is filled with an inert gas such as in particular nitrogen.

[0059] In particular said detergent liquid is chosen between a washing machine or hand washing detergent, a floor detergent, a glass detergent, a dishwashing detergent, a household detergent, a fabric softener, a sanitizer.

[0060] In particular said detergent liquid is chosen between a liquid soap, a bath foam, a shower foam, a shampoo.

[0061] Preferably said detergent or cleaning liquid includes at least one preserving agent, preferably chosen between phenoxyethanol, potassium sorbate and potassium benzoate, at least one bactericidal agent preferably chosen between phenoxyethanol and/or citric acid, and further comprises a plurality of substances of natural origin or derivation, such as in particular coconut oil salts or oil, glucosides.

[0062] Preferably said detergent or cleaning liquid includes at least one chelating agent for metal ions, such as in particular tetrasodium glutamate diacetate.

[0063] Preferably said flexible package when a vacuum is created inside it, said first frontal rectangular wall is pressed against said second rear rectangular wall and therefore the lateral thickness is between 0.5 and 3 millimeters, except where said opening/closing valve is present.

[0064] According to another aspect of the present invention, it is provided a forming and packaging method of a flexible package for a detergent or cleaning liquid according to one or more variants or according to one or more features previously described.

[0065] Preferably said method includes a packaging step which includes a phase of h) completely sucking the air inside of said flexible package by means of a supply duct connected to said outlet duct of said flexible package, followed by a phase of i) filling said flexible package with a detergent liquid or detergent which preferably includes a phase of j) pumping said detergent or cleaning liquid through said supply duct almost completely filling said flexible package.

[0066] Preferably said phase i) include a phase of k) grasping at least one external flange of said outlet duct of said flexible package, in particular with a plier, and keeping said outlet duct facing upwards and in a higher position than said first frontal rectangular wall facing upwards.

[0067] Preferably said phase i) also includes a phase of m) filling a free volume inside said flexible package with an inert gas such as in particular nitrogen after said phase j).

[0068] In particular said phase m) includes a phase of n) introducing an inert gas such as nitrogen into said flexible package, in particular through said supply duct.

[0069] Preferably said method also includes a phase of o) internally closing said outlet duct by lifting and pressing a portion of said second rear rectangular wall, which faces towards said outlet duct, against said outlet duct and in particular against a first internal flange of said outlet duct for preventing a leakage of said detergent or cleaning liquid, and in particular of said inert gas, from said outlet duct of said flexible package.

[0070] Preferably said method preferably includes a phase of p) removing said supply duct and a phase of q) inserting and forcing under pressure said opening/closing valve within said outlet duct of said flexible package obtaining a filled flexible package.

[0071] Preferably said forming and packaging method includes a phase of a) superimposing a first frontal rectangular wall on a second rear rectangular wall having the same dimensions as said first frontal rectangular wall, and said method include a phase of b) folding in half a third bottom rectangular wall, in particular by overlapping the edges of a left side and overlapping the edges of a right side, obtaining a third folded bottom rectangular wall, and also includes a phase of c) insert said third folded bottom rectangular wall between said first frontal rectangular wall and said second rectangular wall rear, making coincide the frontal and rear sides of said third folded bottom rectangular wall with the lower side of said first frontal rectangular wall and with the lower side of said second rear rectangular wall, and also includes a phase of d) heat-welding together a perimeter of said first frontal rectangular wall, a perimeter of said second rear rectangular wall, and a perimeter of said third folded bottom rectangular wall, obtaining a flat package.

[0072] In particular said flexible package filled with said detergent or cleaning liquid is able to remain vertical if placed on a support surface thanks to said third bottom rectangular wall.

[0073] Preferably said method before said phase a) comprises a2) perforating said first frontal rectangular wall in proximity of a lower side of the wall realizing an outlet hole, and a phase of a3) heat-welding an outlet duct to said outlet hole, which preferably comprises heat-welding a first end flange of said outlet duct internally to said outlet hole.

