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(54) **Title:** PACKAGE WITH FLEXIBLE SPOUT

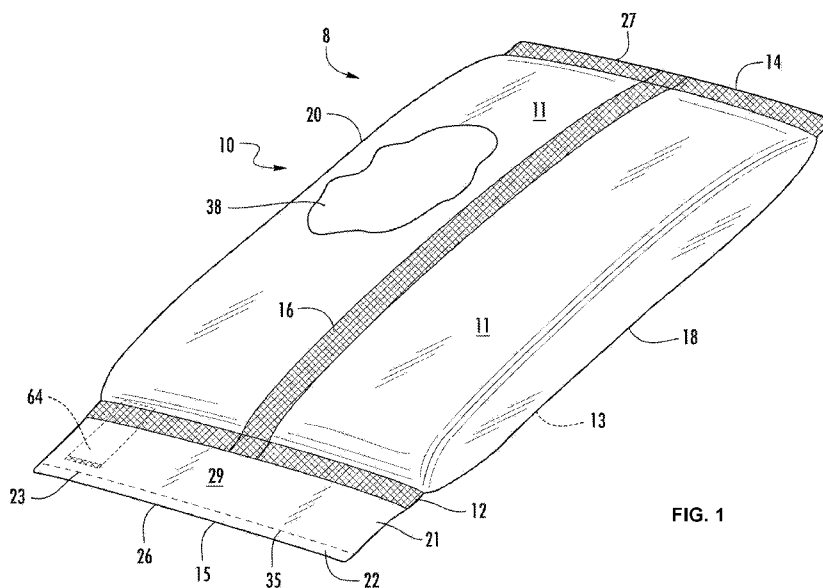


FIG. 1

(57) **Abstract:** A package with a flexible spout includes a pouch including a first and second panel, a first and second end, a first and second side edge, a pouch interior, a first and second transverse seal, a skirt extending from the first transverse seal to the first end of the pouch, a longitudinal seal extending from the first transverse seal to the second transverse seal, and a flexible spout disposed within the skirt, and attached to the first transverse seal, the flexible spout comprising an interior channel in communication with the pouch interior; and a product disposed in the pouch. A method of making a package with a flexible spout in a vertical form/fill/seal process, and a method of making a plurality of flexible spouts, are also disclosed.





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PACKAGE WITH FLEXIBLE SPOUT

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and priority from U.S. Provisional Application No. 62/164,793 filed May 21, 2015.

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FIELD OF INVENTION

This invention relates to a package with a flexible spout, a method of making a package with a flexible spout, and a method of making a plurality of flexible spouts.

BACKGROUND

Vertical form/fill/seal (VFFS) packaging systems have proven to be very
10 useful in packaging a wide variety of food and non-food pumpable and/or flowable products. Many vertical form/fill/seal systems are commercially available from manufacturers or suppliers such as Hayssen, Illipak, Kartridge Pak, DuPont and Fresco.

One example of such systems is the ONPACK™ flowable food packaging
15 system marketed by Cryovac/Sealed Air Corporation. The VFFS process is known to those of skill in the art, and described for example in U.S. Patent Nos. 4,506,494 (Shimoyama et al.), 4,589,247 (Tsuruta et al), 4,656,818 (Shimoyama et al.), 4,768,411 (Su), 4,808,010 (Vogan), and 5,467,581 (Everette), all incorporated herein by reference in their entirety. Typically in such a process, lay-flat thermoplastic film is
20 advanced over a forming device to form a tube, a longitudinal (vertical) fin or lap seal is made, and a bottom end seal is made by transversely sealing across the tube with heated seal bars. A liquid, flowable, and/or pumpable product, such as a liquid, semiliquid, or paste, with or without particulates therein, is introduced through a central, vertical fill tube to the formed tubular film. Squeeze rollers spaced apart and
25 above the bottom end seal squeeze the filled tube and pinch the walls of the flattened tube together. When a length of tubing of the desired height of the bag has been fed through the squeeze rollers a heat seal is made transversely across the flattened tubing by heat seal bars which clamp and seal the film of the tube therebetween. After the seal bars have been withdrawn the film moves downwardly to be contacted
30 by cooled clamping and severing bars which clamp the film therebetween and are provided with a cutting knife to sever the sealed film at about the midpoint of the seal

so that approximately half of the seal will be on the upper part of a tube and the other half on the lower. When the sealing and severing operation is complete, the squeeze rollers are separated to allow a new charge of product to enter the flattened tube after which the aforementioned described process is repeated thus continuously producing
5 vertical form/fill/seal pouches which have a bottom end and top end heat seal closure.

The process can be a two-stage process where the creation of a transverse heat seal occurs at one stage in the process, and then, downstream of the first stage, a separate pair of cooling/clamping means contact the just-formed transverse heat seal to cool and thus strengthen the seal. In some VFFS processes, an upper
10 transverse seal of a first pouch, and the lower transverse seal of a following pouch, are made, and the pouches cut and thereby separated between two portions of the transverse seals, without the need for a separate step to clamp, cool, and cut the seals. A commercial example of an apparatus embodying this more simplified process is the ONPACK™ 2002 VFFS packaging machine marketed by

15 Cryovac/Sealed Air Corporation.

In some applications, e.g. in a food outlet such as a restaurant, squeeze bottles are filled with a food product from packages made on a VFFS system. Typically, a worker will cut off a corner of the package at a transverse seal, and attempt to pour some or all of the contents of the package into the bottle through the
20 bottle opening. Often the opening is missed, and some product is spilled onto the upper surface of the bottle, the surrounding table, or counter top.

Another problem is that if the package is not completely emptied, and it is desired to retain the remainder of the product for later use, preventing leakage is often an issue. A clip or closure of some sort is required to close the package.

25 These temporary closures can include "chip clips", paper clips, or stretch wrap; packages so wrapped frequently leak as they are stored on the cooler or ambient storage shelf.

SUMMARY

In a first aspect, a package with a flexible spout comprises: a pouch
30 comprising a first and second panel, a first and second end, a first and second side edge, a pouch interior, a first transverse seal, a second transverse seal, a skirt extending from the first transverse seal to the first end of the pouch, a longitudinal

seal extending from the first transverse seal to the second transverse seal, and a flexible spout disposed within the skirt, and attached to the first transverse seal, the flexible spout comprising an interior channel in communication with the pouch interior; and a product disposed in the pouch.

5 In a second aspect, a method of making a package with a flexible spout in a vertical form/fill/seal process comprises: providing a lay-flat film on a first roll; providing a plurality of flexible spouts on a second roll of film; advancing a flexible spout from the second roll of film; attaching the flexible spout to the lay-flat film; separating the flexible spout from the second roll of film; advancing the lay-flat film
10 with the attached flexible spout over a forming device to convert the lay-flat film to a folded film; making a longitudinal seal in the folded film; transversely sealing the folded film to form a first pouch having a first transverse seal; putting a product in the first pouch; advancing the folded film, with the first pouch, downward a predetermined distance; transversely sealing the folded film to form a first
15 transverse seal in the folded film, while simultaneously forming a second transverse seal across an upper end of the first pouch; and transversely cutting the folded film to separate the first pouch from the folded film to make a package, the package comprising a pouch comprising a first and second panel, a first and second end, a first and second side edge, a pouch interior, a first transverse seal, a second
20 transverse seal, a skirt extending from the first transverse seal to the first end of the pouch, a longitudinal seal extending from the first transverse seal to the second transverse seal, and a flexible spout disposed within the skirt, and attached to the first transverse seal, the flexible spout comprising an interior channel in communication with the pouch interior.

25 In a third aspect, a method of making a plurality of flexible spouts comprises providing a lay-flat printed film having a plurality of printed regions, the printed regions substantially identical to one another and spaced apart at fixed intervals on the film; advancing the lay-flat printed film to and across a first forming shoe to centerfold the film to make a folded, printed film having a first folded longitudinal
30 edge; transversely sealing the folded, printed film at marginal portions of each of the plurality of printed regions to define a plurality of spouts each comprising an interior channel; advancing the folded, printed film to and across a second forming shoe such that the film is longitudinally folded over itself, along an axis parallel to and

spaced apart from the first folded longitudinal edge, to make a folded, printed film having a second folded longitudinal edge; and applying a crimp seal to each of the plurality of spouts, the crimp seals disposed parallel to and between the first and second folded longitudinal edges.

