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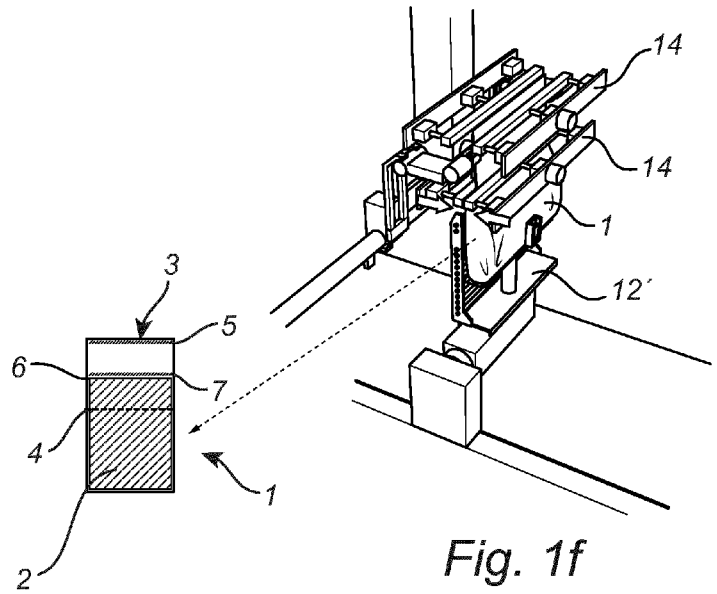

Fig. 1f

(57) Abstract: The invention relates to a method for filling a package (1) with a liquid product (2). The method comprises the steps of filling said package (1) with a predetermined volume of the liquid product (2) through an opening (3) of the package to a first level (4) in the package (1), applying a pressure on the package (1) in order to force the liquid product (2) in the package (1) to rise to a second level (6) in the package (1), and providing the package (1) with a seal at a distance from the second level (6). The invention also relates to a device (8) for filling a package (1) with a liquid product (2), and a package (1) containing a liquid product (2).

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METHOD AND DEVICE FOR FILLING A PACKAGE WITH A LIQUID PRODUCT, AND A PACKAGE CONTAINING A LIQUID PRODUCT

Technical field

The invention relates to a method and a device for filling a package with a liquid product. The invention also relates to a package containing a liquid product.

Background art

Liquids may be packaged in different types of packages, such as bottles, cartons or packages formed by a thin plastic foil material, such as a plastic bag. When choosing the type of packages several properties of the liquid must be taken into account. For example, the liquid may be corrosive or sensitive to light or oxygen.

In the case of the liquid being sensitive to oxygen it is important that the packaging material does not allow oxygen to enter through the packaging material.

One type of package used for liquids, typically for different kinds of beverages, e.g. wine, is the so called “bag-in-box”. This type of package comprises a liquid filled bag made from a thin plastic foil inside a rigid package such as a carton box. Such a package is often used for packaging relatively large volumes, e.g. more than 1.5L. A draining valve is arranged on a side surface of the package, for emptying contents from the package. One example of such a draining valve is disclosed in US 8,657,163.

Conventionally, packages made from a thin plastic foil material, such as a plastic bag, are filled through the draining valve. However, when packaging a liquid in such a package, air, which comprises oxygen, may also be trapped inside of the bag, the so called “head space”. The oxygen present in the air oxidises components of the liquid, which most often leads to a shortened shelf life of the packaged liquid. In addition oxidisation of components of the liquid may not only lead to a shortened shelf life, but also to changes in taste and colour of the liquid.

Summary of the invention

It is an objective of the present invention to provide an improvement of the above technique and prior art. More particularly, it is an objective of this invention to provide an improved method for filling a package with a liquid product.

According to a first aspect, these and other objects, and/or advantages that will be apparent from the following description of embodiments, are achieved, in full or at least in part, by a method for filling a package with a liquid product. The method comprises the steps of filling said package with a predetermined volume of said liquid product through an opening of said package to a first level in said package, applying a pressure on said package in order to force said liquid product in said package to rise to a second level in said package, and providing said package with a seal at a distance from said second level.

When the pressure is applied to the package, the level of the liquid in the package rises and air and foam is pressed out of the package. In this way the amount of air inside the package is decreased. Thus, the amount of oxygen which can oxidise the components of the liquid is also decreased and the shelf life of the packaged liquid is prolonged.

In addition, by applying a pressure to the package before providing the first seal, the volume of the package is decreased.

The method may further comprise the step of stretching said package in order to force said liquid product in said package to rise to a second level in said package. When the package is stretched, the second level is adjusted. In this way a clean seal may be obtained.

The volume of the liquid may be less than the volume of the sealed package. This allows for the liquid to expand when subjected to higher temperatures, e.g. during transportation or storage. This in turn reduces the risk of the package or seal being damaged leading to the leakage of the liquid

The first level may be a predetermined level.

The second level may be a predetermined level.

The seal may be provided at a predetermined distance from said second level.

It is important to realize that a small amount of air may be allowed inside the package. Importantly, the amount of air inside the package, the "head space" may be controlled with the method according to the invention.

Furthermore, by using the method according to the present invention, the size of the package may be adjusted by changing the location of the first seal.

The liquid product may have an arbitrary viscosity.

The liquid product may be an emulsion or paste in which solid particles may be mixed with a liquid.