[0074] Preferably said method includes a phase of e) folding in half a fourth upper rectangular wall, in particular by overlapping the edges of a left side and overlapping the edges of a right side, obtaining a fourth folded upper rectangular wall, and also includes a phase of g1) insert said fourth folded upper rectangular wall between said first frontal rectangular wall and said second rear rectangular wall positioning the frontal and rear sides of said fourth folded upper rectangular wall at a predetermined distance below with respect to an upper side of said first frontal rectangular wall and with respect to an upper side of said second rear rectangular wall, and also includes

a phase of g2) heat-welding the perimeter of said first frontal rectangular wall, the perimeter of said second rear rectangular wall, and a perimeter of said fourth folded upper rectangular wall, obtaining a flat flexible package.

[0075] According to another aspect of the present invention, a forming and packaging system of a flexible package for a detergent or cleaning liquid is provided according to one or more variants or according to one or more features previously described.

[0076] Preferably said system include a feeding device for said flexible package and shall also include a gripper for grasping said at least one external flange of said outlet duct of said flexible package, and further said system includes a three-way valve having an outlet connected to said supply duct connectable to said outlet duct of said flexible package, and also includes a device for supplying said detergent liquid or detergent connectable to a tank of said detergent or cleaning liquid and also connected to a first inlet of said three-way valve, preferably said system also includes a vacuum pump connected to a first inlet of said three-way valve for sucking in the air contained within said flexible package through said outlet duct of the same and also includes a pressure tank of inert gas, in particular nitrogen, which is connected to said first inlet of said three-way valve for introducing an inert gas such as nitrogen in particular into said flexible package.

[0077] Preferably said system comprising a closing device of said flexible package which is capable of grasping and inserting and pressing said opening/closing valve within said outlet duct of said flexible package.

[0078] Preferably said system includes a cutting and heat welding station for realizing said flexible package, and in particular for cutting and heat welding said at least three flexible walls, in particular four flexible walls, and to heat welding said outlet duct to said first frontal rectangular wall.

[0079] According to another aspect of the present invention, it is provided a use of a flexible package for a detergent or cleaning liquid according to one or more variants or according to one or more features previously described, wherein said flexible package filled with said detergent or cleaning liquid is positioned vertically on a support plane, so that said opening/closing valve is protruding externally with respect of the same for allowing an actuation of said at least one opening/closing lever and for allowing the dosage of said detergent or cleaning liquid.

[0080] The same is possible by hanging said flexible package by inserting said at least one handle or handling hole on a hook or on a water tap.

[0081] Use of said flexible package in which said support surface is a top plane of a washing machine and in which said opening/closing valve is protruding with respect to said top plane and positioned above an open drawer for the detergent of said washing machine itself, for permitting an actuation of said at least one opening/closing lever for dosing within said drawer said detergent or cleaning liquid in particular in a predetermined quantity.

[0082] It has thus been seen that a package for a detergent or cleaning liquid and a related forming and packaging method and a use of a flexible package according to this invention fulfills the purposes previously disclosed.

[0083] The package for a detergent or cleaning liquid and the related forming and packaging method and the use of the flexible package of the present invention thus conceived are susceptible to numerous modifications and variations, all falling within the same inventive concept.

[0084] In addition, in practice the materials used, as well as their dimensions and components, can be any depending on the technical needs.

Claims

1. Flexible package for a detergent or cleaning liquid, said flexible package is of a type comprising at least three flexible walls, a first frontal rectangular wall, a second rear rectangular wall and a third bottom rectangular wall which is foldable in half on itself for making said flexible package flat when it is empty, said at least three flexible walls being heat-welded together for containing said detergent or cleaning liquid, said flexible package also includes an outlet duct heat-welded to said flexible package for dispensing said detergent or cleaning liquid, **characterized by** comprising an opening/closing valve equipped with at least one opening/closing lever for dispensing said detergent liquid or detergent, besides said outlet duct is heat-welded to said first frontal rectangular wall in proximity of a lower side of the same for allowing a complete outflow of said detergent or cleaning liquid from said outlet duct, further said opening/closing valve is coupled with said outlet duct for dispensing said detergent or cleaning liquid.