5 BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by reference to the following drawing figures, encompassing different views of various embodiments of the invention, wherein:

FIG. 1 is a perspective view of a package with a flexible spout;

10 FIG. 2 is a plan view of a portion of a package with a flexible spout in a folded position;

FIG. 3 is a plan view of a portion of a package with a flexible spout in an unfolded position;

15 FIG. 4 is a plan view of a portion of a package with a flexible spout in a position to dispense product;

FIG. 5 is a schematic view of an apparatus and process for making a flexible spout;

FIG. 6 is a view of a centerfolded web with a printed region and printed indicator;

20 FIG. 7 is a view of a centerfolded web of FIG. 6, with lateral seals installed on each side of the printed region;

FIG. 8 is a view of a centerfolded web of FIG. 7, with a folded section;

FIG. 9 is a view of a centerfolded web of FIG. 8, with a crimp seal;

25 FIG. 10 is an elevational view of a prior art VFFS process and apparatus for making a package; and

FIG. 11 is a schematic elevational view of an apparatus and method of positioning and attaching a plurality of flexible spouts to a tubular film in a vertical form/fill/seal system.

DETAILED DESCRIPTION

30 Drawings herein are not necessarily to scale, and certain features of the invention may be graphically exaggerated for clarity.

As used in the specification and in the appended claims, the singular forms “a”, “an”, and “the” include plural referents unless the context clearly indicates otherwise. For example, reference to “a film” includes a plurality of such films.

“Film” is used herein to mean a thermoplastic film, laminate, or web, either multilayer or monolayer, that may be used in connection with the present invention. Film can be of any suitable thickness, e.g. between 0.1 and 30 mils.

“Lap seal” is used herein to mean a seal made by sealing an inside surface of a film to an outside surface of the same film.

“Longitudinal seal” herein refers to a fin seal or lap seal.

“Olefinic” and the like herein refer to a polymer or copolymer derived at least in part from an olefinic monomer.

“Polymer” and the like herein mean a homopolymer, but also a copolymer thereof, including terpolymer, tetrapolymer, block copolymer, etc.

“Pouch” herein means a pouch or bag.

“Seal” herein means a bond between two thermoplastic surfaces, e.g. as produced by heat sealing, radio frequency (RF) sealing, ultrasonic sealing, or the like. A “crimp” seal is one in which a spout is folded over to create a crease, using a seal bar or other device applying heat and pressure, such that the spout remains in the creased or folded condition during package production and distribution, but can be thereafter be easily unfolded, at the crease, when the package is opened and product is dispensed from the pouch.

“Sealant” is a polymeric material or blend of materials, such as olefinic polymer or copolymer such as an ethylenic polymer or copolymer that can form a surface of the film, and form a bond between two thermoplastic surfaces.

“Thermoplastic” herein includes plastic materials that when heated to a softening or melting point may be reshaped without significant thermal degradation (burning). Thermoplastic includes both materials that are not crosslinked, and that are crosslinked by chemical or radiation means.

All compositional percentages used herein are presented on a “by weight” basis, unless designated otherwise.

1. Package With A Flexible Spout

Package **8** comprises a product **38**, such as a food or non-food flowable product, disposed in pouch **10**.

In one embodiment, and referring to FIG. 1, package **8** includes a pouch **10** having a first panel **11**, a second panel **13** disposed on the opposite side of pouch **10** from first panel **11**, a first transverse seal **12**, a second transverse seal **14**, an optional third transverse seal **15**, and a longitudinal seal **16**. Longitudinal seal **16** is shown as a lap seal, but can alternatively comprise a fin seal.

Pouch **10** also includes a first end **26**, a second end **27**, a first side edge **18**, and a second side edge **20**. As shown, first and second side edges **18**, **20** will each typically comprise a fold, reflecting the tubular film from which the package can be made in a VFFS process and apparatus. Alternatively, first and second side edges **18**, **20** can comprise lateral seals.

Pouch **10** additionally includes a skirt **21** comprising a first skirt panel **29** and a second skirt panel (not shown), congruent with the first skirt panel **29**, that sandwich a flexible spout **64**. Side edges of skirt **21** will in one embodiment, like first and second side edges **18**, **20**, each typically comprise a fold, reflecting the tubular film from which the package can be made in a VFFS process and apparatus. Skirt **21** extends from the first transverse seal **12** to the first end **26** of package **8**. In one embodiment, third transverse seal **15** is present, and the first and third transverse seals **12**, **15** define skirt **21**. In one embodiment, skirt **21** includes a perforated strip **22** with a line of perforations **23**. Spout **64** is attached to first transverse seal **12**, and includes an interior channel **30** (see FIG. 3) in communication with the pouch interior. Channel **30** is defined by an open end **25** within the interior of pouch **10**, spout end **28** that before opening is in a sealed condition, and marginal lateral seals **24**. Spout **64** also optionally includes a tear notch **34**, and a crimp seal **62** (see FIGs. 2 and 5).

Films for use in the present invention, for construction of the pouch and spout, can comprise a thermoplastic material of any suitable composition, including those having as at least one component olefinic material such as ethylene polymer or copolymer, e.g. polyethylene or ethylene/alpha olefin copolymer; and/or polyamide (nylon); and including films typically used in VFFS packaging apparatus and processes. The films can be monolayer or multilayer in construction; can have any suitable thickness; and can be made by any suitable process, including coextrusion, extrusion coating, extrusion lamination, and conventional lamination using polyurethane or other adhesives. Extrusion can be done in annular or flat dies. The extrudate can be hot blown or cast, and optionally solid-state oriented as desired.

Chemical or electronic crosslinking of one or more layers of the film can be done. The film can be advanced through the apparatus and processes disclosed herein by suitable motive means (not shown, and well known in the art, such as a motor).

Examples of films useful in the invention, for construction of the pouch,
5 include those with high oxygen or low oxygen barrier properties.

A representative multilayer film structure of some high oxygen barrier embodiments of the invention is shown in Table 1:

TABLE 1

Multilayer Film Structure having High Oxygen Barrier Properties

Polyolefin	Tie	Nylon	EVOH	nylon	Tie	Polyolefin
A	B	C	D	E	F	G

10 Core layer D of the above film structure can comprise any suitable EVOH material, and can be blended in any proportion with other polymeric materials or organic or inorganic additives as desired.

Intermediate layers C and E each comprise a polyamide, such as a semicrystalline polyamide such as nylon 6. In one embodiment, layers C and E can
15 each comprise a blend of an amorphous polyamide and a semicrystalline polyamide. In such an embodiment, the amorphous polyamide can comprise any suitable percent of the overall polyamide blend.

The semicrystalline polyamide can be any suitable polyamide, including nylon 6.

20 Tie layers B and F can comprise any suitable polymeric adhesive that functions to bond two layers together. Materials that can be used in embodiments of the present invention include anhydride grafted ethylene/alpha olefin copolymer.

Layer A will typically function as a sealant layer of the film. This layer can comprise one or more semicrystalline olefinic polymers. Polymers that may be used
25 for the layer A include ethylene polymer or copolymer, ethylene/alpha olefin copolymer, ethylene/vinyl acetate copolymer, ionomer resin, ethylene/ acrylic or methacrylic acid copolymer, ethylene/ acrylate or methacrylate copolymer, etc., or blends of any of these materials.

Layer G can comprise a material as defined herein for layer A. Alternatively,
30 layer G can comprise an amorphous polymer e.g. amorphous cyclic olefin

copolymer, e.g. ethylene/norbornene copolymer (ENB). In one embodiment, layer G can comprise one outermost layer of the film such that when formed into a pouch, layer G comprises the layer furthest from the packaged product; and an olefinic polymer or copolymer such as ethylene/alpha olefin copolymer (EAO) can comprise the inner layer A of the film, such that when formed into a pouch, the EAO comprises the layer closest to the packaged product. In this embodiment, the film can be lap sealed such that layer G is sealed to the EAO inner layer A.

A representative multilayer film structure of some low oxygen barrier embodiments of the invention is shown in Table 2:

TABLE 2

Multilayer Film Structure having Low Oxygen Barrier Properties

Polyolefin	Tie	Nylon	Tie	nylon	Tie	Polyolefin
A	B	C	D	E	F	G

The materials for film structures in accordance with table 2 can be as disclosed herein for table 1.

Pouches made from the film of the present invention can be fin sealed or lap sealed depending on the desired configuration of the finished pouch, the equipment used, and the composition of the two outer layers.

Additional materials that can be incorporated into one or both of the outer layers of the film, and in other layers of the film as appropriate, include antiblock agents, slip agents, antifog agents, fillers, pigments, dyestuffs, antioxidants, stabilizers, processing aids, plasticizers, fire retardants, UV absorbers, etc. Additional film layers can be included either within the film structure, or adhered to an outer layer thereof.