According to a second aspect, these and other objects, and/or advantages that will be apparent from the following description of embodiments, are achieved, in full or at least in part, by a method for filling a package with a liquid product. The method comprises the steps of filling said package with a predetermined volume of said liquid product through an opening of said package to a first level in said package, providing said package with a first seal, at a distance from said first level, in order to close said opening and seal said package, applying a pressure on said package in order to force said liquid product in said package to rise to a second level in said package, and providing said package with a second seal, at a distance from first seal, in order to decrease a volume of said package.

By providing a first seal before the pressure is applied to the package, the risk of the liquid spilling over the rim of the package is reduced. If liquid would spill over the rim of the package there would be a need for cleaning the outside of package since remains of the liquid could lead to the growth of mould on the package or to a sticky surface.

When the pressure is applied to the package, the level of the liquid in the package rises and air and foam is pressed towards the first seal. In this way the amount of air inside the package is decreased. Thus, the amount of oxygen which can oxidise the components of the liquid is also decreased and the shelf life of the packaged liquid is prolonged.

In addition, by applying a pressure to the package before providing the second seal, the volume of the package is decreased.

The method may further comprise the step of stretching said package in order to force said liquid product in said package to rise to a second level in said package. When the package is stretched, the second level is adjusted. In this way a clean seal may be obtained.

The volume of the liquid may be less than the volume of the sealed package. This allows for the liquid to expand when subjected to higher temperatures, e.g. during transportation or storage. This in turn reduces the risk of the package or seal being damaged leading to the leakage of the liquid.

The first level may be a predetermined level.

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The seal may be provided at a predetermined distance from said second level.

It is important to realize that a small amount of air may be allowed inside the package. Importantly, the amount of air inside the package, the "head space" may be controlled with the method according to the invention.

Furthermore, by using the method according to the present invention, the size of the package may be adjusted by changing the location of the first seal.

The liquid product may have an arbitrary viscosity.

The liquid product may be an emulsion or paste in which solid particles may be mixed with a liquid.

According to a first embodiment, said first seal may be provided above said first and second level, and said second seal may be provided between said first seal and said second level. In this way, a head space of air is created.

The amount of air may be controlled by adjusting the location of the second seal in relation to the second level.

According to a second embodiment, said second seal may be provided adjacent to said second level. In this way, the amount of air is minimized. This is especially advantageous when the liquid is very sensitive to oxidization.

According to another embodiment, the method may further comprise the step of separating said package from a web of preformed packages. The

package may be separated from the web of preformed packages before it is filled with the liquid. Alternatively, the package may be separated from the web of preformed packages after it is filled with the liquid. This allows for a continuous process of filling and sealing packages without the need for reloading the device used with empty packages.

According to yet another embodiment, the method may further comprise the step of providing said opening in said package.

According to one embodiment, said liquid product may be a wine product. However, the liquid products may be any kind of liquid product. The method is especially suitable for liquid products which are sensitive to oxygen and where there is a need to decrease the amount of air inside the package. Examples of such liquid products are milk; fruit juices, such as orange juice and apple juice, vegetable juices, such as tomato juice, and juices made from berries.

According to a third aspect, these and other objects are achieved, in full or at least in part, by a device for filling a package with a liquid product. The device is adapted to receive a web of preformed packages, wherein said device comprises a cutting tool adapted to provide a first cut to cut off a package from said web, and a second cut in order to provide said package with an opening, a filling device adapted to fill said package with a predetermined volume of said liquid product through said opening to a first level in said package, a pressure device adapted to apply a pressure on said package so that said liquid product will rise to a second level, and a sealing tool adapted to provide a first seal in order to close said opening and seal said package, and to provide a second seal, at a distance from said first seal, in order to decrease a volume of said package.

The first cut and the second cut may be the same cut.

The first level may be a predetermined level.

The second level may be a predetermined level.

The seal may be provided at a predetermined distance from said second level.

The device for filling a package with a liquid product may further comprise a stretching device adapted to stretch said package so that said liquid product will rise to a second level.

According to one embodiment, said first seal may be provided above said first and second level, and said second seal may be provided between said first seal and said second level. In this way, a head space of air is created. The amount of air may be controlled by adjusting the location of the second seal in relation to the second level.

According to another embodiment, said second seal may be provided adjacent to said second level. In this way, the amount of air is minimized. This is especially advantageous when the liquid is very sensitive to oxidization.

According to a further embodiment, said liquid product may be a wine product. However, the liquid products may be any kind of liquid product. The method is especially suitable for liquid products which are sensitive to oxygen and where there is a need to decrease the amount of air inside the package. Examples of such liquid products are milk, fruit juices, such as orange juice and apple juice, vegetable juices, such as tomato juice; and juices made from berries.

According to yet another embodiment, said sealing tool may be an induction heating device. However, the sealing tool may be any device adapted to seal the package, e.g. a device for applying glue to the packaging material, an inductor sealing device or a welding device.

According to another embodiment, said pressure device may comprise two pressure elements arranged opposite to each other at a distance to create a gap, wherein said pressure elements may be adapted to apply a pressure on said package when located in said gap. An advantage of this embodiment is that when the pressure is applied from two directions opposite each other, the resulting shape of the package is essentially symmetrical. This will facilitate its placement into a symmetrical outer package, which, in the case of the “bag-in-box” is a symmetrical carton box.

