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(54) **SHIPPING PRODUCT WITH THERMAL AND MECHANICAL INSULATION FEATURES**

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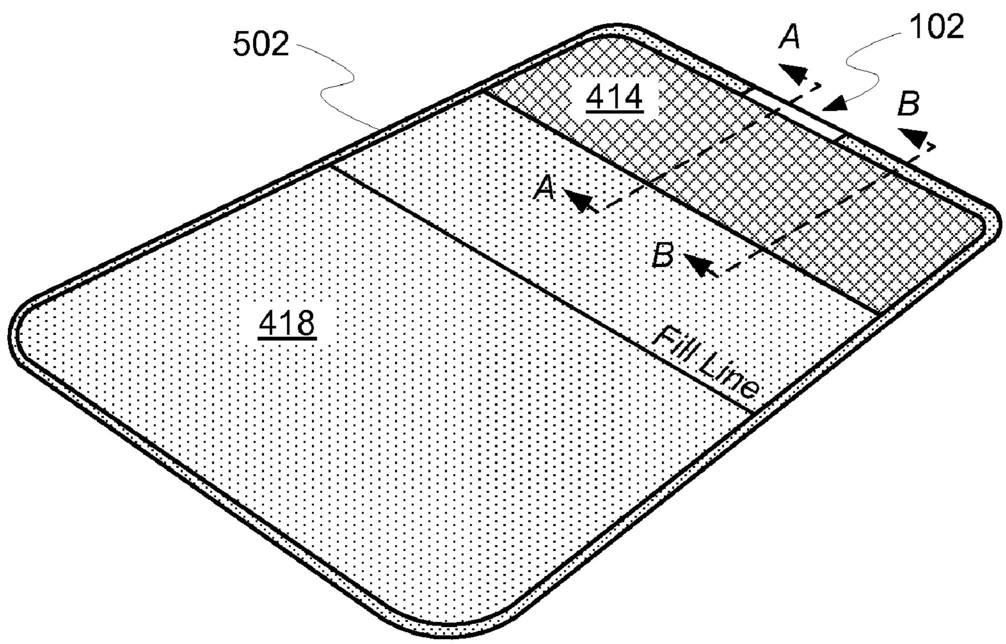
CPC ***F25D 3/08*** (2013.01); *F25D 2303/082* (2013.01)

(57) **ABSTRACT**

A fillable gel pack includes a first film layer having an area and a liquid permeable layer bonded in a region equal to or smaller than the area of the first film layer to define a gel chamber. The fillable gel pack also includes a gel material in dry or powdered form disposed in the gel chamber and a second film layer bonded to at least a portion of the liquid permeable layer or the first film layer to define a liquid chamber.



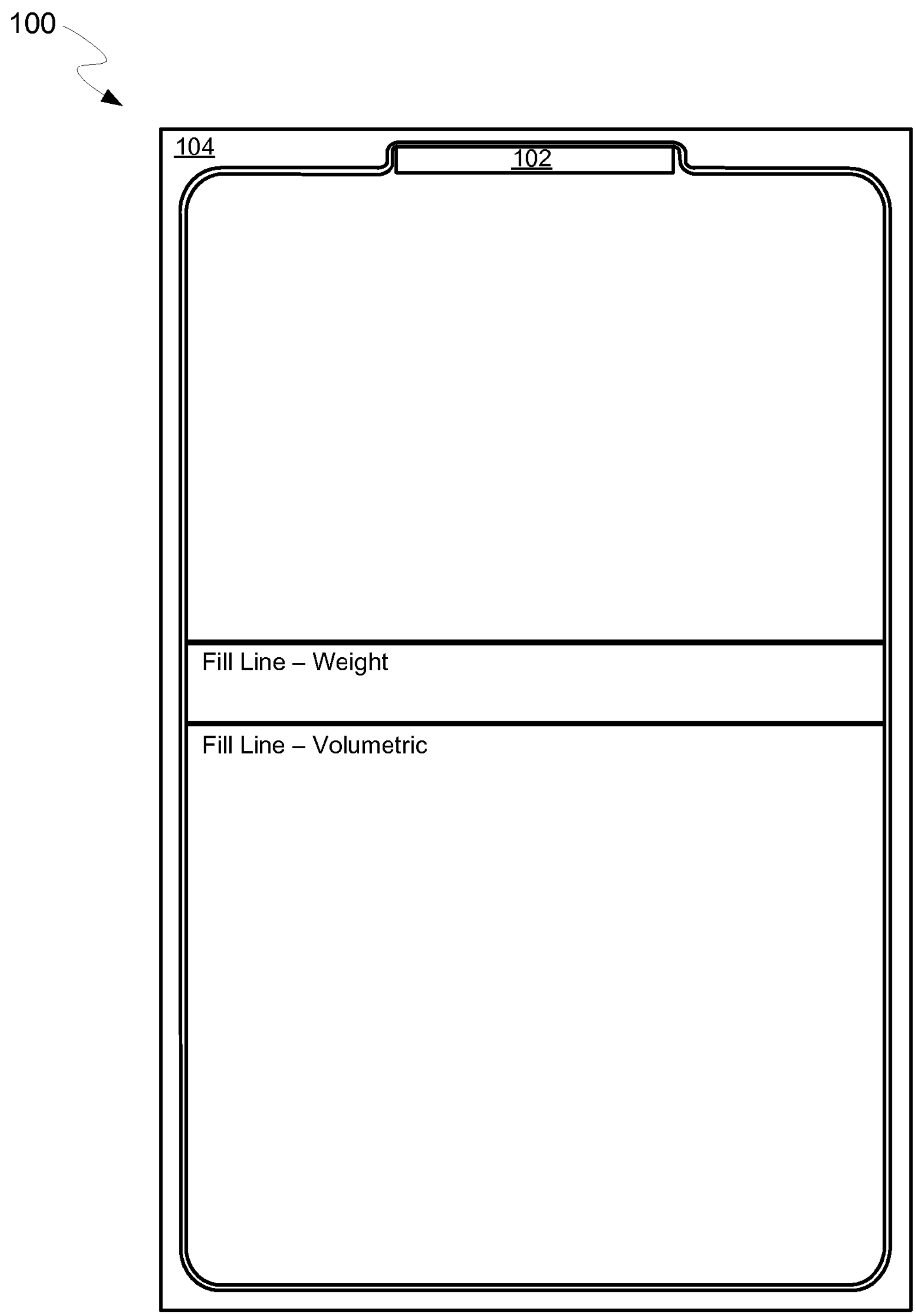
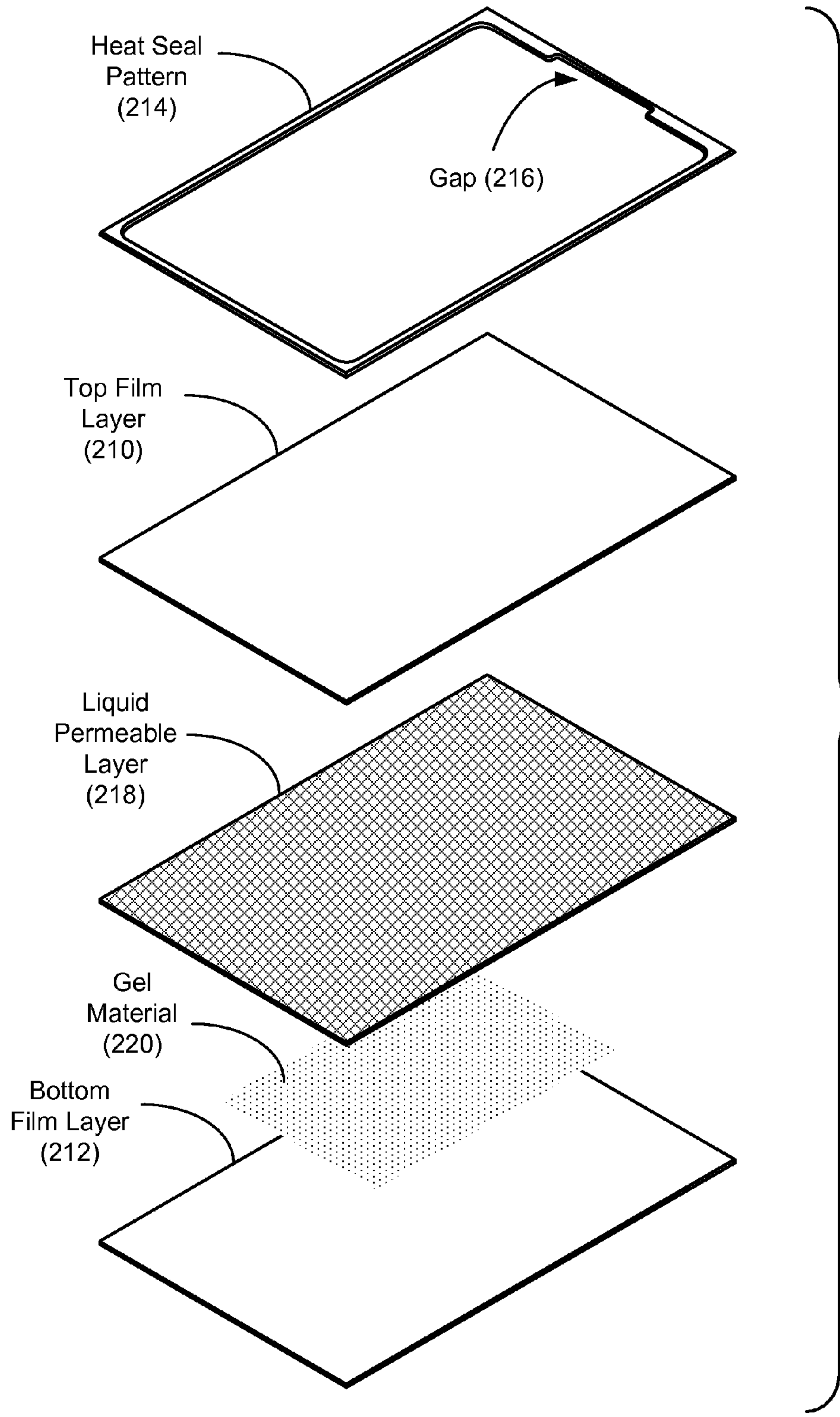