In general, the film can have any total thickness desired, and each layer can have any thickness desired, so long as the film provides the desired properties for the particular packaging operation in which the film is used. Typical total thicknesses are from 0.5 mils to 15 mils, such as 1 mil to 12 mils, such as 2 mils to 10 mils, 3 mils to 8 mils, and 4 mils to 6 mils.

2. Method Of Making A Package With A Flexible Spout

FIG. 10 schematically illustrates a VFFS apparatus **122** that can be used in the process of making a package in accordance with the present invention. VFFS

packaging systems are generally well known to those of skill in the art, and described for example in U.S. Patent Nos. 4,589,247 (Tsuruta et al), 4,656,818 (Shimoyama et al.), 4,768,411 (Su), 4,808,010 (Vogan), 5,467,581 (Everette), 6,244,747 (Caudle), and US Patent Application Publication No. US 2006/0111224 (Caudle), all
5 incorporated herein by reference in their entirety.

Apparatus **122** utilizes a lay-flat film **141**. Product **38** is manually or mechanically supplied to the upper end portion of forming tube **144** via any conventional means, such as a funnel or feed tube.

The product can be any food or non-food product, liquid, semi-liquid, or paste,
10 e.g. flowable or pumpable high acid or low acid foods, such as tomato products, milk or dairy products, medical products, or the like.

Packages are formed in a lower portion of apparatus **122**. Film **141** from which the packages are formed is advanced from a feed roller (not shown), over forming tube **144** (sometimes known as a “sailor’s collar” or “forming collar”) and is
15 provided with a longitudinal lap seal **16** by longitudinal heat sealing device **146**, resulting in the formation of a vertically-oriented folded film in the form of a tube **148**.

In one embodiment of the invention (see FIG. 1), transverse heat seal bars **145** operate to close and seal horizontally across the lower end of vertically-sealed tube **148**, to form a pouch **10** having a first transverse seal **12**. Pouch **10** is
20 thereafter filled with product **38**.

Film drive belts **152**, powered and directed by rollers, as illustrated, or by a suitable alternative motive device, advance tube **148** and pouch **10** downward a predetermined distance. Squeeze rollers (not shown) typically close on the moving film in order to meter the amount of product in the pouch and to void/clean the area
25 where a transverse seal is to be applied. In accordance with the invention, after this step, seal bars **145** again close and seal horizontally across the lower end of vertically-sealed tube **148** to form a first transverse seal **12**, while simultaneously sealing horizontally across upper end of sealed pouch **10** to form a second transverse seal **14**.

30 In an alternative embodiment, a third transverse seal **15** (see FIG. 1) can be included in the finished package **8**. This can be done by configuring the transverse seal bars so that while the first transverse seal is being made, an additional, third transverse seal is made. This seal is spaced apart, typically vertically, from the first

transverse seal. The first and third transverse seals define between them skirt **21**.

In one embodiment, to facilitate a user's removal of third transverse seal **15** from the end of the package, a line of perforations **23** can be imparted to the tube **148**, at any suitable location between first and third seals **12**, **15** by any suitable perforating
5 device known in the art.

In any of these embodiments, the next pouch **150**, thereabove, is then filled with a metered quantity of product, and advanced downwardly, and the packaging cycle is repeated.

It is conventional to incorporate with seal bars **145** a cut-off knife (not shown)
10 which operates to sever a lower sealed pouch **10** from the bottom of upstream pouch **150**.

Lay-flat film **141** of FIG. 10 will in operation travel typically vertically downward from the forming tube **144**.

Spout **64** is present in each finished package **8**. Each spout **64** can be
15 attached to lay-flat film **141** using in one embodiment an apparatus as depicted in FIG. 11. In one embodiment, to attach each flexible spout **64** to each respective pouch **10**, in production, packaging film **141** is fed through the VFFS apparatus **122** from a roll, but in addition spouts **64** are also fed into the apparatus **122** but from a separate roll **162**. With each machine cycle, a spout **64** is indexed from the spout
20 roll **162**, initially attached (via e.g. partial seals along the sides of each spout **64**) to lay flat film **141** and then separated (for example by cutting) from the spout roll **162**. The film index cycle is then used to index film **141** (with the attached spouts **64**) through apparatus **141**. An eye spot or other suitable mechanism can be used on film **141** to accurately index spouts **64** through apparatus **141**. This helps maintain
25 alignment of the attached spouts **64** as they enter the area of apparatus **141** where transverse seals are made. Spouts **64** are attached at pre-determined intervals to the lay-flat film **141**, the gap between sequential spouts pre-determined based on the desired length of each pouch **10** made in the downstream VFFS apparatus, and the ultimate desired length of each final package **8**.

30 Once a given spout **64** is indexed into the area of apparatus **141** where transverse seals are made (multiple indexed to arrive at this position), transverse seal bars **145** completely seal the spout **64** in place. As shown in the embodiment of FIG. 11, this process includes a roll **162** having a ribbon of spouts (not shown) that

advances past a cantilevered dancer bar **164**, splicing pad **166**, film feed assist nip rollers **168**, code dater adjustable roller **170** (in embodiments where code dating the package is desired), eye sensor adjustable roller **172** (in embodiments where eye spots are utilized), and a film tensioning roller **174**. Each spout **64** is initially
5 attached to lay flat film **141** with a spout attachment device **176**.

Transverse seal bars **145** seal each given spout **64** to the pouch while producing first transverse seal **12**.

3. Method of Making a Plurality of Flexible Spouts

Referring to FIGs. 5 through 9, a plurality of flexible spouts can be made using
10 a spout making apparatus **40**. A lay-flat film **42** has on at least one surface thereof a repeating pattern of printed regions **44**. Each printed region **44** provides a portion of film **42** that will not seal to itself during normal heat sealing processes. Thus, when each spout **64** is made and ultimately installed in a respective pouch **10**, by heat sealing the spout to the interior of the pouch at a transverse seal, the interior channel
15 **30** (see FIGs. 3 and 4) of spout **64** remains unsealed to preserve the utility of the spout. "Printed" herein means the application of an ink or any other suitable substance (food-grade substance for applications involving food as product **38**) and/or any surface treatment, that will as a result inhibit the film **42** sealing to itself so as to preserve the interior channel **30** in the finished pouch **10** with spout **64** installed
20 therein. A printed indicator **46** can optionally be selectively printed on film **42** in association with each printed region **44**. Each printed indicator **46** carries a visual colored print, dye, or pigment that, in the finished spout **64**, highlights the spout **64** in package **8** for ease of use in locating the spout, and ensuring that it is extended properly for dispensing product. The indicator may be less important and
25 unnecessary with trained personnel, e.g. in the environment of a trained work force in a restaurant environment. Alternatively, in one embodiment, the printed indicator can be a clear coating, although this approach may not offer the visual advantage discussed above. Printing or coating of the printed regions **44** and optional printed indicators **46** can be done in and during the overall process as shown in FIG. 5.
30 Alternatively, film **42** can be pre-printed at another location or in a separate process, by any suitable printing process. Although printed regions **44** are shown illustratively as a "T" shape, any suitable shape can be used provided that the spouts **64** function as described herein.

The printed lay-flat film **42** is advanced to and across a first folding shoe **48** so as to centerfold the film to make a folded, printed film **50** having a first longitudinal edge fold **51**. Sealing platen **52** is used to produce lateral seals **54a,b** at marginal portions of each of the plurality of printed regions to define an interior channel **30** for each respective printed region. The spout proximal end **53** for each spout **64** is open. It is this segment of each spout that provides an opening **25** (see FIGs. 2 and 3) into the interior of a respective pouch **10**. Although the drawings, especially FIGs. 8 and 9, illustrate in one embodiment a gap or space between the lateral seals **54a,b** and the printed region **44** of each spout, those skilled in the art will appreciate that in alternative embodiments, the space between lateral seals **54a,b** and printed region **44** of each spout can be minimal or entirely absent. The folded, printed film **50** is advanced to and across a second folding shoe **56** such that the film is longitudinally folded over itself, along an axis parallel to and spaced apart from the first longitudinal edge fold **51**, to make a folded, printed film **58** having a second longitudinal edge fold **59**. Crimp seals **62** are then applied to each spout, using a crimp sealer **60**, the crimp seals disposed parallel to and between the first and second folded longitudinal edges. Although the drawings, and in particular FIGs. 5 and 9, illustrate in one embodiment a space between the second longitudinal edge fold **59** and crimp seals **62** for each spout, those skilled in the art will appreciate that in alternative embodiments, the space between the second longitudinal edge fold **59** and crimp seals **62** of each spout can be minimal or entirely absent.