According to another embodiment, said volume of said package may be varied by adjusting said cutting tool and/or by adjusting a feeding speed of a feeding device adapted to feed said web into said device. This is especially

advantageous, since the same device may be used for producing packages of different volumes.

According to a fourth aspect, these and other objects are achieved, in full or at least in part, by a package containing a liquid product, wherein the package has been filled using the method described above and/or by means of the device described above. Such a package will prolong the shelf life of the packaged liquid, since the volume of air inside the package is reduced compared to packages filled using conventional techniques.

Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, from the attached claims, as well as from the drawings. It is noted that the invention relates to all possible combinations of features.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc.]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise.

As used herein, the term "comprising" and variations of that term are not intended to exclude other additives, components, integers or steps.

The method may described herein is not limited to use in connections with the device described herein. That is to say, the method may be implemented using any suitable device or separate components.

Brief description of the drawings

The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of embodiments of the present invention, with reference to the appended drawings, where the same reference numerals may be used for similar elements, and wherein:

Fig. 1a is a schematic drawing of a part of a device according to the invention, wherein the package is about to be introduced into the gap between two pressure elements.

Fig. 1b is a schematic drawing of a part of the device according to the invention, wherein the package is located in the gap between two pressure elements.

Figs. 1c - 1f show a flow chart of a method according to the present invention and schematic drawings of a package as well as a device according to the present invention during the different steps of the method according to the present invention.

Fig. 1g is a schematic drawing of a part of the device according to the invention, wherein the package has been sealed and leaves the device.

Fig. 2a is a schematic drawing of a device for filling a package with a liquid product according one exemplary embodiment of the present invention.

Fig. 2b is a further schematic drawing the device in Fig. 2a.

Detailed description of preferred embodiments of the invention

Figs. 1a and 1b illustrate a part of a device 8 for filling a package 1. In Fig. 1a, the package is shown before it is introduced into the gap 13 between two pressure elements 12´. In Fig.1b, the package is shows when it is located in the gap 13 between two pressure elements 12´. The device 8 is able to receive a web 9 of preformed packages, such as from a roll of preformed plastic bags where the bottom seal is already provided or from a palletainer wherein plastic bags are placed in a zig-zag pattern of overlapping entities. The device 8 comprises a cutting tool 10 which provides a first cut to cut off a package 1 from said web 9, and a second cut in order to provide the package 1 with an opening 3. The cutting tool 10 may provide one single cut to cut off a package 1 from said web 9 and to simultaneously provide the package 1 with an opening 3. Further, the device 8 comprises a filling device 11, which is adapted to fill the package 1 with a predetermined volume of the liquid product 2 through the opening 3 to a first level 4. The device 8 also comprises a pressure device 12 adapted to apply a pressure on the package 1 so that the liquid product 2 will rise to the second level 6. The pressure device 12 comprises two pressure elements 12´ arranged opposite to each other at a distance to create a gap 13. The pressure elements 12´ are adapted to apply

a pressure on the package 1 when the package 1 is located in the gap 13. Furthermore, the device 8 comprises a sealing tool 14, preferably an induction heating device, adapted to provide the first seal 5 in order to close the opening 3 and seal the package 1, and to provide the second seal 7 at a distance from the first seal 5, in order to decrease the volume of the package 1.

The device 8 may also comprises a stretching device adapted to stretch the package 1 so that the liquid product 2 will rise to the second level 6.

Fig. 1c – 1f illustrate the different steps of a method according to the present invention and also depict how the package 1 is formed and sealed during the different steps of the method. Fig. 1c – 1f also show a device 8 according to the present invention during the different steps of the method according to the present invention. In the first step, the package 1 is filled through an opening 3. The package is filled through the filling device 11.The liquid is filled to a first level 4 of the package 1. Depending on the volume of the resulting product, this level is adjusted. Thereafter the package 1 is sealed with a first seal 5. The package is sealed by the sealing device 14. According to this embodiment the seal is made by an induction heating device. In the next step, a pressure is applied by the pressure device 12 on the package 1. The level of the liquid in the package 1 rises to a second level 6 in the package 1. The air inside of the package 1 as well as any foam will be pressed towards the first seal 5. In the final step, the package 1 is provided with a second seal 7. The second seal is provided by the sealing device 14. The second seal 7 is provided at a distance from the first seal 5 and the volume of the package 1 is thus decreased, separating a portion of the air and the foam from the packaged liquid.

In Fig. 2a, a device 8 according to the present invention is shown. A web 9 of preformed packages is shown entering the device 8.

In Fig. 2b, the opposite side of a preferred embodiment of the device 8 is shown. In this embodiment, the cutting tool 10 is adapted to provide a single cut to cut off a package 1 from the web 9 and to simultaneously provide the package 1 with an opening 3. Thus, in this embodiment the cutting tool 10

is adapted to cut off a package 1 from the web and provide the package with an opening 3 with one cut only. In another embodiment the cutting tool 10 is adapted to cut off a package 1 from the web and provide the package with an opening 3 with two separate cuts.

CLAIMS

1. A method for filling a package (1) with a liquid product (2), comprising the steps of

filling said package (1) with a predetermined volume of said liquid product (2) through an opening (3) of said package (1) to a first level (4) in said package (1),

applying a pressure on said package (1) in order to force said liquid product (2) in said package (1) to rise to a second level (6) in said package (1), and

providing said package (1) with a seal at a distance from said second level (6).