2. Flexible package according to claim 1, **characterized in that** said opening/closing valve is coupled with said outlet duct by means of a pressure coupling in particular of the male/female type which is preferably realized internally within said outlet duct and externally to a tubular portion of an external body of said opening/closing valve with which said opening/closing valve is equipped.

3. Flexible package according to claim 1 or 2, **characterized in that** said outlet duct includes a first internal flange which is heat-welded internally to said first frontal rectangular wall, and also includes at least a second external flange, in particular at least two external flanges, preferably for supporting said flexible package and for filling said flexible package with said detergent or cleaning liquid for inserting said opening /closing valve under pressure within said outlet duct.

4. Flexible package according to any claim from 1 to 3, **characterized in that** said first frontal rectangular wall and said second rear rectangular wall have the same dimensions and are superimposed on each other so that corresponding edges are coincident, said third bottom rectangular wall is foldable in half on itself so that two edges of each left and right side of the same are superimposed said folded third bottom rectangular wall is inserted between said first frontal rectangular wall and said second rear rectangular wall in such a way that the frontal and rear sides of said folded third bottom rectangular wall coincide with the lower side of said first frontal rectangular wall and with the lower side of that second rectangular wall, and also are heat-welded together a perimeter of said first frontal rectangular wall, a perimeter of said second rear rectangular wall, and a perimeter of said folded third bottom rectangular wall.

5. Flexible package according to any claim from 1 to 4, **characterized in that** said opening/closing valve includes an external body, an inlet duct internal to said external body, a second outlet duct preferably vertical in which is inserted a first element made of an elastic polymeric material chosen between silicone or other elastic plastic material having a sealing function, and also includes a second polymeric closing element of said second outlet duct which is made in one single piece with said at least one opening/closing lever and is slidable, preferably vertically, within said external body for moving away from an outlet section of said second outlet duct following an actuation of said at least one opening/closing lever for opening said second outlet duct for dispensing said detergent or cleaning liquid.

6. Flexible package according to any claim from 1 to 4, **characterized by** comprising a plastic seal removable before use which prevents the actuation of said at least one opening/closing lever preventing an accidental opening of said opening/closing valve, also preferably said opening/closing valve includes a flexible closing tongue and includes a second outlet duct preferably vertical for dosing said detergent or cleaning liquid, in which said second outlet duct includes a free end at which said removable flexible tab is heat-welded for keeping said flexible package closed and unaltered before its use.

7. Flexible package according to any claim from 1 to 6, **characterized by** comprising at least one handle or at least one handling hole which is made in proximity of an upper side of said first frontal rectangular wall in a substantially central position for keeping said flexible package vertical, in particular preventing it from tilting to one side, and for attaching said flexible package to a hook or water tap.

8. Flexible package according to claim 7, **characterized by** comprising a fourth upper rectangular wall which is heat-welded to said first frontal rectangular wall and said second rear rectangular wall at a predetermined distance from a predetermined distance from one upper side of each of them, preferably said at least one handle or said at least one handling hole are two coaxial handles, or two coaxial handling holes, preferably horizontal and in particular "I" shaped, each of which shall be made respectively in proximity of an upper side of said first frontal rectangular wall in a substantially central position and in proximity of an upper side of said second rear rectangular wall in a substantially central position.

9. Flexible package according to any claim from 1 to 8, **characterized in that** said flexible package comprises an internal volume which is filled at least at 90% with said detergent or cleaning liquid and also a remaining portion of said internal volume is filled with an inert gas such as in particular nitrogen.