4. Method of Operation

To use the package of the present invention, if third transverse seal **15** and perforated strip **22** are present in the package, strip **22** is manually removed from package **8**. If desired, perforations **23** can be visually highlighted by a distinctive color or printed indicia to make it easier to locate the perforations. Optionally, a tear notch or other tear initiation feature can be included in skirt **21** to facilitate removal of strip **22**. This action removes third seal **15**. Spout **64** is then grasped, and unfolded along crimp seal **62**, bringing the distal end **28** of spout **64** out beyond the end **35** of that portion of skirt **21** that remains after removal of strip **22** (see FIG. 3). The tip of spout **64** is torn off at tear notch **34** (see FIG. 4), removing the end seal at the distal end **28** of spout **64**. Spout **64** is directed toward the opening of the container into which, or product onto which, product **38** is to be dispensed. Manual pressure is

applied to package **8** simultaneously while the spout **64** is being pulled, and product flows from the interior of the package, through opening **25** and interior channel **30**, and out of the spout **64**. After dispensing is completed, spout **64** can be pressed to remove residual product, and then refolded along crimp seal **62** and tucked between
5 the two walls of skirt **21**.

The above descriptions are those of embodiments of the invention. All parts and percentages are by weight, unless otherwise indicated or well understood in the art. Any reference to an item in the disclosure or to an element in the claim in the singular using the articles "a," "an," "the," or "said" is not to be construed as limiting
10 the item or element to the singular unless expressly so stated.

With reference to the drawings, the flow of materials is in the direction of the arrows.

A package according to the invention can optionally carry printed indicia, which can be decorative or informational in nature. Decorative printed indicia can
15 include a logo, a trademark, product information, etc. with text and/or graphics.

Although flexible spout **64** is disclosed in the drawings as longitudinally centered in package **8**, it can in alternative embodiments be located in a longitudinally uncentered location in the package, for example near or at one side edge of the package.

20 In some embodiments, the line of perforations **23** if present, or tear notch **34**, can be highlighted with color or other indicia to make it easier for the user to open the package.

In one embodiment, the portion of spout **64** at the open end **25** within the interior of pouch **10** is sealed or otherwise attached to the interior surface of pouch
25 **10**, i.e. to the interior surface of one or both side panels **11**, **13**. This configuration helps to avoid the possibility of the open end **25** being obstructed by outside edges of the spout folding over at the interior end of the spout.

Spout **64** can have any suitable shape. For example, spout **64** can be rectangular or curved.

30 First end **26** of pouch **10** and package **8** is typically defined by the outer longitudinal extremity of skirt **21**; or if third transverse seal **15** is present, by the outer longitudinal extremity of third transverse seal **15**. Second end **27** of pouch **10** and package **8** is typically defined by the outer longitudinal extremity of second

transverse seal **14**. In some embodiments, some unsealed pouch material can be present between the outer longitudinal extremity of a transverse seal, and the actual respective longitudinal end of the pouch or package. Such embodiments are also contemplated within the scope of the present invention.

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Statement of Embodiments of the Invention

The present application is directed in various embodiments to the subject matter described in the following paragraphs. These are optional embodiments of any of the first (package), second (method of making a package), and third (method of making a plurality of flexible spouts) aspects of the invention as described hereinabove in the Summary of the Invention. For each aspect, these features can be incorporated alone or in any suitable combination of these features:

10

- a) the longitudinal seal comprises a fin seal.
- b) the longitudinal seal comprises a lap seal.
- 15 c) the package has substantially no headspace.
- d) the transverse seals are ribbed seals.
- e) the first side edge comprises a fold.
- f) the second side edge comprises a fold.
- g) the first side edge comprises a seal.
- 20 h) the second side edge comprises a seal.
- i) the skirt comprises a first wall and a second wall, each wall laterally

coextensive with respective first and second panels.

25

j) the flexible spout comprises a first portion disposed between the first transverse seal and the first end of the pouch, and a second portion extending from the first transverse seal into the interior of the pouch.

k) the flexible spout is folded over within the skirt, and adapted when in use to unfold and dispense product from the interior of the pouch.

30

l) the interior channel is selectively printed such that when the first transverse seal is made, the interior channel remains unsealed to itself in the area of the first transverse seal.

m) the flexible spout is configured to extend, when in use, beyond the first end of the pouch.

n) the flexible spout comprises lateral edges spaced from respective first and second side edges of the skirt.

o) the flexible spout is substantially rectangular, with its longitudinal axis parallel to the longitudinal axis of the pouch.

5 p) the package comprises a line of perforations in the skirt, disposed near and substantially parallel to the first end of the pouch.

q) the flexible spout comprises a tear notch disposed near the distal end of the flexible spout.

10 r) the flexible spout comprises an end seal at the distal end thereof, an opening at the proximal end thereof, and lateral seals that define the interior channel.

s) the package comprises a third transverse seal, spaced apart from the first transverse seal, the first and third transverse seals defining the skirt.

15 t) the package comprises a third transverse seal, spaced apart from the first transverse seal, and disposed at the end of the package, the first and third transverse seals defining the skirt.

u) the flexible spout comprises a printed indicator that provides, in a package in which the spout is disposed, a visual indication of the location of the spout.

20 v) the portion of the flexible spout at the open end within the interior of the pouch is sealed or otherwise attached to the interior surface of the pouch.

w) the portion of the flexible spout at the open end within the interior of the pouch is sealed or otherwise attached to the interior surface of one or both side panels.

What is claimed is:

1. A package with a flexible spout comprising:
 - a) a pouch comprising
 - i) a first and second panel,
 - 5 ii) a first and second end,
 - iii) a first and second side edge,
 - iv) a pouch interior,
 - v) a first transverse seal,
 - vi) a second transverse seal,
 - 10 vii) a skirt extending from the first transverse seal to the first end of the pouch,
 - viii) a longitudinal seal extending from the first transverse seal to the second transverse seal, and
 - 15 ix) a flexible spout disposed within the skirt, and attached to the first transverse seal, the flexible spout comprising an interior channel in communication with the pouch interior; and
 - b) a product disposed in the pouch.
2. The package of claim 1, wherein the package further comprises a third transverse seal disposed at the first end of the pouch.
- 20 3. The package of one of claims 1 or 2, further comprising a line of perforations in the skirt.
4. The package of claim 3, wherein the line of perforations is disposed near and substantially parallel to the first end of the pouch.
5. The package of claim 1, wherein the first and second side edges comprise a
25 first and second fold respectively.
6. The package of claim 1, wherein the skirt comprises a first wall and a second wall, each wall laterally coextensive with respective first and second panels.

7. The package of claim 1, wherein the interior channel is selectively printed such that when the first transverse seal is made, the interior channel remains unsealed to itself in the area of the first transverse seal.
8. The package of claim 1, wherein the flexible spout comprises a first portion
5 disposed between the first transverse seal and the first end of the pouch, and a second portion extending from the first transverse seal into the interior of the pouch.
9. The package of claim 8, wherein the flexible spout is folded over within the skirt, and adapted when in use to unfold and dispense product from the interior of the pouch.
10. The package of claim 8, wherein the flexible spout is configured to extend,
10 when in use, beyond the first end of the pouch.
11. The package of claim 8, wherein the flexible spout comprises lateral edges spaced from respective first and second side edges of the skirt.
12. The package of claim 11, wherein the flexible spout is substantially
15 rectangular, with its longitudinal axis parallel to the longitudinal axis of the pouch.
13. The package of one of claims 8 to 12, wherein the flexible spout comprises a tear notch disposed near the distal end of the flexible spout.
14. The package of claim 13, wherein the flexible spout comprises an end seal at the distal end thereof, an opening at the proximal end thereof, and lateral seals that
20 define the interior channel.
15. The package of claim 13, wherein the flexible spout is longitudinally centered in the pouch.
16. The package of claim 13, wherein the flexible spout comprises a printed region that is configured to not seal to itself.
17. The package of claim 16, wherein the flexible spout comprises a printed
25 indicator that provides, in a package in which the spout is disposed, a visual indication of the location of the spout.