2. A method for filling a package (1) with a liquid product (2), comprising the steps of

filling said package (1) with a predetermined volume of said liquid product (2) through an opening (3) of said package (1) to a first level (4) in said package (1),

providing said package (1) with a first seal (5), at a distance from said first level (4), in order to close said opening (3) and seal said package (1),

applying a pressure on said package (1) in order to force said liquid product (2) in said package (1) to rise to a second level (6) in said package (1), and

providing said package (1) with a second seal (7), at a distance from first seal (5), in order to decrease a volume of said package (1).

3. The method according to claim 2, wherein said first seal (5) is provided above said first and second level (4, 6), and said second seal (7) is provided between said first seal (5) and said second level (6).

4. The method according to claim 2 or 3, wherein said second seal (7) is provided adjacent to said second level (6).

5. The method according to any one of the preceding claims, further comprising the step of separating said package (1) from a web (9) of preformed packages.

6. The method according to any one of the preceding claims, further comprising the step of providing said opening (3) in said package (1).

7. The method according to any one of the preceding claims, wherein said liquid product (2) is a wine product.

8. A device (8) for filling a package (1) with a liquid product (2), said device (8) being adapted to receive a web (9) of preformed packages, wherein said device (8) comprises

a cutting tool (10) adapted to provide a first cut to cut off a package (1) from said web (9), and a second cut in order to provide said package (1) with an opening (3),

a filling device (11) adapted to fill said package (1) with a predetermined volume of said liquid product (2) through said opening (3) to a first level (4) in said package (1),

a pressure device (12) adapted to apply a pressure on said package (1) so that said liquid product (2) will rise to a second level (6), and

a sealing tool (14) adapted to provide a first seal (5) in order to close said opening (3) and seal said package (1), and to provide a second seal (7), at a distance from said first seal (5), in order to decrease a volume of said package (1).

9. The device (8) according to claim 8, wherein said first seal (5) is provided above said first and second level (4, 6), and said second seal (7) is provided between said first seal (5) and said second level (6).

10. The device (8) according to claim 8 or 9, wherein said second seal (7) is provided adjacent to said second level (6).

11. The device (8) according to any one of claims 8-10, wherein said liquid product is a wine product.

12. The device (8) according to any one of claims 8-11, wherein said sealing tool (14) is an induction heating device.

13. The device (8) according to any one of claims 8-12, wherein said pressure device (12) comprises two pressure elements (12´) arranged opposite to each other at a distance to create a gap (13), wherein said pressure elements (12´) are adapted to apply a pressure on said package (1) when located in said gap (13).

14. The device (8) according to any one of claims 8-13, wherein said volume of said package (1) can be varied by adjusting said cutting tool (10) and/or by adjusting a feeding speed of a feeding device adapted to feed said web (9) into said device (8).

15. A package (1) containing a liquid product (2), wherein said package (1) has been filled using the method according to any one of claims 1-7 and/or by means of the device (8) according to any one of the claims 8-14.

