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(71) Applicant: TETRA LAVAL HOLDINGS & FINANCE

S.A. [CH/CH]; 70, Avenue Général-Guisan, CH-1009 Pully (CH).

(72) Inventor: JÖNSSON, Joel; Möllevångsvägen 12b, 222 40

Lund (SE).

(74) Agent: TETRA PAK - PATENT ATTORNEYS SE; AB

Tetra Pak, Patent Department, Ruben Rausings gata, 221 86 Lund (SE).

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(54) Title: SUPPORT PLATE FOR A PACKAGE SUITABLE FOR A FOOD PRODUCT

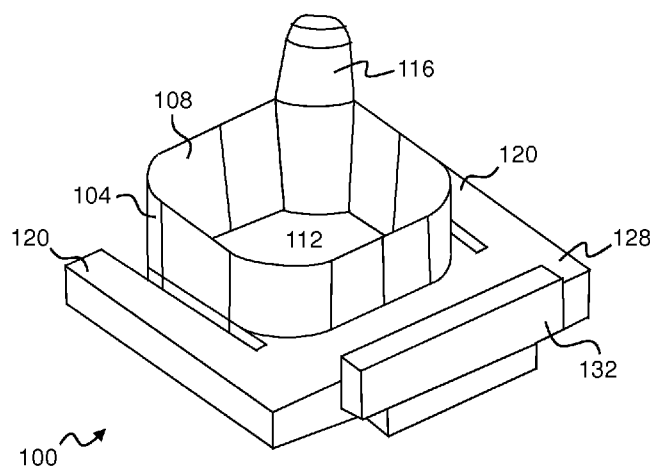


Fig. 1A

(57) Abstract: A support plate (100, 150) for supporting a package (200) during filling with a food product is disclosed. The support plate (100, 150) comprises a wall (104, 154) defining a cavity (112, 162) for receiving a top portion (212, 216) of the package (200). The wall (104, 154) has a slanted interior surface (108, 158) that is complementary to the top portion (212, 216) of the package (200). The support plate (100, 150) also comprises a support projection (116, 166) extending in a parallel direction to and away from the wall (104, 154), the support projection (116, 166) being complementary to and for abutting the top portion comprising a concave top surface (216) and a concave surface (208) of the package (200). A system (320) comprising the support plate (100, 150) for use in a filling machine (400) and a filling machine (400) comprising a plurality of the systems (320) are also disclosed.



## SUPPORT PLATE FOR A PACKAGE SUITABLE FOR A FOOD PRODUCT

### Technical Field

The present invention relates to a support plate for a package suitable for containing a food product. The present invention also relates to a system comprising the support plate and a filling machine comprising the system.

### Background

Packaging containers for food products are well known. One type of package known as a Tetra Top<sup>®</sup> package has a top portion with a closure (such as a screw cap) surrounded by convex or straight surfaces extending out and down towards four vertical side walls. During a filling operation this type of package is held with the closure facing downwards before the package is filled with a food product from above and through the opposing end of the package i.e. the end that eventually forms the bottom of the package as understood by the consumer. The bottom portion is then sealed and the filled package is removed from the filling operation.

More recent packages include a concave surface on their top portion and a concave surface elsewhere on the package such as at an edge between two of the adjacent vertical walls. A concave surface and a concave edge have an aesthetically pleasing appearance and may function as a thumb grip for the user when the food product is poured from the package. Unfortunately, packages with a concave surface on their top portion and a concave edge tend to rotate or twist during filling operations. This leads to incomplete package filling and stoppages in filling operations.

WO 2015/086362 discloses a package carrier for a tetrahedral-shaped package. However, such package carrier is unsuitable for use with packages having a top portion with a concave surface. The WO 2015/086362 package carrier is also unsuitable for use with packages having a concave surface at another location of the package such as an edge between adjacent side walls.

Thus, there is a need for improving the filling of packages with a concave top surface and a concave surface elsewhere on the package.

### Summary

According to a first aspect, there is provided a support plate for supporting a package during filling with a food product, the support plate comprising:

a wall defining a cavity for receiving a top portion of the package;  
the wall having a slanted interior surface that is complementary to the top portion of the package; and

a support projection extending in a parallel direction to and away from the wall, the support projection being complementary to and for abutting the top portion comprising a concave top surface and a concave surface of the package.