18. The package of claim 8, wherein the flexible spout has one of a rectangle shape and a curve shape.

19. A method of making a package with a flexible spout in a vertical form/fill/seal process comprising:

- 5 a) providing a lay-flat film on a first roll;
- b) providing a plurality of flexible spouts on a second roll of film;
- c) advancing a flexible spout from the second roll of film;
- d) attaching the flexible spout to the lay-flat film;
- e) separating the flexible spout from the second roll of film;
- 10 f) advancing the lay-flat film with the attached flexible spout over a forming device to convert the lay-flat film to a folded film;
- g) making a longitudinal seal in the folded film;
- h) transversely sealing the folded film to form a first pouch having a first transverse seal;
- 15 i) putting a product in the first pouch;
- j) advancing the folded film, with the first pouch, downward a predetermined distance;
- k) transversely sealing the folded film to form a first transverse seal in the folded film, while simultaneously forming a second transverse seal
- 20 across an upper end of the first pouch; and
- l) transversely cutting the folded film to separate the first pouch from the folded film to make a package, the package comprising a pouch comprising
 - 25 (a) a first and second panel,
 - (b) a first and second end,
 - (c) a first and second side edge,
 - (d) a pouch interior,
 - (e) a first transverse seal,
 - (f) a second transverse seal,
 - 30 (g) a skirt extending from the first transverse seal to the first end of the pouch,

- (h) a longitudinal seal extending from the first transverse seal to the second transverse seal, and
- (i) a flexible spout disposed within the skirt, and attached to the first transverse seal, the flexible spout comprising an interior channel in communication with the pouch interior.

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20. The method of claim 19, further comprising, during steps h) and k), transversely sealing the folded film to form a third transverse seal, spaced from the first transverse seal, to define the skirt.

21. The method of claim 19, further comprising making a line of perforations in the skirt.

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22. The method of claim 19, wherein the flexible spout comprises a first portion extending from the first transverse seal toward the first end of the pouch, and a second portion extending from the first transverse seal into the interior of the pouch.

23. The method of claim 22, wherein the flexible spout is folded over within the skirt, and adapted when in use to unfold and conduct product from the interior of the pouch.

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24. The method of one of claims 19 to 23, wherein the flexible spout comprises a tear notch disposed near the distal end of the flexible spout.

25. The method of claim 24, wherein the flexible spout comprises an end seal at the distal end thereof, an opening at the proximal end thereof, and lateral seals that define the interior channel.

20

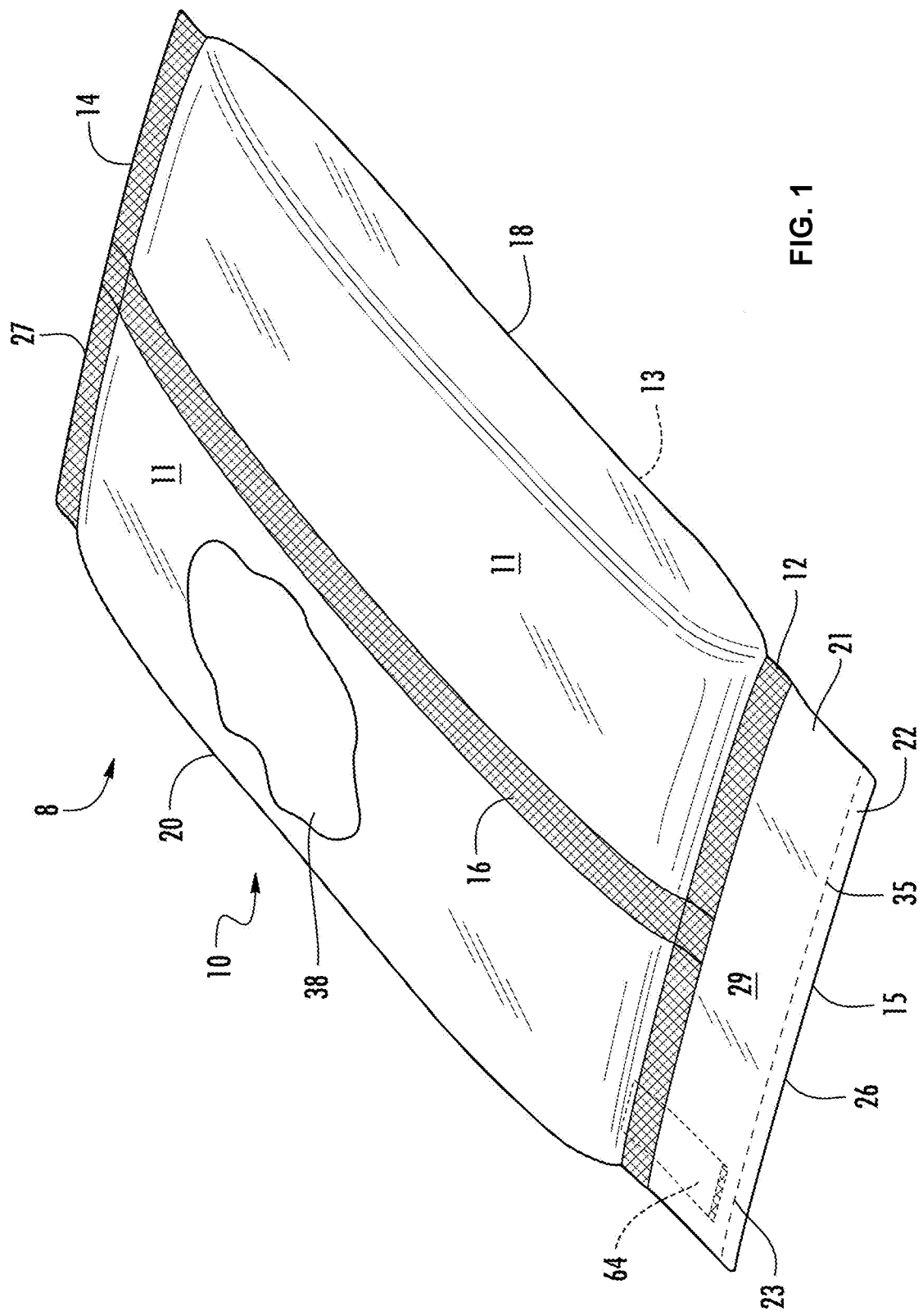
26. A method of making a plurality of flexible spouts comprising:

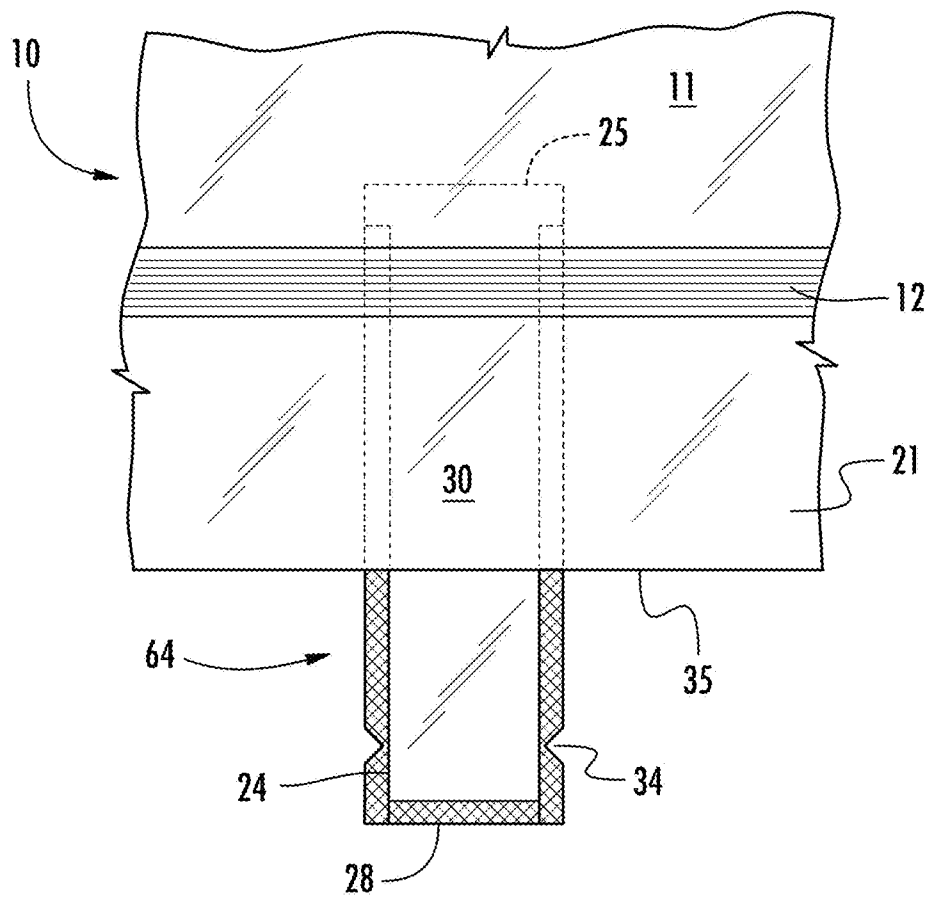
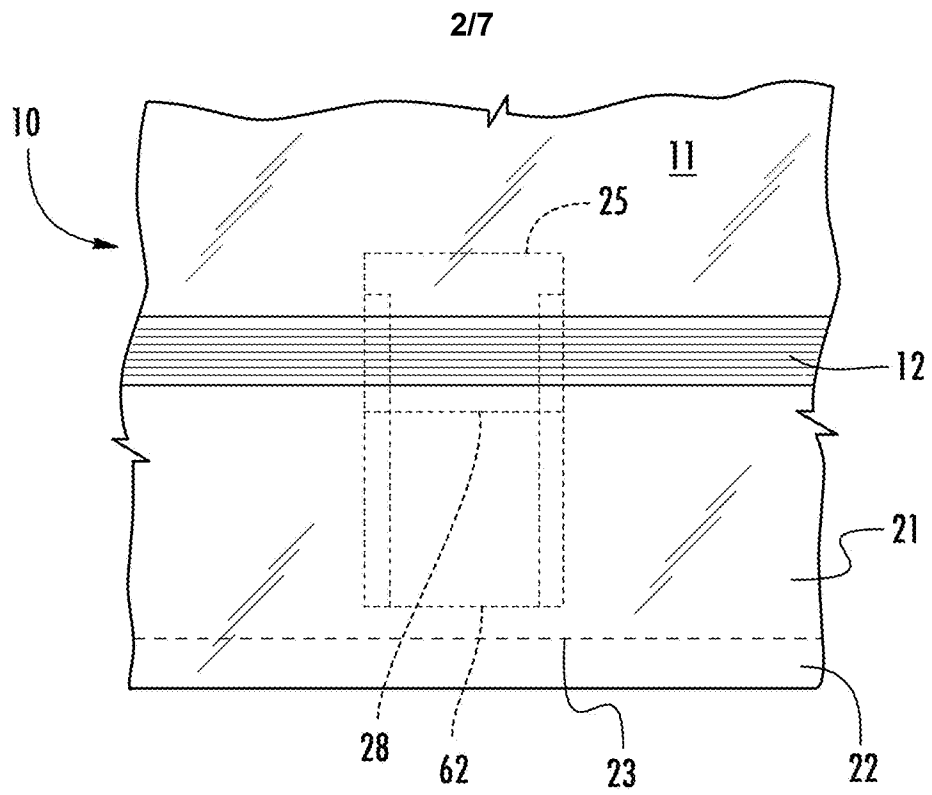
- a) providing a lay-flat printed film having a plurality of printed regions, the printed regions substantially identical to one another and spaced apart at fixed intervals on the film;
- b) advancing the lay-flat printed film to and across a first forming shoe to centerfold the film to make a folded, printed film having a first folded longitudinal edge;