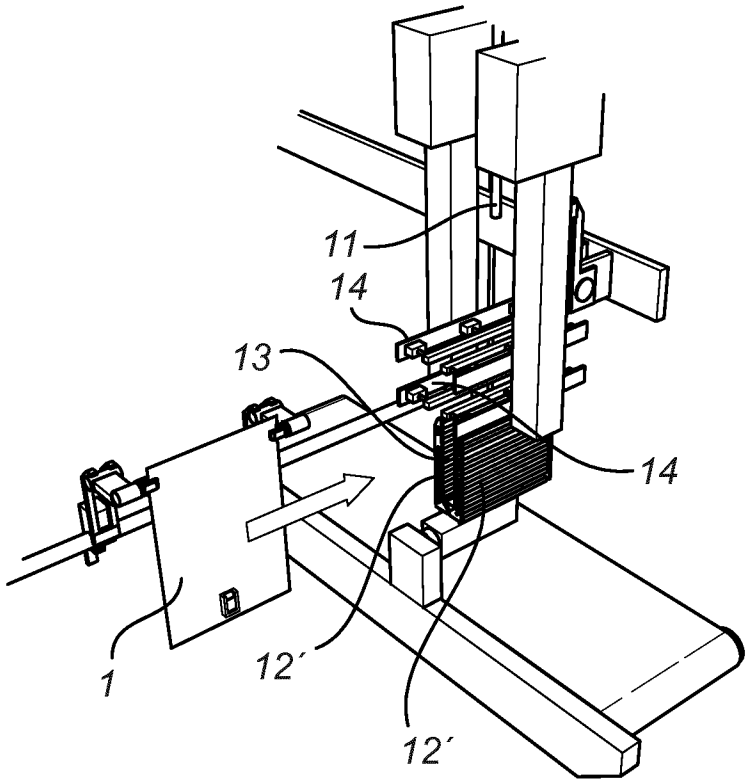

Fig. 1a

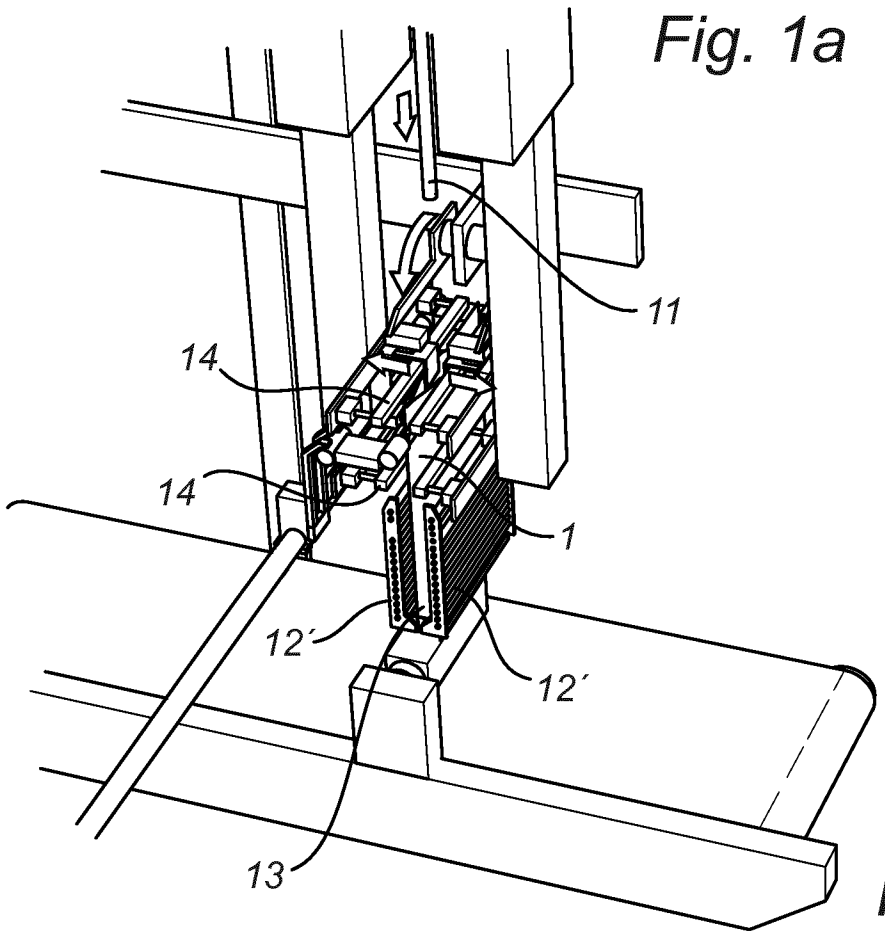

Fig. 1b

Filling of package with liquid to a first predetermined level

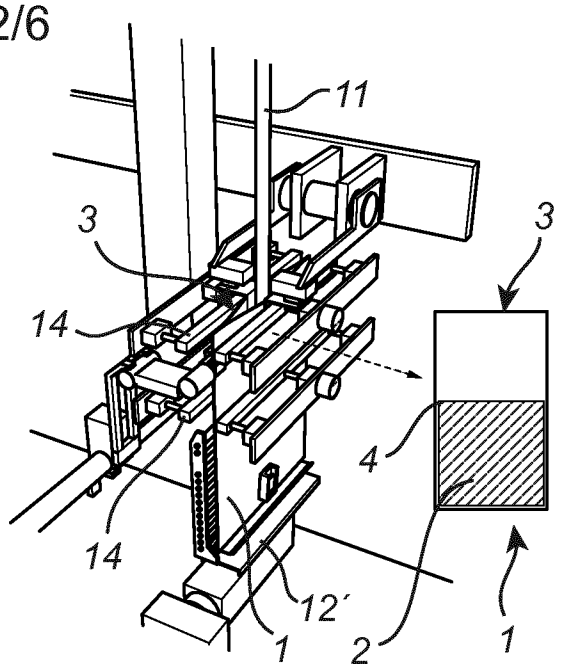

Fig. 1c

Providing the package with a first seal at a predetermined distance from said first predetermined level