According to a second aspect, there is provided a system for use in a filling machine, the system comprising:

a package guide; and

a support plate according to the first aspect above for supporting a package during filling with a food product;

wherein the support plate is mounted on the package guide and the package guide is configured for receiving the package.

According to a third aspect, there is provided a filling machine comprising:

a rotating support;

a plurality of systems according to the second aspect above mounted on the rotating support; and

a filling station for filling a package with a food product when the package is being supported by the support plate of each system.

#### Brief Description of Drawings

Some preferred, non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Fig. 1A illustrates a support plate according to an embodiment;

Fig. 1B illustrates another support plate according to an embodiment;

Fig. 2 is a cross-sectional view of the support plate in Fig. 1B along line

A-A;

Fig. 3A is a top view of a package suitable for use with the support plates in Figs 1A and 1B;

Fig. 3B is a front view of the package in Fig. 3A;

Fig. 4 is a front view illustrating a system comprising the support plate in Fig. 1B, the package in Figs 3A and 3B, and a package guide;

Fig. 5A is a front view of a filling machine according to an embodiment;

and

Fig. 5B is a side view of the filling machine from direction Z shown in Fig. 5A.

#### Detailed Description

- 5 The table below lists various features and their respective reference numerals of the embodiments that will be described below with reference to the figures.

<b>Feature</b>	<b>Reference numeral</b>
Support plate(s)	100, 150
Wall	104, 154
Slanted interior surface	108, 158
Cavity	112, 162
Support projection	116, 166
Clip member	120, 170
Clip recess	174
Connecting portion	128, 178
Grip member	132, 182
Package	200
Lateral walls	204
Concave surface	208
Convex top wall	212
Concave top surface	216
Closure	220
Sealing ring	224
Package guide	300
Support ridges	304
Viewing hole	308
Bevelled end	312
System	320
Filling machine	400
Rotating support	404
Sterilizer	408

- 10 Figs. 1A and 1B illustrate support plates 100 and 150 respectively that are suitable for use with the package depicted in Figs. 3A and 3B that will be

described below. Support plates 100 and 150 each comprise a wall 104, 154 surrounding a cavity 112, 162. Walls 104 and 154 have a slanted interior surface 108, 158 which is best shown in Fig. 2 in respect of support plate 150. A support projection 116, 166 extends vertically upwards to and from walls 104 and 154. Clip members 120, 170 are located at opposing ends of an approximately rectangular-shaped connecting portion 128, 178. Each clip 120, 170 has a clip recess 174 as depicted in Fig. 2. A grip member 132, 182 is located on a longitudinal side of the connecting portion 128, 178. The grip member 132, 182 is configured for engaging with an automated arm (not shown) of a filling machine in order to move the support plate to a different height or location as necessary. The support plates 100, 150 are injection moulded from plastic such as polyoxymethylene (POM) or polyoxyethylene. Preferably, the plastic is resistant to hydrogen peroxide solutions and / or UV light as used during sterilisation of the packages in a filling machine or process.

The location of support projections 116 and 166 on walls 104 and 154 is the sole difference between support plates 100 and 150. Both plates 100 and 150 may be used in a filling machine depending on the location of the plate in the filling machine and the orientation of the package to be used with the plate 100, 150. Although the support projections 116 and 166 are illustrated in one corner of walls 104 and 154, they need not be located in the wall corner. For example, the support projections 116 and 166 could be located on the side of the walls 104 and 154 i.e. between two adjacent corners of the walls 104 and 154.

The slanted interior surfaces 108, 158 and the cavities 112, 162 are configured for receiving the top dome of a package. The shape of the support projections 116, 166 is complementary to a concave top surface and another concave surface (such as a concave edge) of a package in order that the projections 116, 166 are able to abut and support the concave top surface and the concave surface (e.g. concave edge). This will become clearer with respect to Fig. 4 below.

Figs. 3A and 3B illustrate a package 200 suitable for use with the support plates 100 and 150 in Figs. 1A and 1B. Package 200 has four lateral walls 204 and a concave surface 208 at an edge between two adjacent lateral walls 204. The top dome of package 200 comprises a convex top wall 212 and a concave top surface 216. A sealing ring 224 joins the top dome to the lateral walls 204 and the concave surface 208. A closure 220 atop the dome seals the package 200. The closure 220 may be a re-sealable screw cap or a peel-back lid.