FIG. 1



Heat Seal Pattern (214)
Gap (216)
Top Film Layer (210)
Liquid Permeable Layer (218)
Gel Material (220)
Bottom Film Layer (212)

FIG. 2A

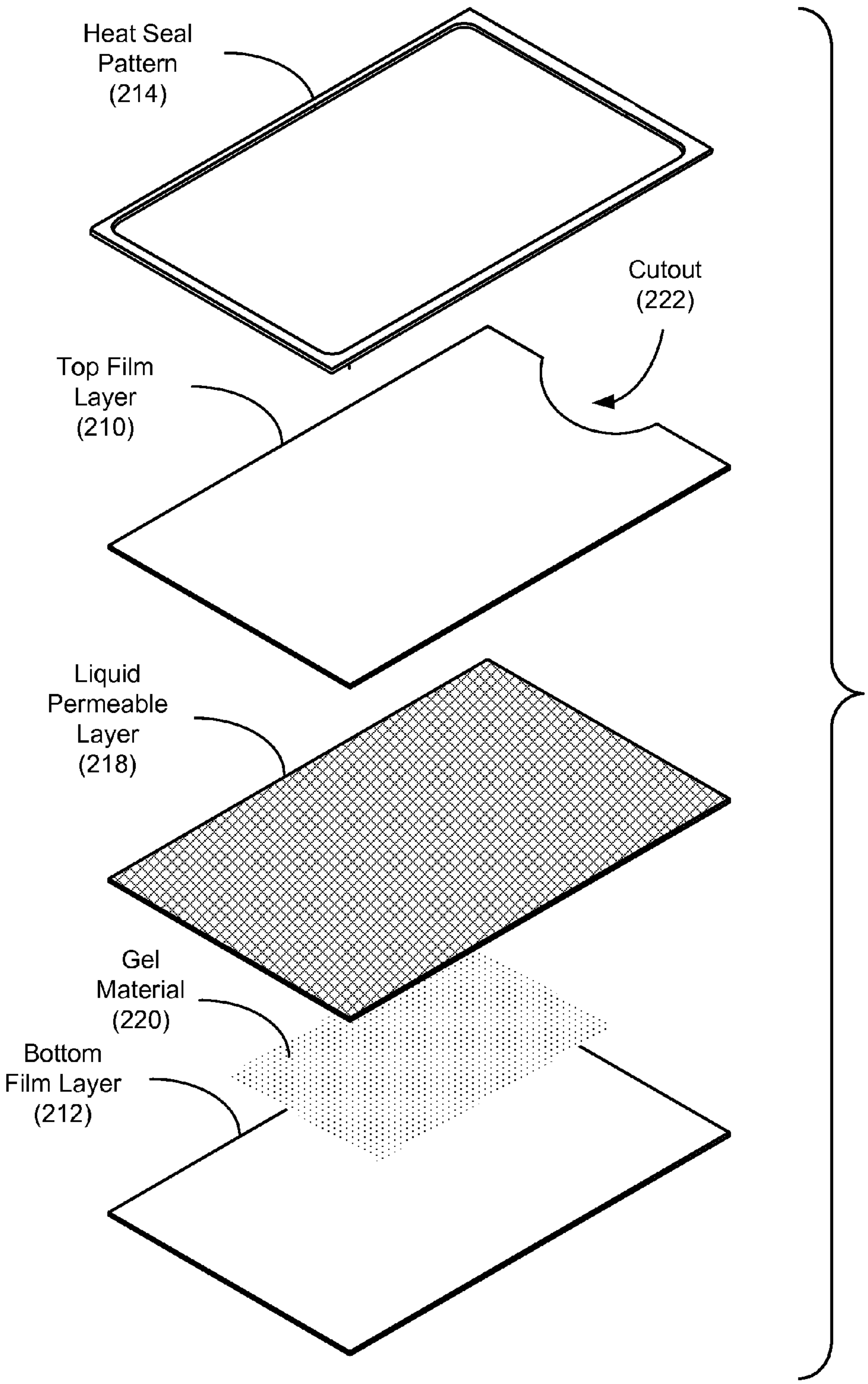

Heat Seal
Pattern
(214)
Cutout
(222)
Top Film
Layer
(210)
Liquid
Permeable
Layer
(218)
Gel
Material
(220)
Bottom
Film Layer
(212)