10. A forming and packaging method of a flexible package according to any claim from 1 to 9, **characterized in that** it includes a packaging step which includes a phase of h) completely sucking the air inside to said flexible package by means of a supply duct connected to said outlet duct of said flexible package, followed by a phase of i) filling said flexible package with a detergent or cleaning liquid which preferably includes a phase of j) pumping said detergent or cleaning liquid through said feeding duct almost completely filling said flexible package, said phase i) includes a phase of k) grasping at least one external flange of said outlet duct of said flexible package and keeping said outlet duct facing upwards and in a higher position than said first frontal rectangular wall facing upwards, a phase of o) internally closing said outlet duct by lifting and pressing a portion of said second rear rectangular wall, which faces towards said outlet duct, against said outlet duct and in particular against a first internal flange of said outlet duct for preventing a leakage of said detergent or cleaning liquid from said outlet duct of said flexible package, a phase of p) removing said supply duct and a phase of q) inserting and forcing under pressure said opening/closing valve within said outlet duct of said flexible package by obtaining a filled flexible package.

11. Method according to claim 10, **characterized in that** said phase i) also includes a phase of m) filling a free volume inside said flexible package with an inert gas such as in particular nitrogen after said phase j), said phase m) includes a phase of n) introducing an inert gas such as nitrogen within said flexible package, in particular through said supply duct.

12. Method according to claim 10, **characterized in that** it includes a phase of a) superimposing a first frontal rectangular wall on a second rear rectangular wall having the same dimensions as said first frontal rectangular wall, and said method include a phase of b) folding in half a third bottom rectangular wall, in particular by overlapping the edges of a left side and overlapping the edges of a right side, obtaining a third folded bottom rectangular wall, and also includes a phase of c) insert said third folded bottom rectangular wall between said first frontal rectangular wall and said second rectangular wall rear, making the frontal and rear sides of said third folded bottom rectangular wall coincide with the lower side of said first frontal rectangular wall and with the lower side of said second rear rectangular wall, and also includes a phase of d) heat-welding together a perimeter of said first frontal rectangular wall, a perimeter of said second rear rectangular wall, and a perimeter of said third folded bottom rectangular wall, obtaining a flat package.

13. Method according to claim 12, **characterized by** comprising a phase of e) folding in half a fourth upper rectangular wall, in particular by overlapping the edges of a left side and overlapping the edges of a right side, obtaining a fourth folded upper rectangular wall, and also includes a phase of g1) insert said fourth folded upper rectangular wall between said first frontal rectangular wall and said second rear rectangular wall positioning the frontal and rear sides of said fourth folded upper rectangular wall at a predetermined distance below with respect to an upper side of said first frontal rectangular wall and with respect to an upper side of said second rectangular wall, and also includes a phase of g2) heat welding the perimeter of said first frontal rectangular wall, the perimeter of said second rear rectangular wall, and the perimeter of said fourth folded upper rectangular wall, obtaining a flat flexible package.

14. Use of a flexible package according to any claim from 1 to 9, **characterized in that** said flexible package is filled with said detergent or cleaning liquid and is positioned vertically on a support plane, so that said opening/closing valve is protruding externally with respect of the same for allowing an actuation of said at least one opening/closing lever for allowing the dosage of said detergent or cleaning liquid.

15. Use according to claim 14, **characterized in that** said support surface is a top plane of a washing machine and in which said opening/closing valve is protruding with respect to said top plane and positioned above an open drawer for the detergent of said washing machine itself, for permitting an actuation of said at least one opening/closing lever for dosing within said drawer said detergent or cleaning liquid.

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EUROPEAN SEARCH REPORT

Application Number
EP 22 00 0196

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2014/246455 A1 (MURRAY R CHARLES [US]) 4 September 2014 (2014-09-04)	1-5,7,8	INV. B65D75/58
Y	* paragraph [0024] - paragraph [0036] * * figures 1-4 *	8,9	B65B3/04
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2022	Fitterer, Johann

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EPO FORM 1503 03.82 (P04C01)

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