Fig. 4 illustrates a system 320 for use in a food product filling machine. System 320 comprises a package guide 300 and a support plate 150 as described in Fig. 1B mounted on the package guide 300. Of course, support plate 100 may be used instead of support plate 150 in system 320. The package guide 300 is configured for mounting to a rotating support (not shown) inside a filling machine.

Guide 300 is overall tubular in shape for receiving a package 200 as depicted with dashed lines. In use the package 200 enters guide 300 at bevelled end 312 and is lowered through guide 300 until the convex top wall 212 and the concave top surface 216 of the package's top dome rests on the complementary slanted interior surface 108, 158 of wall 104, 154. In this position the concave surface 208 of package 200 also rests against the support projection 116, 166 of support plate 100, 150. Once the package 200 is being supported by plate 100, 150 within the guide 300, the package is filled with a food product at the end opposing closure 220 prior to sealing what eventually becomes the bottom of the package 200.

Package guide 300 has a plurality of support ridges 304 located on external opposing faces of guide 300. The support ridges 304 are arranged in pairs wherein each member of a given pair is located at the same height on the guide 300. In this way a pair of ridges 304 is receivable by clip recesses 174 of clip members 120, 170. This allows adjustment of the support plate 100, 150 to a different height on the guide 300 depending on the volume of the package 200 that is to be filled. As mentioned above, the height of the support plate 100, 150 may be adjusted by cooperation between grip member 132, 182 and an automated arm (not shown).

A viewing hole 308 is also provided on package guide 300 for facilitating inspection of décor or other features of the package 200.

The package guide 300 is preferably made of metal.

Figs. 5A and 5B illustrate a filling machine 400 comprising a plurality of systems 320 mounted to a rotating support 404 that rotates in the direction of the arrows. Filling machine 400 also comprises a sterilizer 408 such as an ultra-violet lamp, a HEPA (high efficiency particulate air) purifier, and / or a hydrogen peroxide sprayer. Although not shown, the filling machine 400 may also comprise a package feeder for providing a package to the systems 320, a filling station for filling the package with a food product, and a sealing station for sealing the bottom of the package after filling. Fig 5B depicts that one side of the filling machine may comprise systems 320 with support plates 100 while the

opposing side may comprise systems 320 with support plates 150. This arrangement of supporting plates is suitable for use with a package feeder configured for providing packages 200 in one orientation only to all of the systems 320 in the filling machine 400. All concave surfaces 208 of packages  
5 200 will be correctly orientated with support projections 116 and 166. Sterilizer 408 is omitted from Fig. 5B for clarity.

The support provided by projections 116 and 166 to the concave surface 208 and to the top dome of the package 200 (which includes concave top surface 216) prevents package 200 from rotating or twisting as well as helping  
10 to ensure the package 200 is held at the correct height during a filling operation. The support plates 100, 150 also absorb additional pressure generated on the package 200 during filling without damaging the package 200.

The support provided by projections 116 and 166 also allows for reducing or eliminating the requirement for a sealing ring 224 thereby improving  
15 the visual appearance of the package 200.

## CLAIMS

1. A support plate (100, 150) for supporting a package (200) during filling with a food product, the support plate (100, 150) comprising:
  - 5 a wall (104, 154) defining a cavity (112, 162) for receiving a top portion (212, 216) of the package (200);  
the wall (104, 154) having a slanted interior surface (108, 158) that is complementary to the top portion (212, 216) of the package (200); and  
a support projection (116, 166) extending in a parallel direction to and  
10 away from the wall (104, 154), the support projection (116, 166) being complementary to and for abutting the top portion comprising a concave top surface (216) and a concave surface (208) of the package (200).
- 15 2. The support plate (100, 150) of claim 1, wherein the concave surface (208) of the package (200) is arranged at an edge along the length of the package (200).
3. The support plate (100, 150) of claim 1 or claim 2, further comprising a pair of clip members (120, 170) and a connecting portion (128, 178), the clip members  
20 (120, 170) being located at opposing ends of the connecting portion (128, 178).
4. The support plate (100, 150) of claim 3, wherein each clip member (120, 170) comprises a clip recess (174).
- 25 5. The support plate (100, 150) of claim 3 or claim 4, comprising a grip member (132, 182) on a longitudinal side of the connecting portion (128, 178).
6. The support plate (100, 150) of any one of claims 1 to 5, wherein the support plate (100, 150) is injection moulded from plastic, preferably polyoxymethylene  
30 (POM) or polyoxyethylene.
7. A system (320) for use in a filling machine (400), the system (320) comprising:
  - a package guide (300); and  
35 a support plate (100, 150) according to any one of claims 1 to 6 for supporting a package (200) during filling with a food product;