FIG. 2B

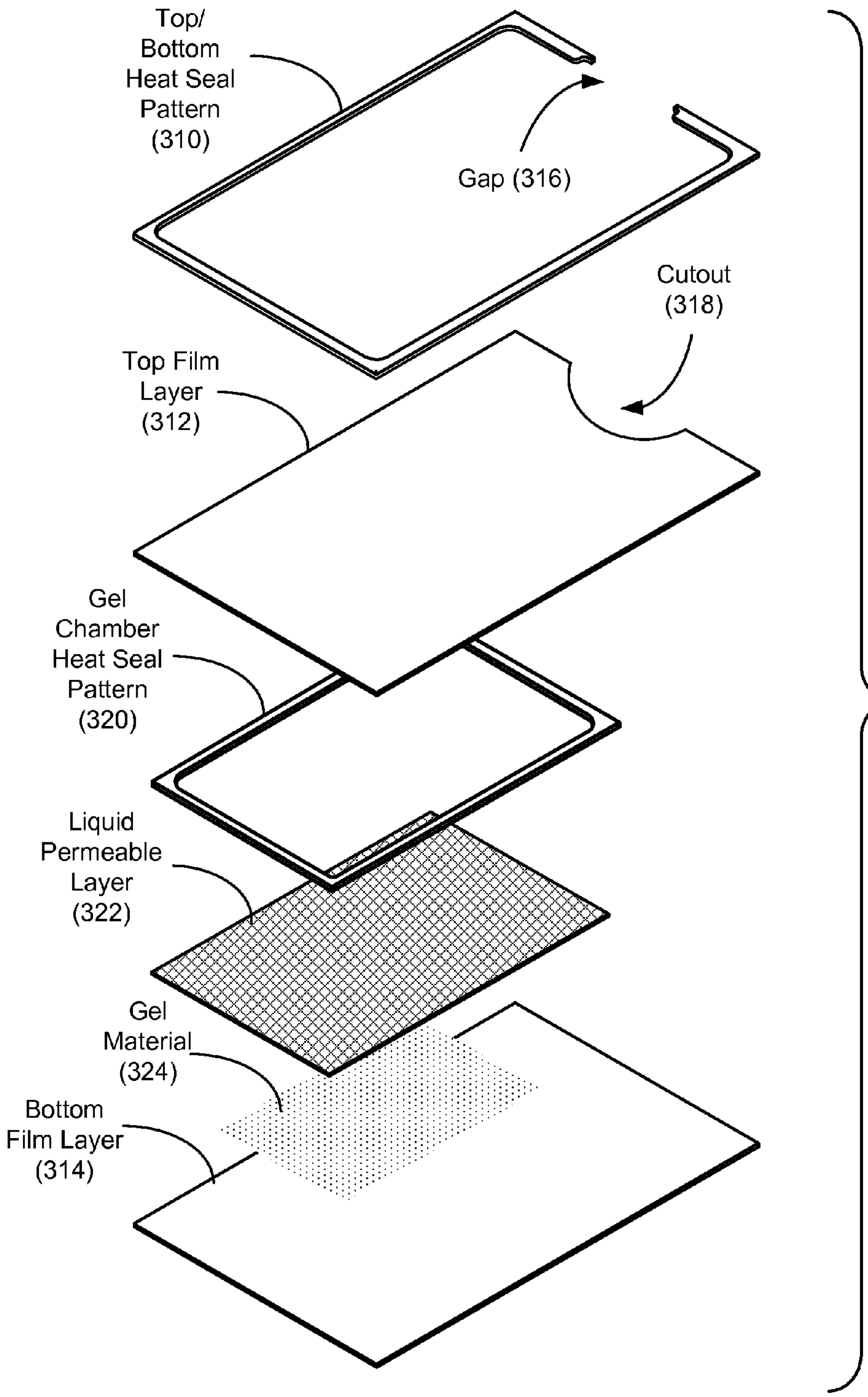

Top/
Bottom
Heat Seal
Pattern
(310)
Gap (316)
Cutout
(318)
Top Film
Layer
(312)
Gel
Chamber
Heat Seal
Pattern
(320)
Liquid
Permeable
Layer
(322)
Gel
Material
(324)
Bottom
Film Layer
(314)

FIG. 3

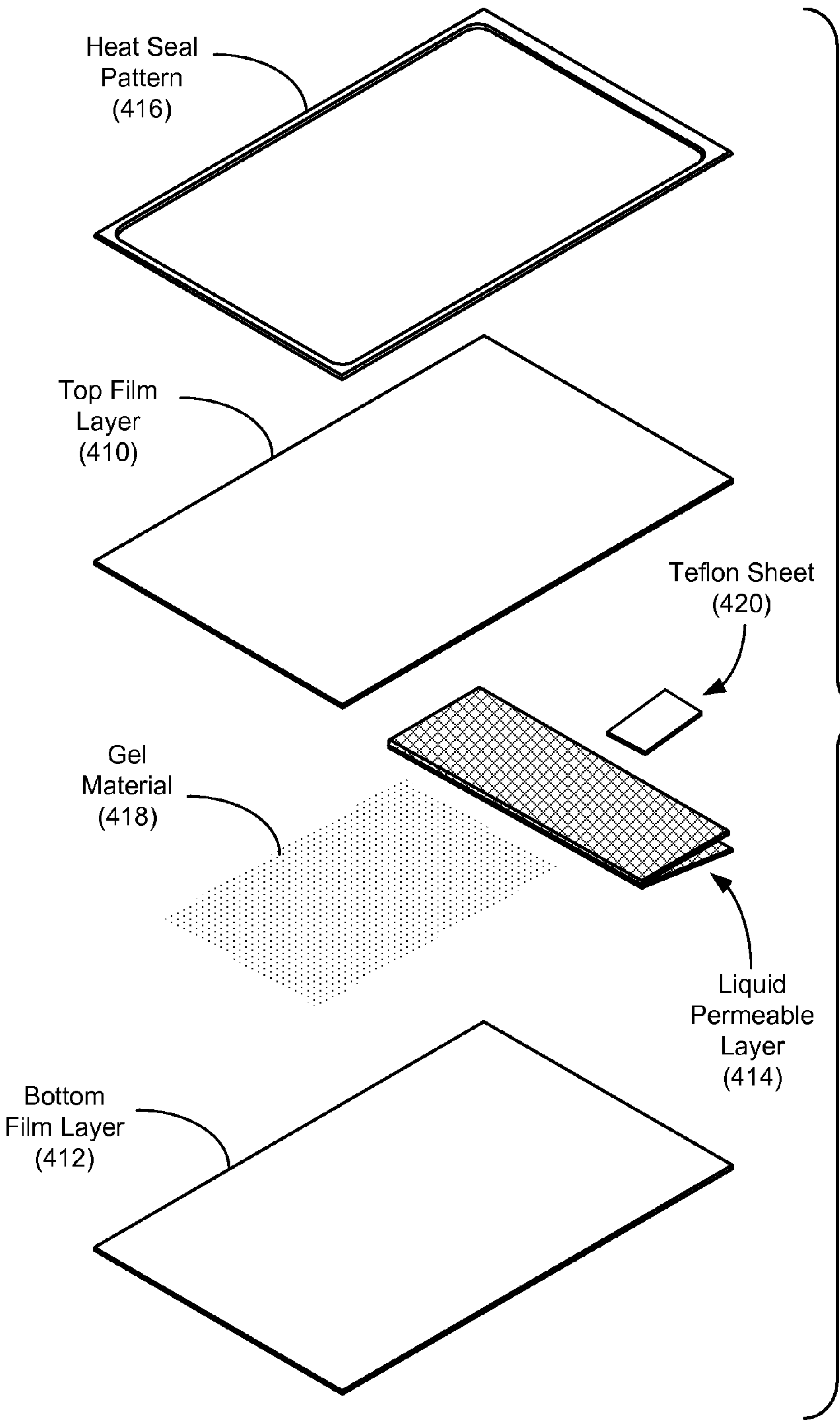

Heat Seal
Pattern
(416)
Top Film
Layer
(410)
Teflon Sheet
(420)
Gel
Material
(418)
Liquid
Permeable
Layer
(414)
Bottom
Film Layer
(412)