25

- c) transversely sealing the folded, printed film at marginal portions of each of the plurality of printed regions to define a plurality of spouts each comprising an interior channel;
- d) advancing the folded, printed film to and across a second forming shoe such that the film is longitudinally folded over itself, along an axis parallel to and spaced apart from the first folded longitudinal edge, to make a folded, printed film having a second folded longitudinal edge; and
- e) applying a crimp seal to each of the plurality of spouts, the crimp seals disposed parallel to and between the first and second folded longitudinal edges.

27. The method of claim 26, further comprising providing a printed indicator on each of the plurality of spouts, the printed indicator configured to provide, in a package in which the spout is disposed, a visual indication of the location of the spout.





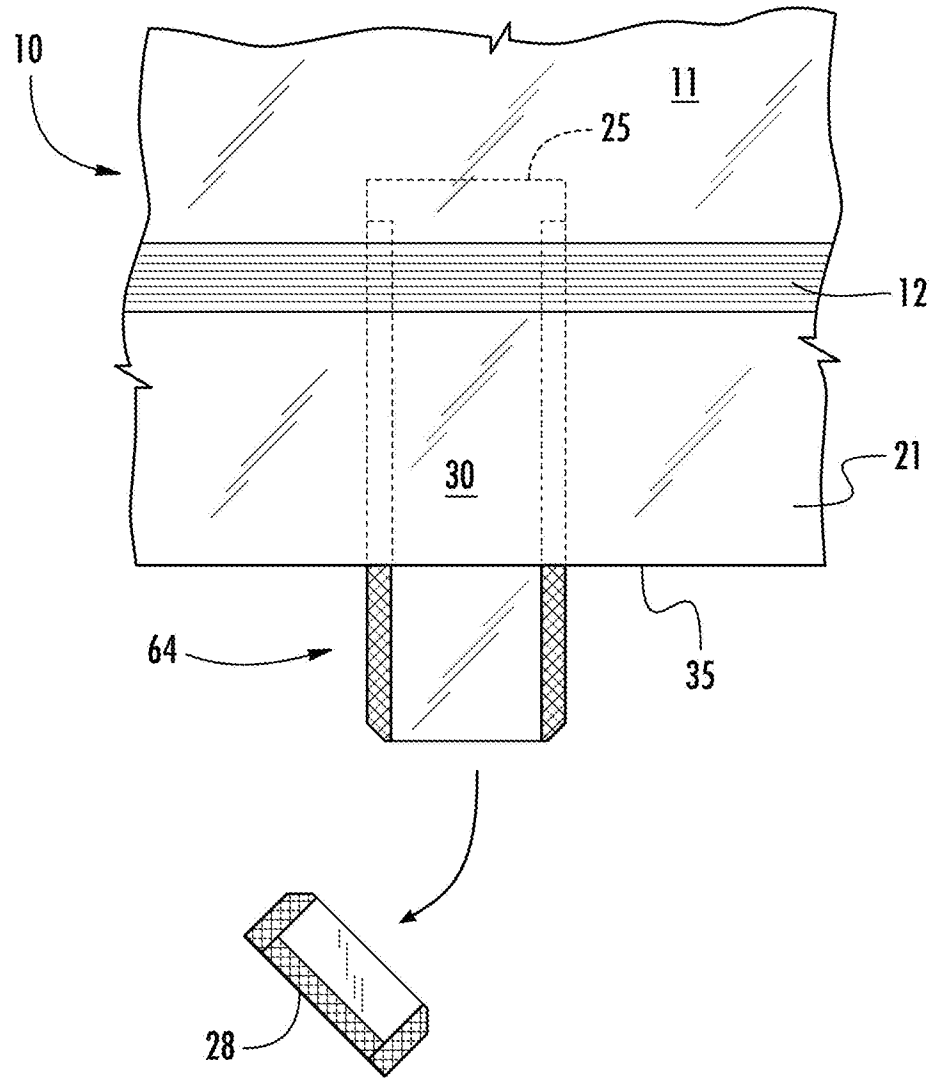


FIG. 4

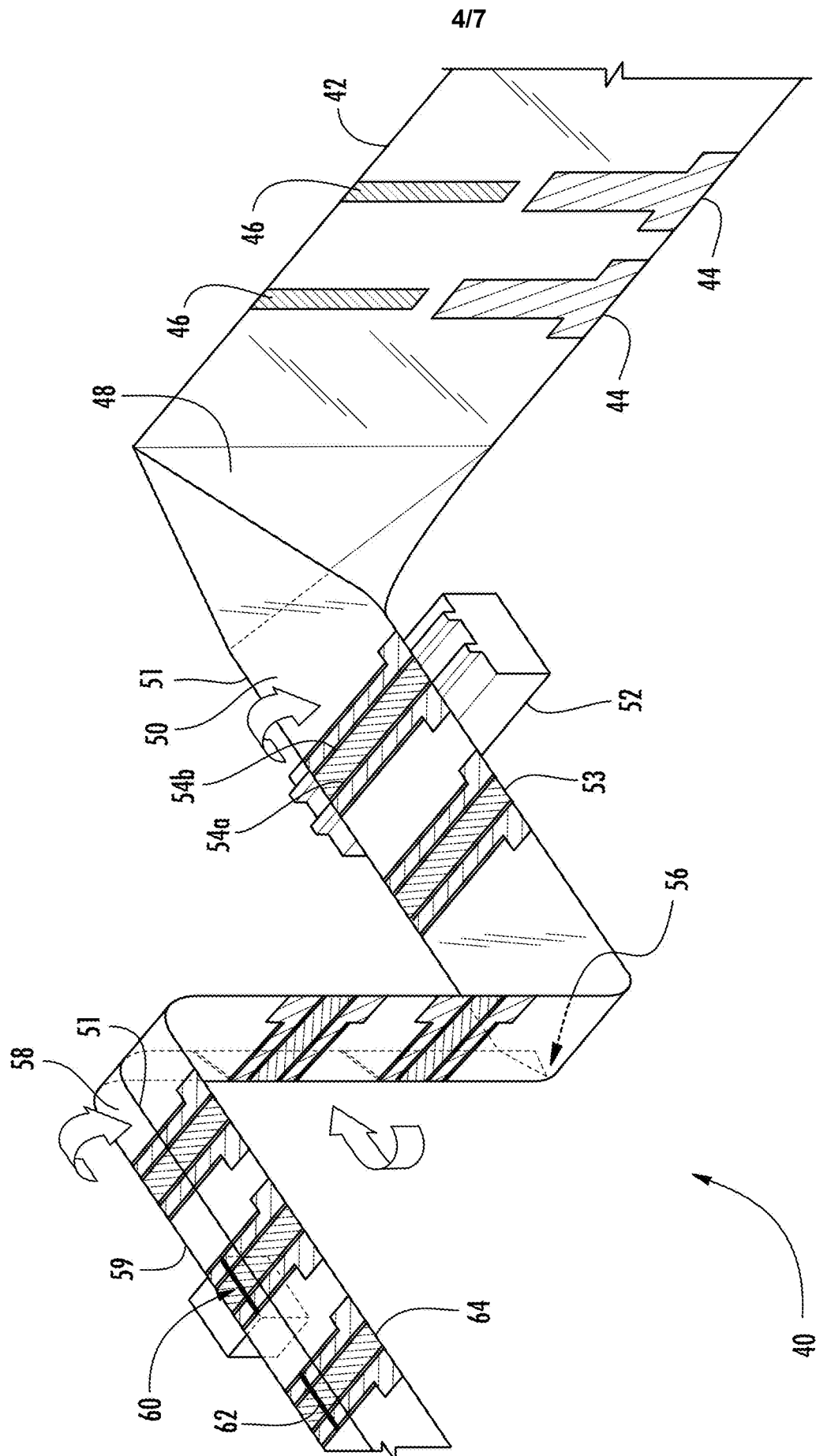


FIG. 5

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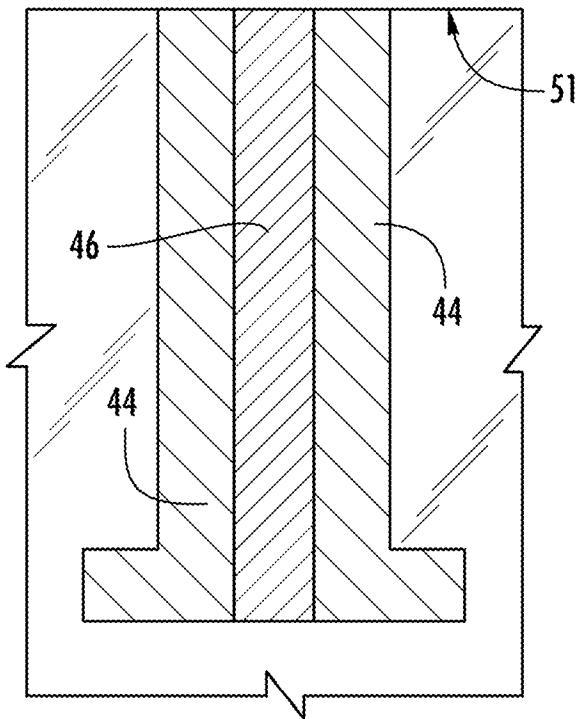