wherein the support plate (100, 150) is mounted on the package guide (300) and the package guide (300) is configured for receiving the package (200).

- 5     8. The system (320) according to claim 7, further comprising a plurality of support ridges (304) located on external opposing faces of the package guide (300), each support ridge (304) being receivable by the clip recess (174) of the support plate (100, 150).
- 10    9. The system (320) according to claim 7 or claim 8, wherein the package guide (300) comprises a bevelled end (312).
10. The system (320) according to any one of claims 7 to 9, wherein the package guide (300) comprises a viewing hole (308).
- 15    11. The system (320) according to any one of claims 7 to 10, wherein the package guide (300) is made of metal.
12. A filling machine (400) comprising:
- 20        a rotating support (404);
- a plurality of systems (320) according to any one of claims 7 to 11 mounted on the rotating support (404); and
- a filling station for filling a package (200) with a food product when the package (200) is being supported by the support plate (100, 150) of each
- 25    system (320).
13. The filling machine (400) of claim 12, further comprising a sterilizer (408) preferably selected from the group consisting of an ultra-violet lamp, a HEPA (high efficiency particulate air) purifier, and a hydrogen peroxide sprayer.
- 30    14. The filling machine (400) of claim 12 or claim 13, further comprising a package feeder for providing a package to the plurality of systems (320).
15. The filling machine (400) of any one of claims 12 to 14, further comprising a
- 35    sealing station for sealing the bottom of the package (200) after filling with the food product.

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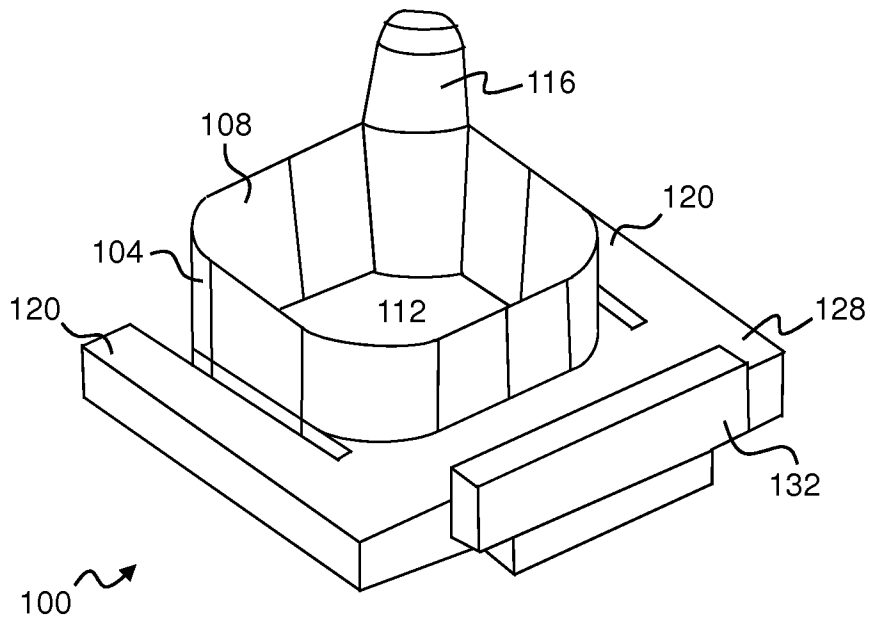