FIG. 4

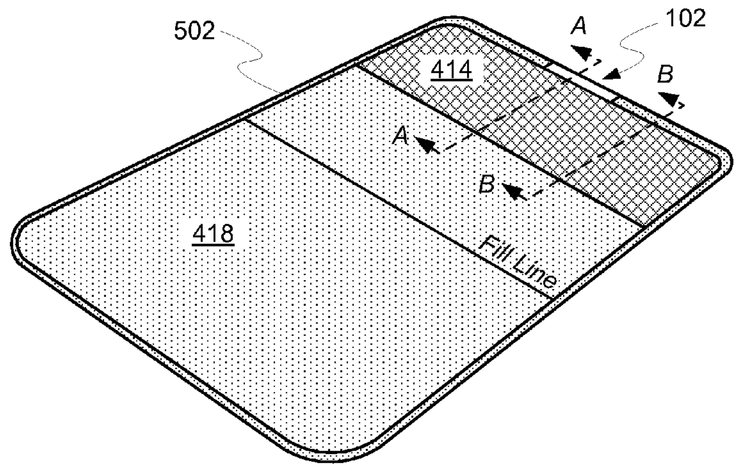


FIG. 5A

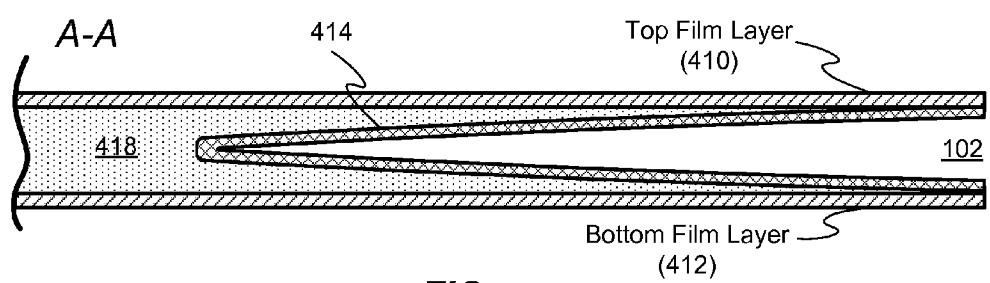


FIG. 5B

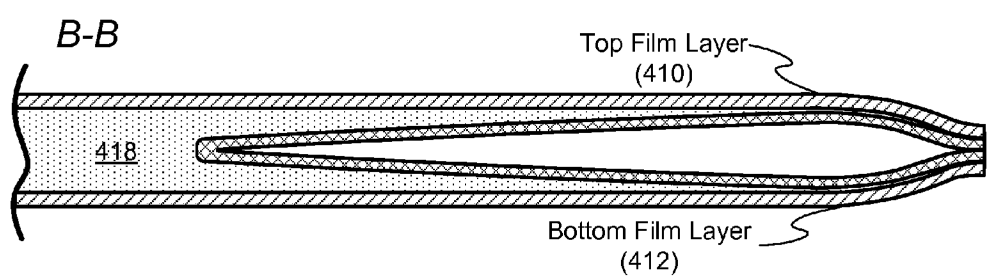


FIG. 5C

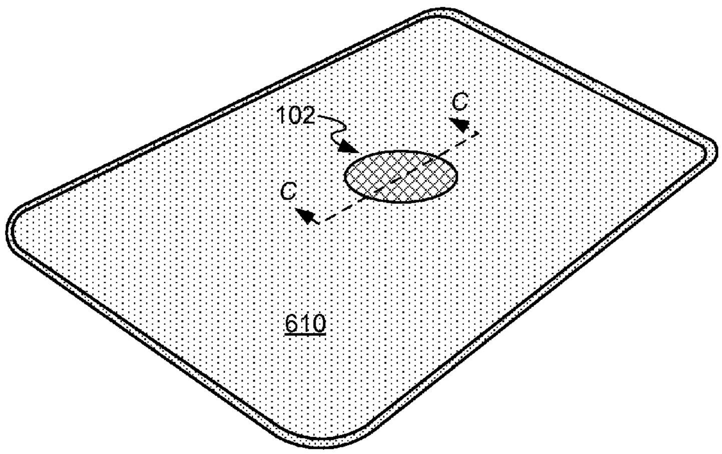


FIG. 6A

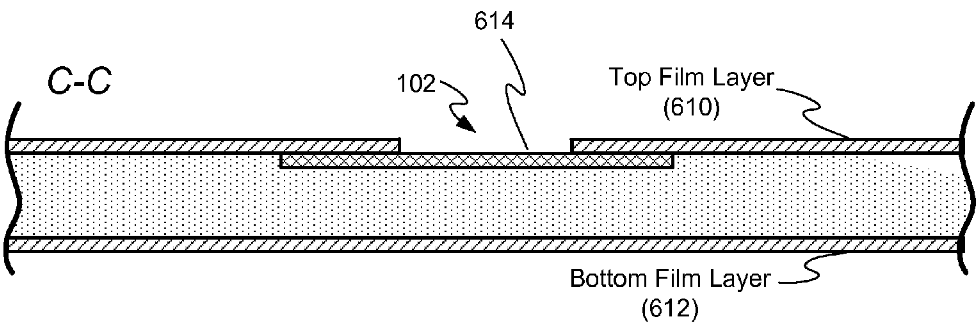


FIG. 6B

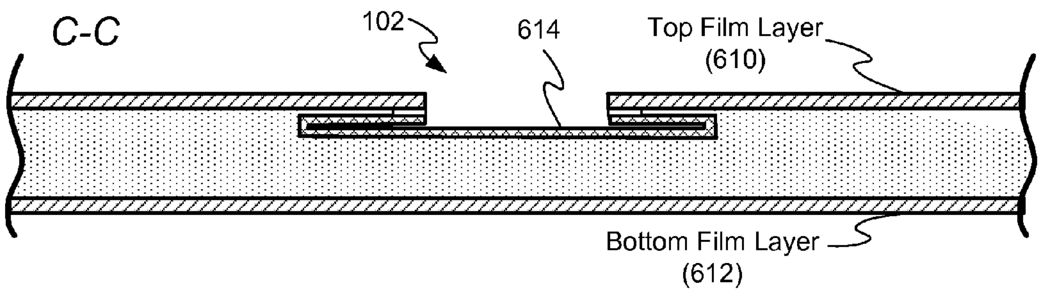

C-C
102
614
Top Film Layer
(610)
Bottom Film Layer
(612)