FIG. 6

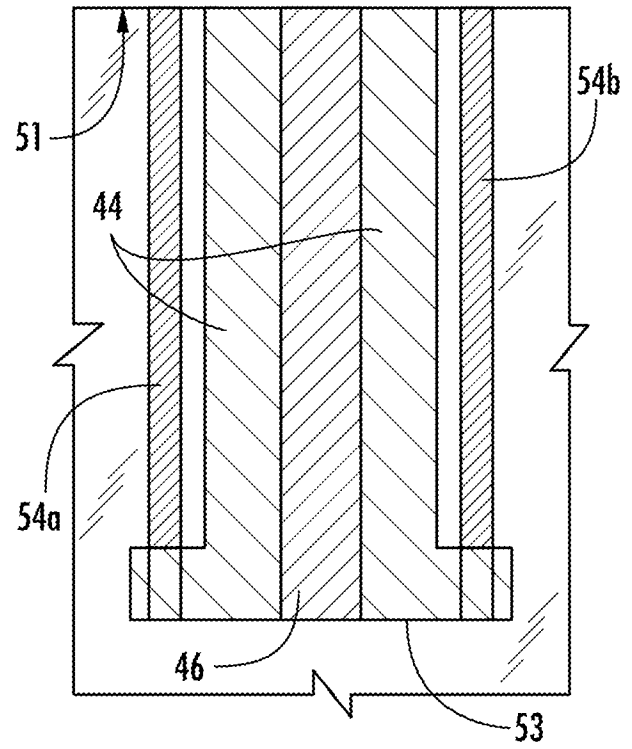


FIG. 7

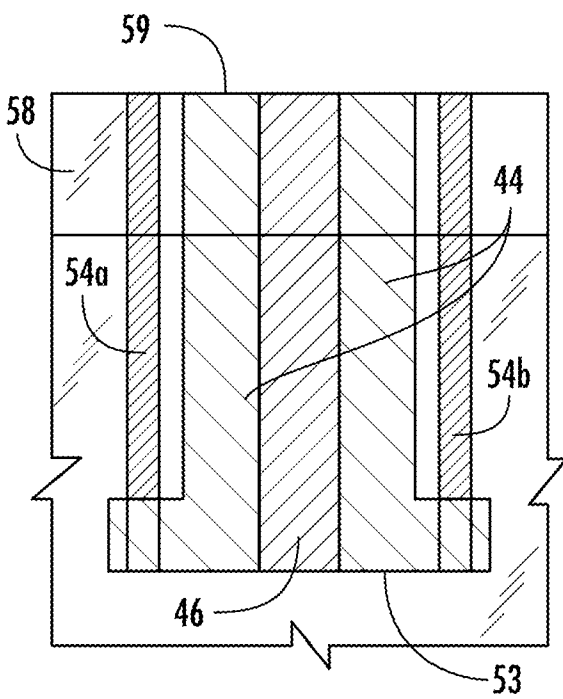


FIG. 8

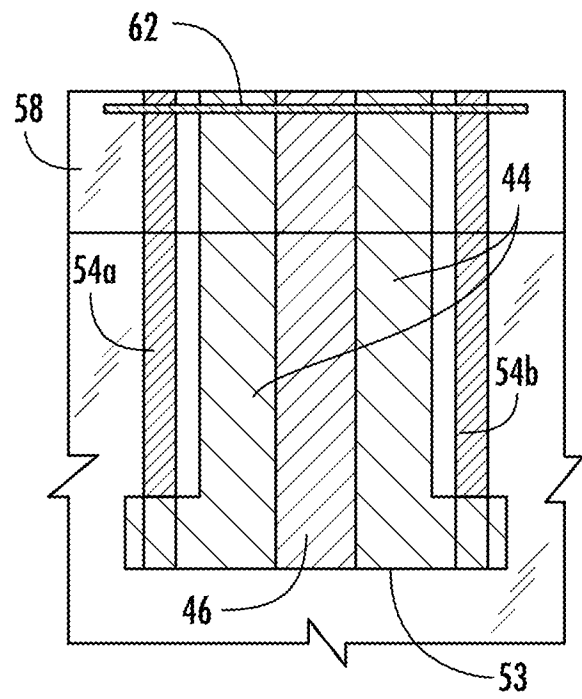


FIG. 9

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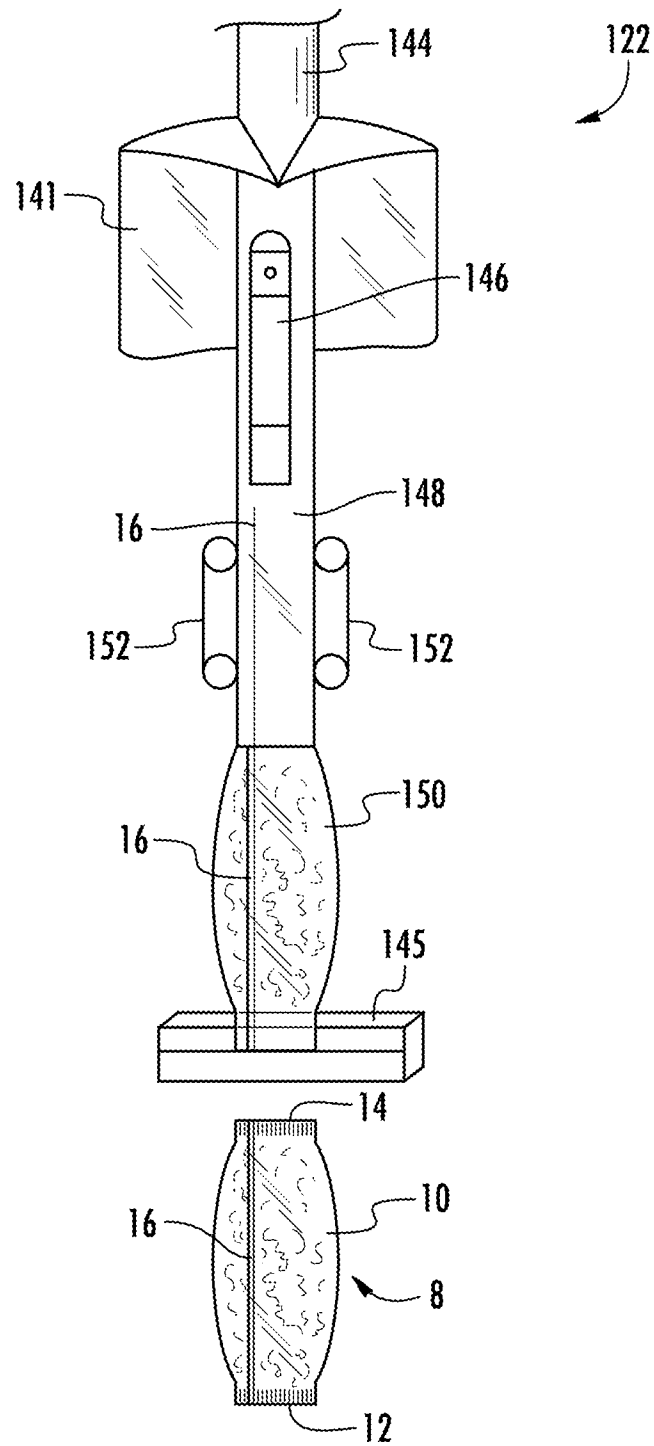


FIG. 10
PRIOR ART

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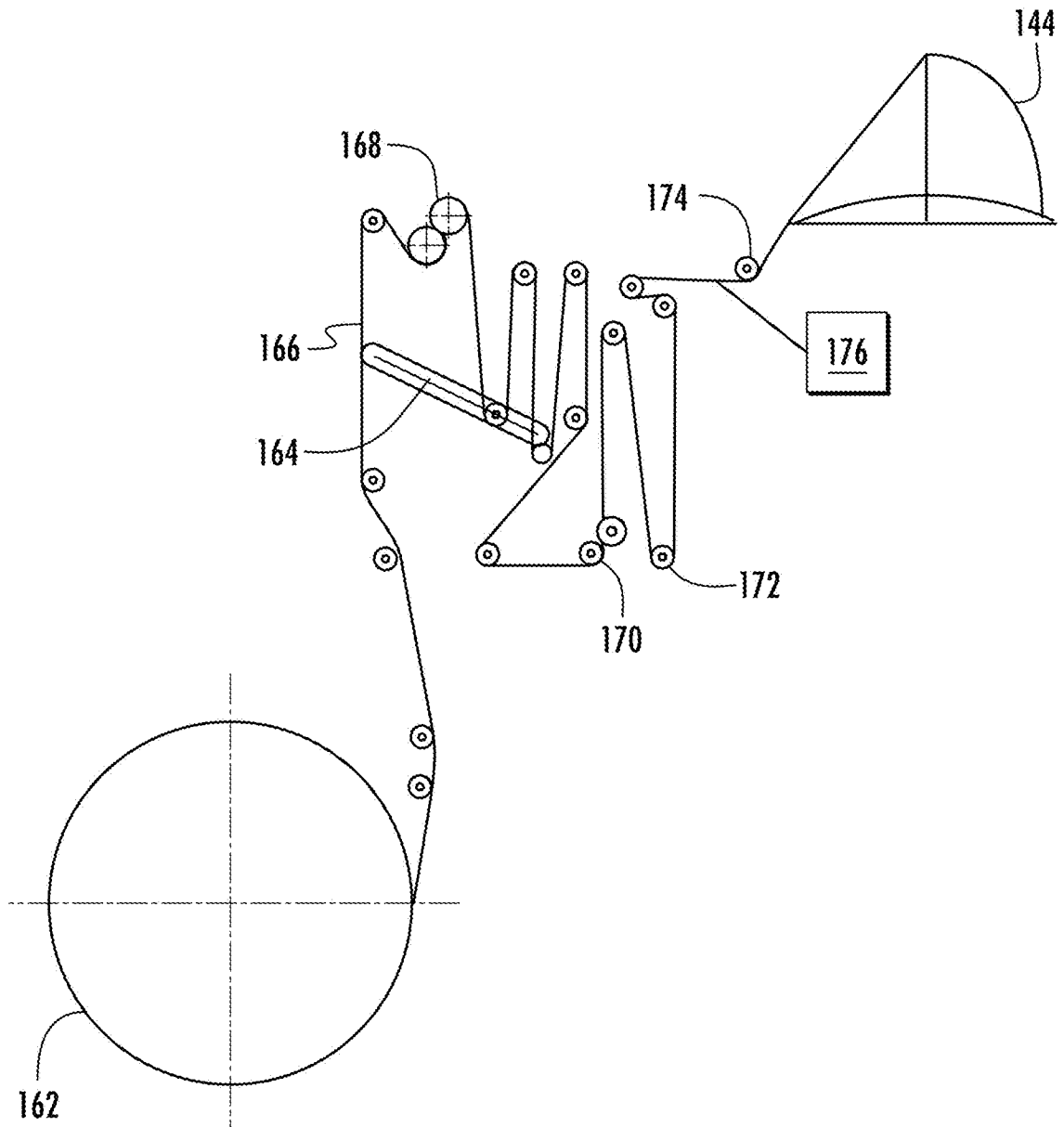


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/032821

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-6, 8-15, 18-25

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/032821

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B65D75/58
 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)
 B65D

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	US 2014/217119 A1 (FUTASE KATSUNORI [JP]) 7 August 2014 (2014-08-07)	1-4,6,8, 10,11, 13,14, 18-22, 24,25
Y A	paragraphs [0071], [0075], [0076], [0085], [0097], [0108]; figures 1-7 -----	5,23 9,12,15
X	EP 2 172 403 A1 (WORLD WATER BAG CO LTD [JP]) 7 April 2010 (2010-04-07)	1,2,6, 8-12,18
Y A	paragraphs [0012], [0013], [0017] figures 1-10 ----- -/-	23 3-5, 13-15, 19-22, 24,25



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 July 2016

Date of mailing of the international search report

27/09/2016

Name and mailing address of the ISA/

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Weyand, Tim

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/032821

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/54217 A1 (BOSTON RESEARCH AND DEV COMPAN [AU]; HOLMAN MARK [AU]; ROBERTSON BRUCE) 28 October 1999 (1999-10-28)	1,3,15