Fig. 1A

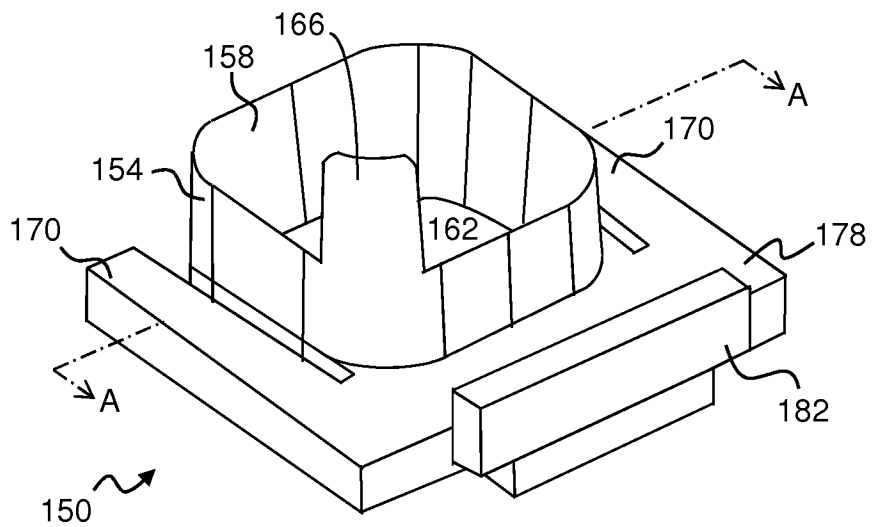


Fig. 1B

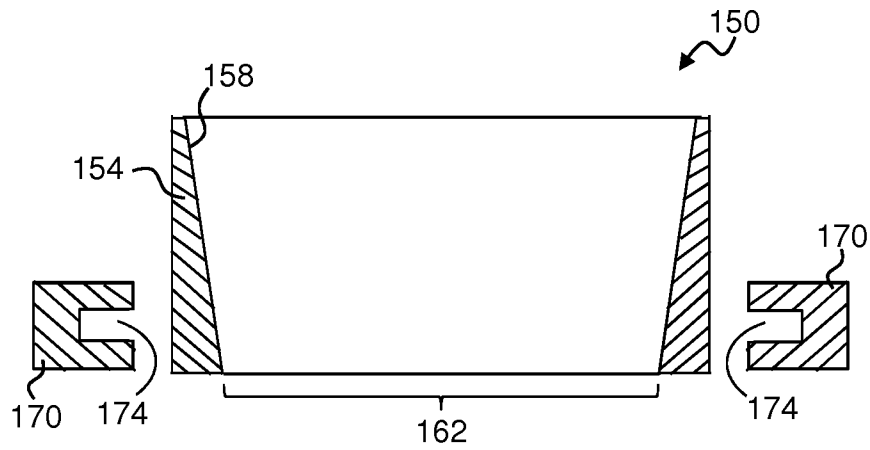


Fig. 2

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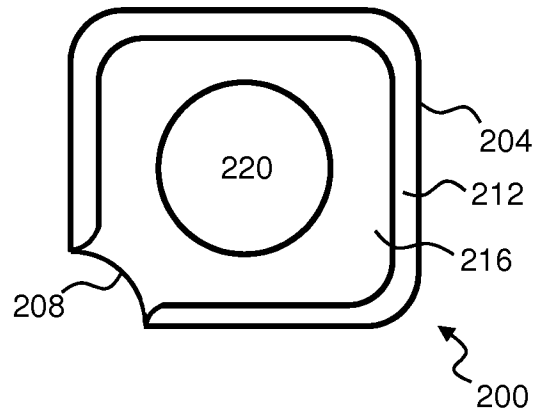