FIG. 6C

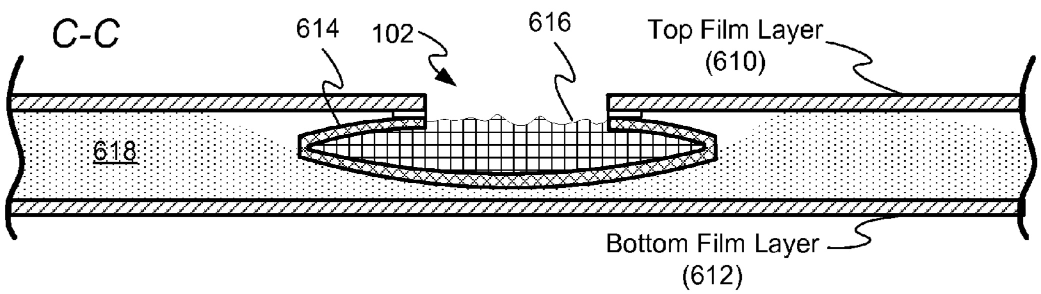

C-C
614
102
616
Top Film Layer
(610)
618
Bottom Film Layer
(612)

FIG. 6D

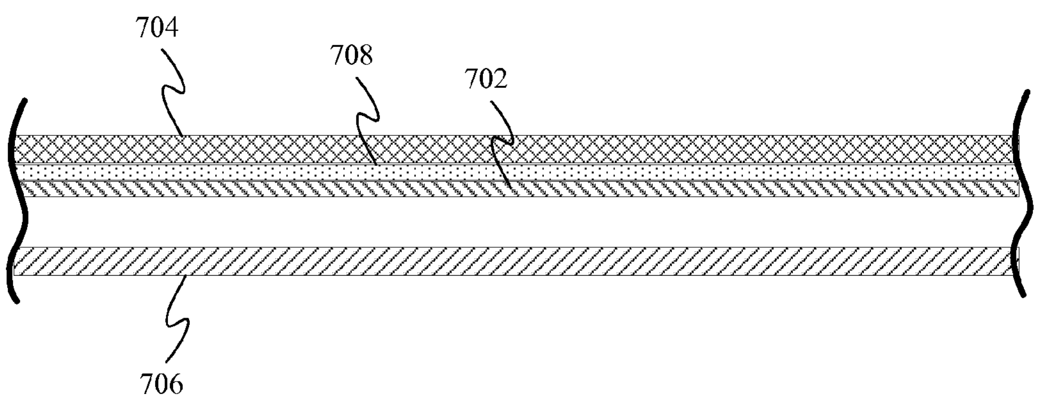


FIG. 7

SHIPPING PRODUCT WITH THERMAL AND MECHANICAL INSULATION FEATURES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims the benefit of U.S. Provisional Application No. 62/039,841, filed on Aug. 20, 2014, the disclosure of which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] Thermal gel packs that include a gelatinous material are used for maintaining a cool or hot state for extended periods of time. Cool packs in particular have been used for preserving perishable items being shipped (e.g., in boxes, crates or Styrofoam containers) in a cool state. The gel pack is refrigerated to a frozen state prior to putting the gel pack in the shipping container. Some gel packs come pre-filled with the gelatinous material prior to being used by the customer that is shipping the products. However, these pre-filled gel packs are expensive to transport to the customer due to their size and weight.

[0003] Therefore, there is a need in the art for improved methods and systems for providing shipping products with thermal and mechanical insulation features.

SUMMARY OF THE INVENTION

[0004] According to the present invention, methods and systems related to packaging structures are provided. More particularly, embodiments of the present invention provide a fillable gel pack that includes an inner sealed chamber containing gel in powder form. Upon filling with water, the fillable gel pack is suitable for use in cold/frozen packaging applications. The methods and systems described herein can be applied to other applications as well, including heated applications. A variety of users can benefit from the embodiments described herein, including businesses that ship perishable or temperature sensitive products, end user transporting perishable products in coolers or other containers, and the like.

[0005] According to an embodiment of the present invention, a fillable gel pack is provided. The fillable gel pack includes a first film layer having an area and a liquid permeable layer bonded in a region equal to or smaller than the area of the first film layer to define a gel chamber. The fillable gel pack also includes a gel material disposed in the gel chamber and a second film layer bonded to at least a portion of the liquid permeable layer or the first film layer to define a liquid chamber.

[0006] According to another embodiment of the present invention, a fillable gel pack is provided that includes a first and second layer joined together to define an exterior surface of the fillable gel pack and a fill port leading into a first interior portion of the fillable gel pack. The first and second layers are formed of a material that is generally impermeable to liquids. The first and second layers can also be referred to as non-permeable layers. Due to the material properties of the first and second layers, any liquids introduced into the fillable gel pack are prevented from escaping the gel pack through either of the first and second layers. The fillable gel pack also includes a liquid permeable layer that separates the first interior portion from a second interior portion that contains powdered gel material. When a liquid is introduced into the first interior portion of the fillable gel pack through the fill port, the liquid can then enter the second interior portion by passing through the liquid permeable layer. Once inside the second interior portion, the liquid can be absorbed by the powdered gel material, which then expands as the gel material absorbs the liquid. After absorbing the liquid, the gel material and absorbed water remain firmly secured within the second interior portion, thereby preventing liquid from subsequently leaking back out of the fillable gel pack during transit.

[0007] Numerous benefits are achieved by way of the present invention over conventional techniques. For example, embodiments of the present invention provide customers with a gel pack that is delivered to the customer in a low profile, low weight package. The gel pack includes a sealed gel chamber that encloses a gel material during shipping and prevents the gel material from escaping the gel pack. Although the gel chamber is sealed with respect to the gel material, it is permeable to liquids for subsequent filling. When ready for use, the customer can fill the gel pack with a liquid that gels the enclosed gel material and then freeze the gel pack for use during shipping of product. These and other embodiments of the invention along with many of its advantages and features are described in more detail in conjunction with the text below and attached figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. **1** shows a simplified plan view of a fillable gel pack with sealed gel chamber according to an embodiment of the present invention.

[0009] FIG. **2**A shows an exploded view of a fillable gel pack according to an embodiment of the present invention.

[0010] FIG. **2**B shows an exploded view of a fillable gel pack with a cutout configured to accommodate a tool used to introduce liquids into the fillable gel pack.

[0011] FIG. **3** shows an exploded view of a fillable gel pack with a sealed gel chamber according to another embodiment of the present invention.

[0012] FIG. **4** shows an exploded view of a fillable gel pack with a folded liquid permeable layer positioned near a fill port of the fillable gel pack.

[0013] FIGS. **5**A-**5**C show perspective and cross-sectional views of the fillable gel pack depicted in FIG. **4**.

[0014] FIGS. **6**A-**6**D show perspective and cross-sectional views of a fillable gel pack having a fill port defined by a central portion of the fillable gel pack.