A	page 5, line 14 - page 7, line 11; figures 1-11	2,4-6, 8-14, 18-25
Y	----- EP 2 471 723 A1 (HOSOKAWA YOKO KK [JP]) 4 July 2012 (2012-07-04)	5
A	figure 4 -----	1-4,6, 8-15, 18-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/032821

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2014217119	A1	07-08-2014	CN 103732506 A	16-04-2014
			EP 2871137 A1	13-05-2015
			JP 2014009030 A	20-01-2014
			KR 20140030314 A	11-03-2014
			US 2014217119 A1	07-08-2014
			WO 2014006981 A1	09-01-2014

EP 2172403	A1	07-04-2010	CN 101687574 A	31-03-2010
			CN 103523353 A	22-01-2014
			EP 2172403 A1	07-04-2010
			HK 1191623 A1	24-03-2016
			JP 4880754 B2	22-02-2012
			KR 20100074088 A	01-07-2010
			TW 200925061 A	16-06-2009
			US 2010220942 A1	02-09-2010
			WO 2009054171 A1	30-04-2009

WO 9954217	A1	28-10-1999	CA 2328158 A1	28-10-1999
			CN 1298358 A	06-06-2001
			EP 1097085 A1	09-05-2001
			JP 2002513718 A	14-05-2002
			WO 9954217 A1	28-10-1999

EP 2471723	A1	04-07-2012	AU 2010287526 A1	29-03-2012
			CN 102482005 A	30-05-2012
			EP 2471723 A1	04-07-2012
			JP 5593165 B2	17-09-2014
			JP 2011148549 A	04-08-2011
			KR 20120035941 A	16-04-2012
			US 2012170876 A1	05-07-2012
			WO 2011024906 A1	03-03-2011

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6, 8-15, 18-25

Package with flexible spout arranged in a skirt and method of production

2. claims: 7, 16, 17, 26, 27

Package with flexible printed spout and method of production