Fig. 3A

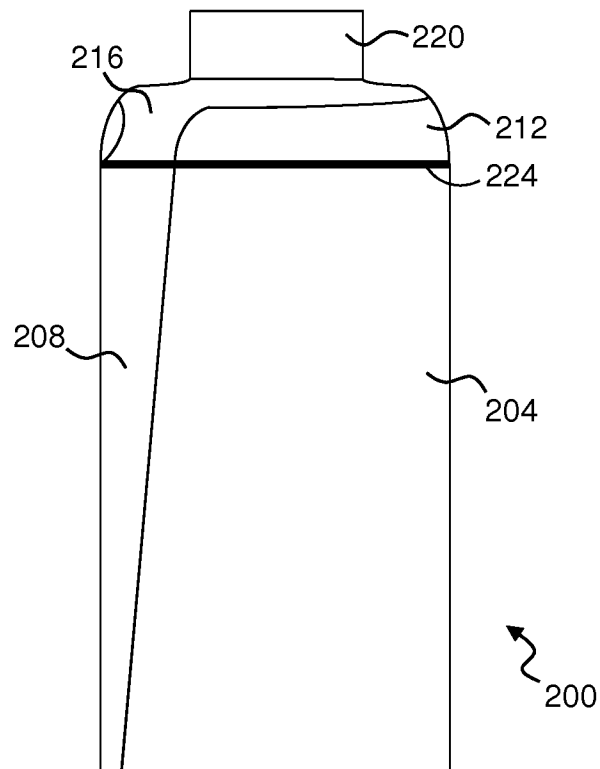


Fig. 3B

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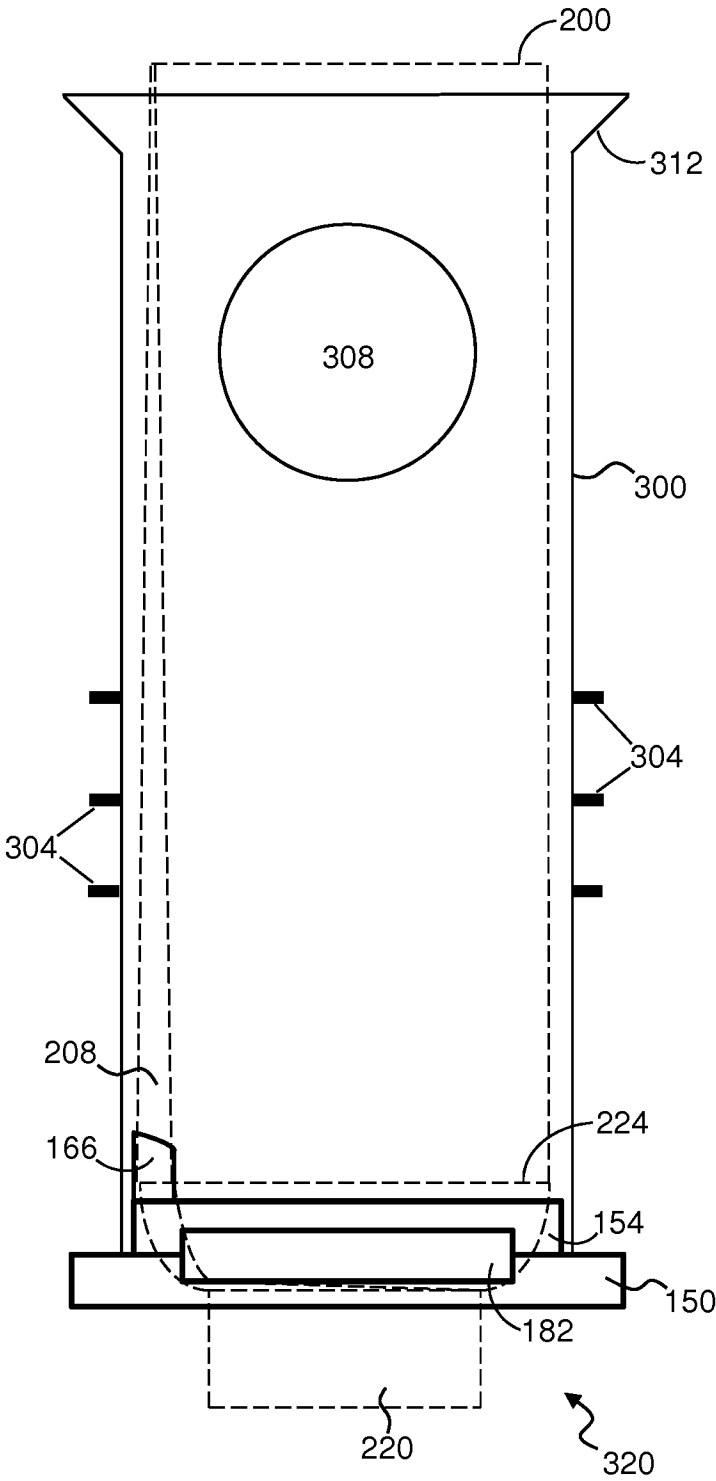
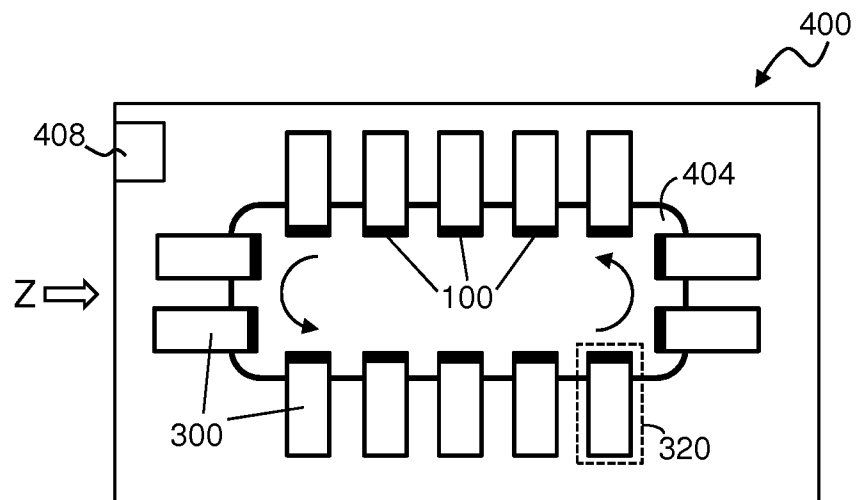
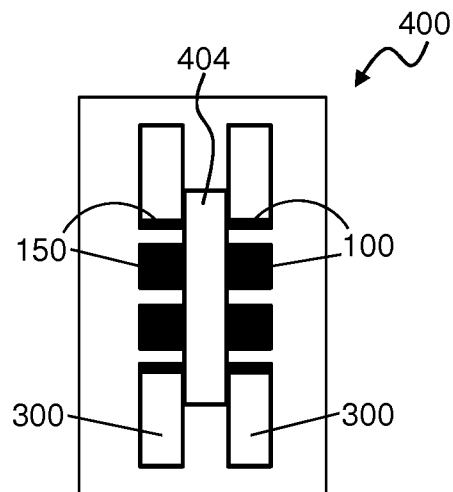