[0015] FIG. **7** shows a cross-sectional view of a gel chamber in which the powdered gel material is evenly distributed by adhering the powdered gel material to an interior surface of the gel chamber.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

[0016] FIG. **1** is a simplified plan view of a fillable gel pack with sealed gel pack according to an embodiment of the present invention. The fillable gel pack includes multiple layers of material that are bonded together along a periphery of the fillable gel pack (e.g., using a heat seal or an adhesive) to form an interior portion configured to receive an amount of liquid. The fillable gel pack includes a fill port **102** (e.g., a two inch wide opening) that provides an opening passing from the exterior of the gel pack to the interior portion of the gel pack. Using the fill port, water or another liquid can enter the interior portion of the gel pack. In the illustrated embodiment, the corners of the fillable gel pack are rounded during the manufacturing process, preventing sharp edges that can be formed after freezing and damaging (e.g., puncturing) materials adjacent the fillable gel pack.

[0017] As illustrated in FIG. **1**, the outer surfaces of the fillable gel pack can include one or more fill lines indicating the amount of water or other liquid to be added to the gel pack, the final weight of the gel pack, or the like. In some embodiments, the fill line can correspond to a fill level at which all the added liquid is absorbed by materials within the fillable gel pack. While two fill lines are depicted in FIG. **1** it should be appreciated that in some embodiments only a single fill line or many lines are possible. For example, one line can indicate an amount of liquid desirable to attain a particular weight and/or volumetric size, while another line could indicate a line below which liquid absorbent materials within the fillable gel pack are capable of completely absorbing the liquid.

[0018] As illustrated in FIG. **1**, periphery region **104** can be heat sealed, adhesively coupled or joined by some other mechanism to the other layers of fillable gel pack **100**. In this way an exterior layer of fillable gel pack **100** can be made non-permeable so that the passage of liquids (e.g. water) into or out of the fillable gel pack **100** is limited to fill port **102** By leaving a portion of at least one layer of the gel pack unattached to the other layers of material (e.g., film), an opening defining fill port **102** is established. The gap between the unattached portion and the other layers of material determines a size (e.g., a two inch opening) at one side (e.g., the top) of the fillable gel pack to enable an end user to fill the pouch with a liquid such as water. The fillable gel pack can be configured in numerous sizes and shapes. For example, in some embodiments, fillable gel pack can be produced in standard sizes ranging from about 8 ounces to 48 ounces, although it should be understood that other sizes and shapes are within the consideration of this application. In other embodiments, the fillable gel pack could be configured in custom sizes and shapes. For example, an annular gel pack could be designed to surround a cylindrical container.

[0019] FIG. **2**A shows an exploded view of the fillable gel pack **100** illustrated in FIG. **1** according to an embodiment of the present invention. The fillable gel pack **100** includes at least two layers of film (i.e., top film layer **210** and bottom film layer **212**) that are joined together over a portion of their periphery using a heat seal pattern **214**. The heat seal pattern **214** in the illustrated embodiment includes a gap **216** that prevents the heat sealing of the two film layers along a portion of the periphery corresponding to the fill port. As described above, the fill port can be used to fill the space between the two film layers **210** and **212** with water or other suitable liquid.

[0020] Top film layer **210** and the bottom film layer **212** can be a formed from a variety of coextruded multilayer films or monolayers. As an example, these layers can include, nylon, LDP (low density polyethylene), or combinations thereof. The peripheral seal can be formed by heat treatment or by lamination with a glue or adhesive. The outer surfaces of the film layers can be treated as appropriate for later printing on these surfaces.

[0021] A liquid permeable layer **218** is provided to enclose and seal a predetermined quantity of a hydratable gel material **220**. The liquid permeable layer **218** in the depicted embodiment can be bonded to at least one of the top film layer **210** and the bottom film layer **212**. By bonding liquid permeable layer **218** in this manner liquid permeable layer **218** can create an interior portion referred to as a gel chamber in cooperation with one of the film layers so that the hydratable gel material remains confined within the fillable gel pack. The hydratable gel material **220**, which can also be referred to as a dehydrated gel material, can be sodium polyacrylate or some other polymer or copolymer containing acrylic acid or acrylamide monomers, as well as polymers of acrylamide. Using gel material in dry or powder form provides both mechanical and physical benefits based on the characteristics of the gel material in dry form over the gel material in wet form. For example, benefits of the use of gel material in dry form include a decrease in shipping volume since the gel material can have a shipping volume of less than 0.1 ounce compared to 24 ounces when gelled. Thus, in terms of physical volume, embodiments of the present invention provide a product that is less than ⅛" in thickness compared to a thickness greater than or equal to 1" for conventional gelled products. The entrapment of the gel material **220** between material that is substantially impermeable to the movement of the gel material **220** prevents leaking of the gel during shipping. As described herein, liquid permeable layer **218** is permeable to water or other liquids, enabling gelling of the gel material when ready for use. Moreover, the gel material can be transformed into a gelled state without being submerged in a large body of water. Rather, embodiments of the present invention enable the user to add liquid into fillable gel pack **100** through fill port **102** using just enough water to gel the gel material. When the liquid enters through fill port **102** it enters an interior portion of fillable gel pack **100** defined on one side by top film layer **210** and on another side by liquid permeable layer **218**. The liquid entering the first interior portion then passes through liquid permeable layer **218** and then interacts with gel material **220** at which point the liquid absorbed by gel material **220** is now trapped within the fillable gel pack. Accordingly, using embodiments of the present invention, one characteristic of the gel pack once formed compared to conventional systems is that no air bubble is formed during the freezing process or during the thawing process, since air can pass into and out of the fillable gel pack by way of fill port **102**.

[0022] The liquid permeable layer **218** can be formed of any of a number of materials arranged in a permeable configuration including, for example, polyethylene, polyester, nylon, polypropylene, polyurethane and rayon. In some embodiments, these materials can be spun into a web to form a nonwoven spunbond cloth that is permeable to water, allowing water to flow through the gel chamber layer and make contact with the hydratable gel. In one particular embodiment, liquid permeable layer **218** can be a layer of nonwoven spunbond formed entirely of polypropylene and having a thickness of between about 100 and 200 microns. In other embodiments, liquid permeable layer **218** can be formed from a layer of film defining a perforated nano-grid that allows the passage of liquids while blocking solids with a particulate size greater than or equal to the particulate size of the powdered gel material.

[0023] As depicted, the gel material **220** is placed between the liquid permeable layer **218** and the bottom film layer **212** prior to heat sealing such that the gel material is sealed between the bottom film layer and the gel chamber layer during heat sealing. As an example, the gel material can be measured and dispensed by a powder dispenser before the layers are heat sealed to form the gel chamber between the gel chamber layer and the bottom film layer. This dispensing of the powder between the layers can be integrated into a larger manufacturing process that includes unwinding each of a number of layers of raw materials in roll stock form and heat sealing or otherwise joining all the raw material layers together in a predetermined pattern. In some embodiments, the aforementioned powder addition between the liquid permeable layer **218** and bottom film layer **212** can be automated. An automated process can be implemented when the unwinding of the raw material layers is conducted in a vertical orientation that allows the gel material **220** to be dropped between liquid permeable layer **218** and bottom film layer **212** prior to lamination of the layers.