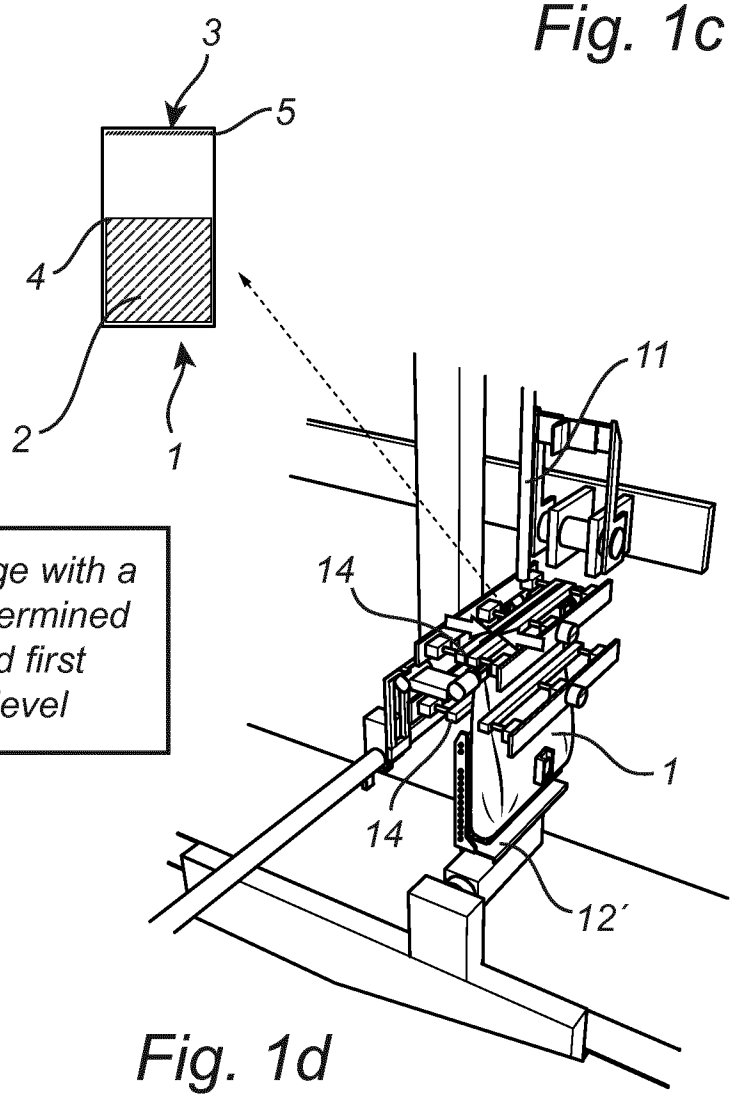

Fig. 1d

Applying a pressure on the package in order to force said liquid product in the package to rise to a second predetermined level

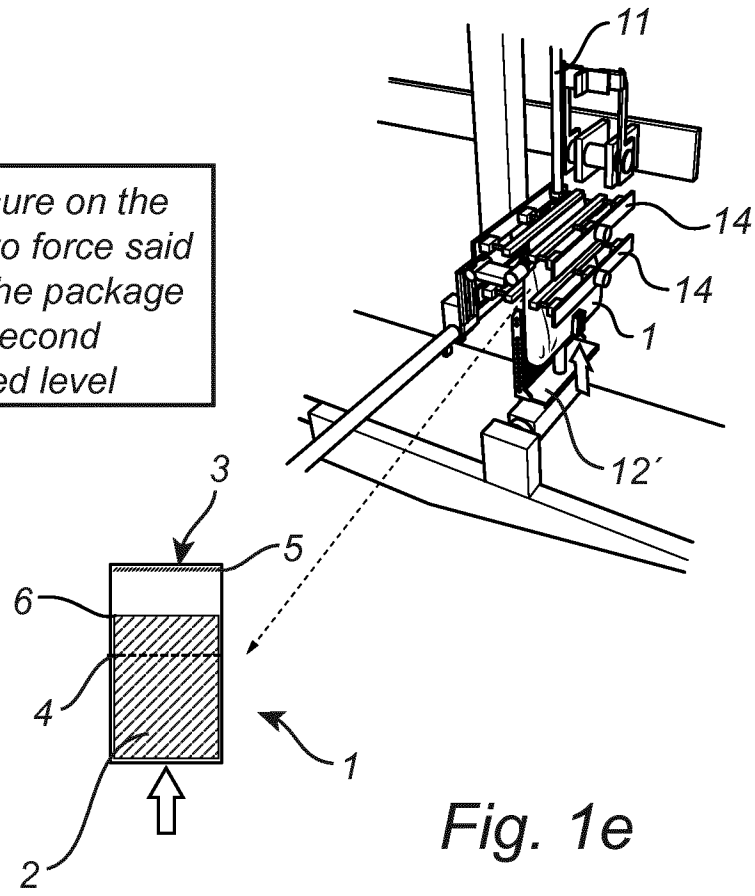

Fig. 1e

Providing the package with a second seal at a predetermined distance from first seal