Fig. 4

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**Fig. 5A**



**Fig. 5B**

# INTERNATIONAL SEARCH REPORT

International application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
INV. B65B43/54  
ADD.

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 B65G

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.
Y	US 5 484 052 A (PAWLOSKI JAMES C [US] ET AL) 16 January 1996 (1996-01-16) column 4, lines 15-33; figures -----	1
Y	US 2012/024673 A1 (PASKELL KIRK [US] ET AL) 2 February 2012 (2012-02-02) paragraph [0034]; figures -----	1
A	US 2013/105038 A1 (SWANSON JOHN H [US]) 2 May 2013 (2013-05-02) figures -----	1-6
A	US 2002/099467 A1 (SLEEP NICHOLAS J [GB] ET AL) 25 July 2002 (2002-07-25) the whole document -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040,  
Fax: (+31-70) 340-3016

Authorized officer

Lawder, M

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/069344

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5484052	A	16-01-1996	US 5484052 A	16-01-1996
			WO 9530611 A1	16-11-1995
-----				
US 2012024673	A1	02-02-2012	NONE	
-----				
US 2013105038	A1	02-05-2013	AU 2010357202 A1	10-01-2013
			BR 112012032408 A2	08-11-2016
			CA 2802667 A1	12-01-2012
			CN 102958818 A	06-03-2013
			EP 2590881 A1	15-05-2013
			ES 2466355 T3	10-06-2014
			KR 20130055639 A	28-05-2013
			MX 339044 B	05-05-2016
			PH 12014502599 A1	03-08-2015
			US 2013105038 A1	02-05-2013
			WO 2012005726 A1	12-01-2012
			ZA 201209454 B	28-05-2014
-----				
US 2002099467	A1	25-07-2002	AU 732628 B2	26-04-2001
			CA 2265537 A1	12-03-1998
			EP 1009359 A1	21-06-2000
			JP 2002506358 A	26-02-2002
			US 6317648 B1	13-11-2001
			US 2002099467 A1	25-07-2002
			US 2003176942 A1	18-09-2003
			WO 9809598 A1	12-03-1998
-----				