[0024] Herein, reference is made to the liquid permeable layer as "sealing" the gel material in the region between the gel chamber layer and the bottom film layer, which can be referred to as the gel chamber. The liquid permeable layer is permeable to water and other liquids, but not significantly permeable to the gel material in either its powdered state nor its hydrated state. Thus, after heat sealing, the gel material is prevented from escaping the gel chamber. The sealing of the gel material in the gel chamber prevents problems associated with conventional designs in which the gel material was loose and able to pass through the fill port during transport or use. However, although the gel material is substantially prevented from escaping the gel chamber, the liquid is able to enter into the gel chamber and interact with the gel material, which is also prevented from escaping the gel chamber.

[0025] In some embodiments, the top film layer **212**, the liquid permeable layer **218**, and the bottom film layer **212** have the same lateral dimensions (i.e., width and length) as illustrated in FIG. **2**. The bottom film layer and the gel chamber layer are heat sealed along their peripheries in the embodiment illustrated in FIG. **2**. Having the same lateral dimensions facilitates heat sealing of the layers to form the finished package. In order to provide an inlet for fluid filling of the space between the top and bottom film layers, a punch can be used to form an opening in the top film layer. Alternatively, a material that prevents sealing, such as ink, can be placed on a portion of the periphery of the top film layer facing the liquid permeable layer, which thereby prevents sealing of that portion of the top film layer to the gel chamber layer. Other techniques for leaving a portion of the top film layer unsealed are included within the scope of the present invention in order to provide a fill port to fill the gel pack with liquid between the top and bottom film layers.

[0026] In a typical use case, the fillable gel pack is shipped to the user in a substantially flat form since the gel material is in powder form. During shipping, the gel material remains in the gel chamber and is prevented from spilling from the fillable gel pack. When ready for use, the gel material is hydrated by adding liquid (e.g. water) through the fill port, which subsequently passes through the liquid permeable layer. Typically, the fillable gel pack is filled with a defined volume of water to transform the powdered gel material into a gel of predetermined volume. In some use cases, the fillable gel pack is maintained in a vertical position for a predetermined amount of time (e.g., two minutes) to enable the water to enter the gel chamber through the gel chamber layer, which is permeable to water but not to the gel material. After the liquid is all absorbed by the powdered gel material, the fillable gel pack can be frozen for subsequent use, for example, by laying the filled gel pack flat in a freezer. Embodiments of the present invention provide systems not available using conventional techniques, including quick gel times. As described herein, the liquid permeable layer entraps the gel material in the gel chamber, but does not provide mechanical support for the gel pack. Accordingly, the gel material layer can utilize larger pores than found in conventional systems, enabling relatively higher flow rates as the liquid enters the gel chamber. At the same time, the larger pore sizes, which would typically result in tearing of the encasing material in a stand-alone design, do not impact the mechanical performance since the outer film layers provide protection and support for the liquid permeable layer.

[0027] In contrast with conventional packages, the fillable gel pack design prevents the formation of air bubbles in the gel pack since the gelling process enables the volume inside the pouch to remain the same after gelling and at later points in time, up to and through freezing of the gel pack. The fill port enables air to escape as the gelling and subsequent freezing processes are performed, reducing or eliminating air bubbles from forming within the finished package. Moreover, embodiments of the present invention provide benefits not available using conventional techniques. As an example, gelling time can be separated from filling time since for gels that take longer to gel than the time needed to fill the gel pack, the gelling process can continue after filling since the water is confined to the interior portions of the gel pack by the top film layer and the bottom film layer. Thus, embodiments of the present invention provide benefits not available using gel material separate from the fillable gel pack.

[0028] Although the outer edges of the layers illustrated in FIG. **2** are square corners, this is not required by the present invention. In some embodiments, the corners are rounded both on the outer edges of the layers as well as the outer edges of the heat seal pattern (as shown in FIG. **2**A).

[0029] FIG. **2**B shows a similar embodiment to the one depicted in FIG. **2**A; however, FIG. **2**B depicts cutout **222** defined by top film layer **210**. The formation of cutout **222** can prevents any additional steps of separating a portion of top film layer **210** from liquid permeable layer **218** or bottom film layer **212** to form fill port **102**, since the material of top film layer **210** that would otherwise bond and cover fill port **102** is removed. For this reason an upper portion of heat seal pattern **214** can be substantially uniform and continuous along a periphery of the fillable gel pack. It should be noted that cutout **222** can be formed prior or subsequent to lamination of the layers of the fillable gel pack.

[0030] FIG. **3** is a simplified perspective view of a fillable gel pack with sealed gel chamber according to another embodiment of the present invention. The embodiment illustrated in FIG. **3** shares some similarities with FIGS. **2**A-**2**B and the description provided in reference to FIGS. **2**A-**2**B is also applicable to FIG. **3** as appropriate.

[0031] In the embodiment illustrated in FIG. **3**, a top/bottom heat seal pattern **310** that is used to join or bond the top film layer **312** and the bottom film layer **314** includes a gap **316** that corresponds to a cutout **318** in a portion of the top film layer **312**. Thus, the top film layer **312** and the bottom film layer **314** are joined at the periphery with the exception of the gap **316**. The cutout **318** provides an opening that can be used to insert a liquid dispenser partially into the interior of the fillable gel pack.

[0032] The gel chamber heat seal pattern **320**, which is used to bond liquid permeable layer **322** to the bottom film layer **314** and define a gel chamber that encloses gel material **324**, has an area that is smaller than the area of the bottom film layer **314**. In this embodiment, the periphery and area of the gel chamber heat seal pattern **320** are equal to the periphery and area of the liquid permeable layer **322**. In other embodiments, the width of the liquid permeable layer **322** and the bottom film layer **314** (measured across the shorter dimension) are equal, but the length of the liquid permeable layer is less than the length of the bottom film layer **314**, extending in some implementations up to the bottom portion of the cutout **318**. In these embodiments, the area of the gel chamber is less than the area of the bottom film layer **314**, providing a finished product that has a gel chamber smaller than the outer area.

[0033] FIG. **4** shows an exploded view of an embodiment in which a liquid permeable layer is positioned proximate a fill port of the fillable gel pack. The embodiment illustrated in FIG. **4** shares some similarities with the embodiments illustrated in FIGS. **2**A-**2**B and **3** and the description provided in reference to FIGS. **2**A-**2**B and **3** is also applicable to FIG. **4** as appropriate.

[0034] In particular FIG. **4** shows liquid permeable layer **414** folded over itself so that a folded end faces a bottom end of the fillable gel pack and an open end of the liquid permeable layer **414** faces the fill port. By positioning liquid permeable layer between top and bottom film layers **410** and **412** during a laminating or sealing process, liquid permeable layer **414** can effectively act as a barrier between any liquid entering the fillable gel pack and a portion of the fillable gel pack that retains gel material **418**. To prevent heat seal pattern **416** from closing a fill port leading into the fillable gel pack during a bonding operation, a piece of material having high temperature resistance and a width in accordance with a desired fill port size (e.g. Teflon sheet **420**) can be inserted between the folded over portions of liquid permeable layer **414**, so that portions of liquid permeable layer **414** separated by Teflon sheet **420** can remain unbonded and suitable for receiving liquid.