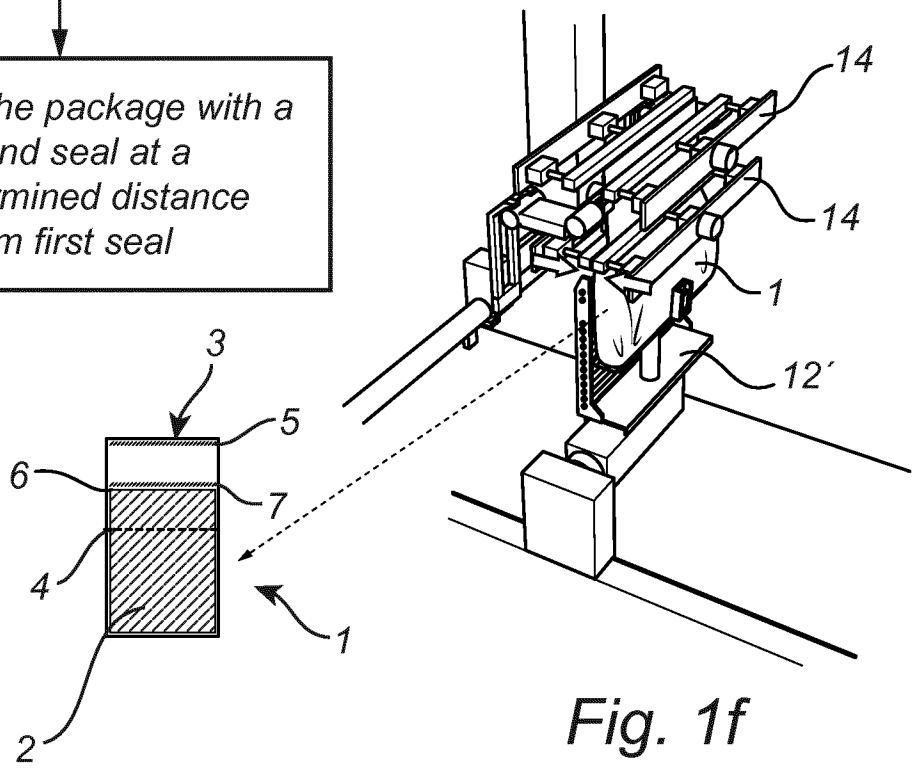

Fig. 1f

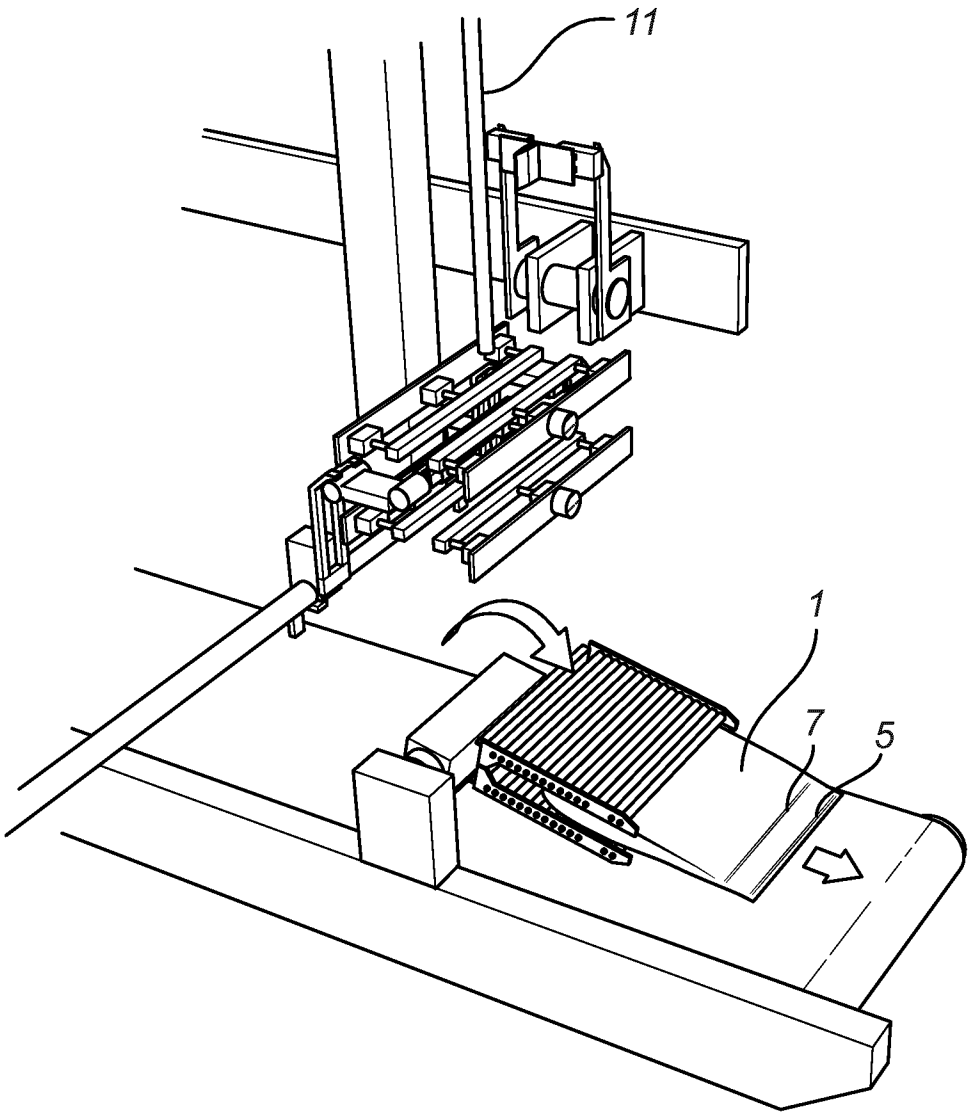

Fig. 1g

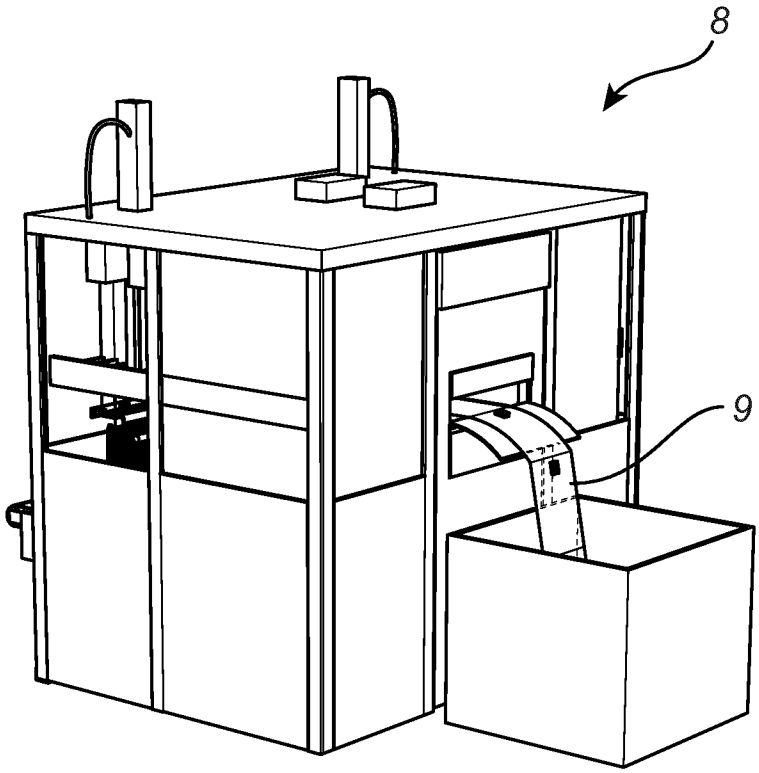

Fig. 2a

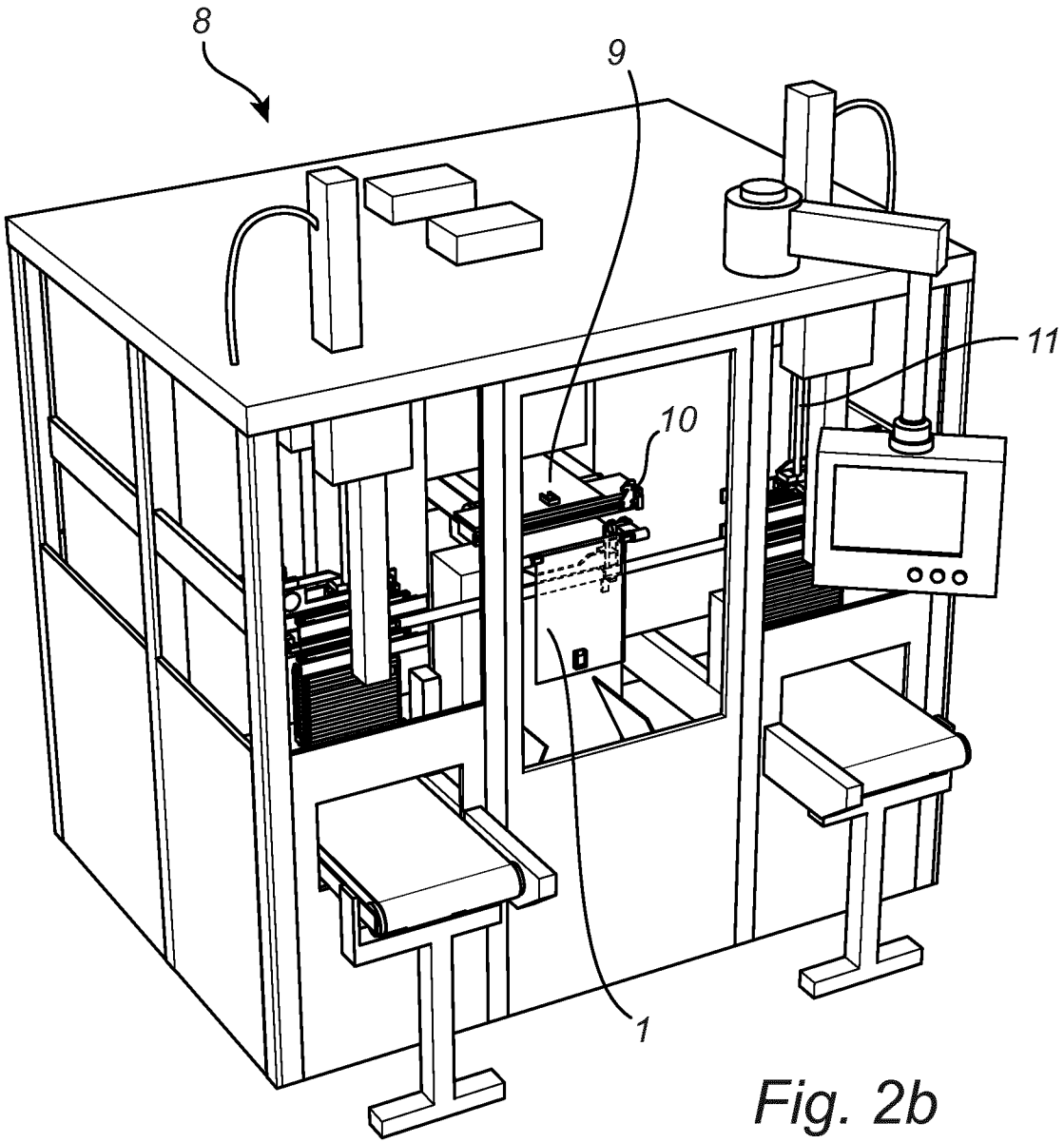

Fig. 2b

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/071651

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B3/16 B65B3/18 B65B25/00 B65B31/04 B65B31/00
B65B39/12 B65B43/12 B65B43/16 B65B43/26 B65B43/30
B65B43/34 B65B43/54 B65B51/14 B65B51/22 B65B61/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B B67C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 6 289 654 B1 (YAMAGUCHI SHUICHI [JP] ET AL) 18 September 2001 (2001-09-18) figures 6B, 7A, 7B, 8A, 8B column 1, lines 24-29 column 4, line 55 - column 5, line 35 column 5, lines 44-48 -----	1-4,7,15 5,6,8-14
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Y	US 2010/218462 A1 (MURRAY R CHARLES [US]) 2 September 2010 (2010-09-02) figures 1-3 paragraphs [0009], [0031], [0037] - [0043] -----	5,6,8-14
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/071651

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