[0035] FIGS. **5**A-**5**C show perspective and cross-sectional views of the embodiment depicted in FIG. **4**. FIG. **5**A shows a depiction of what the fillable gel pack depicted in FIG. **4** looks like when assembled. In particular, bonding region **502** is shown positioned along a periphery of the gel pack. Further, fill port **102** is defined by a break in bonding region **502** and created by the presence of Teflon sheet **420**, which is removed from the fillable gel pack subsequent to a bonding operation. FIG. **5**B shows a cross-sectional view of a portion of the fillable gel pack in accordance with section line A-A. Section line A-A coincides with a position of fill port **102**, which is indicated in FIG. **5**B. FIG. **5**B also shows how liquid permeable layer **414** can assume a tapered geometry with respect to fill port **102** as a result of the folded geometry in which it is positioned within the fillable gel pack. A liquid chamber defined by liquid permeable layer **414** provides a place for liquid to gather while it passes through liquid permeable layer **414**. Depending on a permeability of liquid permeable layer **414** it may not be large enough to accommodate all the liquid necessary to fill the fillable gel pack. In certain embodiments, liquid permeable layer can extend farther into the fillable gel pack to create a larger chamber for accommodating the liquid. In this way, a user filling the fillable gel pack need not wait for a portion of the liquid to pass through the liquid permeable layer **414** prior to finish filling up the fillable gel pack.

[0036] FIGS. **6**A-**6**B show perspective and cross-sectional views of another alternate embodiment of a fillable gel pack. FIG. **6**A shows a perspective view of a fillable gel pack in which a fill port is defined by a central portion of top film layer **610**. Although fill port **102** is shown as having a circular geometry it should be understood that any geometry is possible (e.g. rectangular, oval, etc.). FIG. **6**B shows a cross-sectional view of the fillable gel pack depicted in FIG. **6**A. In particular, FIG. **6**B shows how top film layer **610** and bottom film layer **612** cooperate to define an interior volume of the fillable gel pack. Furthermore, an opening defined by the top film layer **610** takes the form of fill port **102**. The opening defining fill port **102** is covered by liquid permeable layer **614**, which can be laminated to a portion of an interior surface of the top film layer **610** that surrounds fill port **102**. A porosity of liquid permeable layer **614** should generally be quite high to allow water to pass quickly through it since the configuration depicted in FIG. **6**B leaves little to no room for liquids to pool prior to passing through the liquid permeable layer **614**.

[0037] FIG. **6**C-**6**D show cross-sectional views of the fillable gel pack depicted in FIG. **6**A in accordance with section line C-C. FIG. **6**C shows how an additional amount of material can be added to liquid permeable layer **614**, by sealing or adhesively coupling a peripheral edge of liquid permeable layer **614** to the interior facing surface of top film layer **610**. FIG. **6**D shows how liquid permeable layer **614** can expand to accommodate an amount of liquid **616** added through fill port **102** while liquid **616** permeates through liquid permeable layer **614** to hydrate powdered gel material **618**. In some embodiments, the powdered gel material **618** can take between 30 and 50 seconds to become fully saturated with liquid.

[0038] FIG. **7** shows an additional embodiment in which an amount of powdered gel material **702** is evenly distributed within an exemplary gel chamber defined by liquid permeable layer **704** and film layer **706**. Adhesive layer **708** can be adhered to either liquid permeable layer **704** and/or to film layer **706**. Adhesive layer **708** can be operable to distribute the powdered gel material **702** within the gel chamber. Adhesive layer **708** can be liquid soluble so that as liquid passes through liquid permeable layer **704** the hydrated gel material is free to expand and arrange itself in a space efficient manner. This preplacement of the powdered gel material **702** within the gel chamber can help to influence the hydrated gel material to be evenly distributed throughout the fillable gel pack. In this way, irregularities in a distribution of the hydrated gel material within the fillable gel pack can be reduced.

[0039] It is also understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application and scope of the appended claims.

What is claimed is:

1. A fillable gel pack comprising:

a first film layer having an area;

a liquid permeable layer bonded to a region of the first film layer equal to or smaller than the area of the first film layer to define a gel chamber;

a gel material in powder form disposed in the gel chamber; and

a second film layer bonded to at least a portion of the liquid permeable layer or the first film layer to define a liquid chamber.

2. The fillable gel pack of claim **1** wherein the first film layer, the liquid permeable layer, and the second film layer are heat sealed to define the gel chamber and the liquid chamber.

3. The fillable gel pack of claim **1** wherein the liquid chamber includes a fill port disposed between at least one of the first film layer or the liquid permeable layer and the second film layer.

4. The fillable gel pack of claim **1** wherein the first film layer comprises a bottom film layer.

5. The fillable gel pack of claim **1** wherein the second film layer comprises a top film layer.

6. The fillable gel pack of claim **1** wherein at least one of the first film layer or the second film layer comprise a multilayer stack.

7. The fillable gel pack of claim **6** wherein the multilayer stack comprises at least two different layers of polyethylene.

8. A fillable gel pack, comprising:

a first non-permeable layer;

a second non-permeable layer coupled with the first non-permeable layer, the first and second non-permeable layers cooperating to define both an exterior surface of the fillable gel pack and an opening leading into a first interior portion of the fillable gel pack;

a powdered gel material carried within a second interior portion of the fillable gel pack; and

a liquid permeable layer disposed within the fillable gel pack that forms a barrier between the first and second interior portions of the fillable gel pack.

9. The fillable gel pack as recited in claim **8**, wherein a peripheral portion of the liquid permeable layer is heat sealed to peripheral portions of both the first and second non-permeable layers.

10. The fillable gel pack as recited in claim **9**, wherein the first and second non-permeable layers comprises polymer film layers that are not permeable to liquid water.

11. The fillable gel pack as recited in claim **8**, wherein the liquid permeable layer comprises polypropylene.

12. The fillable gel pack as recited in claim **8**, wherein the powdered gel material is adhesively coupled with the liquid permeable layer.

13. The fillable gel pack as recited in claim **8**, wherein the powdered gel material comprises a polymer or copolymer containing acrylic acid or acrylamide monomers.

14. The fillable gel pack as recited in claim **8**, wherein the second interior portion is defined by the liquid permeable layer and the second non-permeable layer.

15. The fillable gel pack as recited in claim **14**, wherein the first non-permeable layer defines a cutout region that enlarges the opening leading into the first interior portion.

16. A fillable gel pack, comprising:

a first film layer;

a second film layer joined to the first film layer to form an interior volume;

a fill port defined by one or both of the first film layer and the second film layer; and

a liquid permeable layer disposed within the interior volume that separates the interior volume into a first region and a second region, the first region being in communication with an exterior environment through the fill port.

17. The fillable gel pack as recited in claim **16**, wherein the fill port is defined only be the first film layer and wherein the liquid permeable layer is coupled to an interior facing surface of the first film layer and is disposed across the fill port.

18. The fillable gel pack as recited in claim **16**, wherein the fill port is defined by both the first film layer and the second film layer.

19. The fillable gel pack as recited in claim **18**, wherein the liquid permeable layer is folded so that an open end of the liquid permeable layer is oriented towards the fill port and a creased end of the liquid permeable layer is oriented towards the bottom of the interior volume.

20. The fillable gel pack as recited in claim **16**, wherein the liquid permeable layer is substantially the same size as both the first film layer and the second film layer.

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