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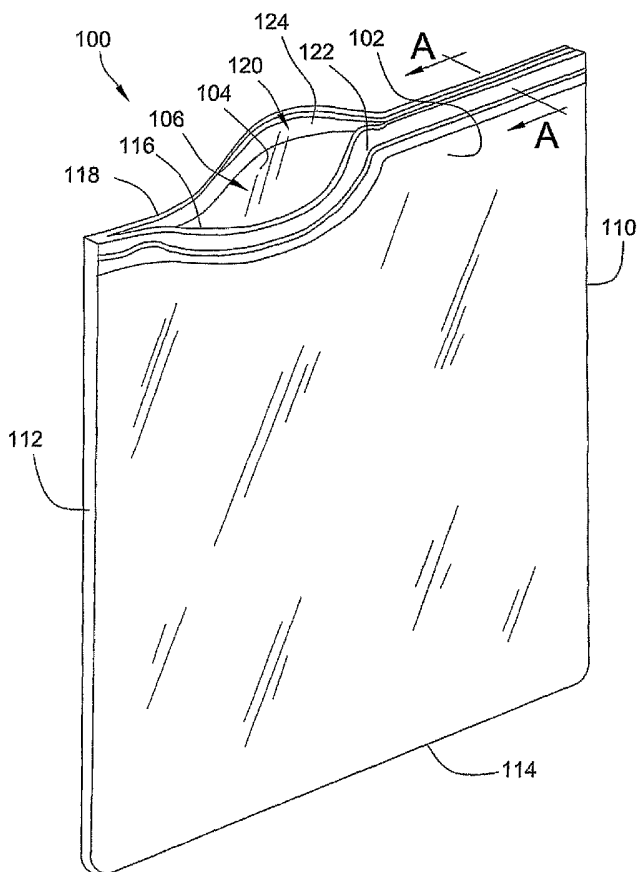
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[Continued on next page]

(54) Title: CLOSURE DEVICE FOR STORAGE BAG



(57) Abstract: A closure element is used for closing an opening disposed through the flexible sidewall of a storage bag such as those used to store food items. Storage bags of this type provide an internal volume accessible via the opening. The closure element includes a first fastening strip and an interlocking second closure strip. The first and second fastening strips include complementary, engagable first and second closure profiles. To hermetically seal the internal volume, at least a portion of the first or second fastening strip can include a sealant. The sealant can be a displaceable fluid, fluid-like substance, or wax-like substance such as an oil or a gel. When the closure profiles are engaged, the sealant provides an air tight barrier sealing the internal volume.



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CLOSURE DEVICE FOR STORAGE BAG

FIELD OF THE INVENTION

[0001] The invention relates generally to storage containers and more particularly to flexible storage bags configured with closure devices such as interlocking fastening strips. The invention finds particular applicability in the field of food storage.

BACKGROUND OF THE INVENTION

[0002] Storage bags are commonly used for a variety of purposes including, for example, storing food items. Such storage bags are typically made from a low cost, pliable thermoplastic material that provides an internal volume into which the food items can be inserted. To access the internal volume, the storage bags are typically formed with an opening. Furthermore, to preserve the food items and to otherwise prevent the contents from spilling out of the bag, the storage bag may also include a closure device that comprises interlocking fastening strips for closing the opening. In order to preserve food items, it is also known to provide storage bags with one-way valve elements or similar devices for evacuating the internal volume after interlocking the closure device.

[0003] As will be apparent to those of skill in the art, interlocking fastening strips are typically formed as elongated strips of semi-rigid, thermoplastic material and are provided as opposing pairs disposed along the opposite edges of the opening. Formed along the length of each strip are engagable closure profiles that are adapted to engage or mate with the corresponding profile formed on the opposing fastening strip. To allow for repeated access to the internal volume, the closure profiles are commonly configured to releasably and repeatedly engage each other.

[0004] Because of the semi-rigid characteristic of the fastening strip material and because of variations in alignment between and shape of the closure profiles, engagement between the interlocking fastening strips is often not perfect. Leak paths or crevices may form between the closure profiles that allow for environmental air to pass into the internal volume. Additionally, the leak paths also allow for aromatic gases or liquids stored inside the internal volume to escape. Moreover, in those embodiments which include one-way valve elements or similar devices for evacuation, the leak paths may prevent the storage bag from maintaining the interior volume in an evacuated state.

BRIEF SUMMARY OF THE INVENTION

[0005] The invention provides interlocking fastening strips for a storage bag that are adapted to hermetically seal the opening disposed in the bag. To provide the hermetic seal, a sealant is included on or in at least one of the closure profiles formed on the interlocking fastening strips. The sealant can be a viscous liquid or semi-liquid substance such as an oil, gel, or wax. When the fastening strips are pressed together to engage the closure profiles, the sealant displaces or flows to close or fill any voids or leak paths existing between the closure profiles. The sealant thereby provides an adaptable barrier between the engagable closure profiles.

[0006] An advantage of the invention is that it provides a low-cost hermetic or airtight seal for use with flexible storage bags. Another advantage is that the displaceable sealant may allow for multiple repeated uses of the storage bag by displacing so as to recreate the seal during each use. Yet another advantage is that the invention may simplify manufacture by allowing reduced precision and accuracy in forming or shaping the profiles. These and other advantages and features of the invention will be apparent from the detailed description and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figure 1 is a front perspective view of a storage bag having a closure element in the form of interlocking fastening strips designed in accordance with the teachings of the invention.

[0008] Figure 2 is a cross-sectional view taken along line A-A of Figure 1 illustrating the interlocking fastening strips including sealant in an unengaged arrangement.

[0009] Figure 3 is a cross-sectional view taken along line A-A of Figure 1 illustrating the interlocking fastening strips including sealant in an engaged arrangement.

[0010] Figure 4 is a cross-sectional view taken along line A-A of Figure 1 illustrating another embodiment of the interlocking fastening strips including sealant in an engaged arrangement, the sealant being disposed on only one strip.

[0011] Figure 5 is a cross-sectional view taken along line A-A of Figure 1 illustrating another embodiment of the interlocking fastening strips including sealant in an engaged arrangement, the sealant being disposed on only one strip.

[0012] Figure 6 is a cross-sectional view taken along line A-A of Figure 1 illustrating another embodiment of the interlocking fastening strips including sealant in an engaged arrangement, the sealant being disposed on only one strip.

[0013] Figure 7 is a cross-sectional view taken along line A-A of Figure 1 illustrating another embodiment of the interlocking fastening strips including sealant in an engaged arrangement, the sealant being disposed as a film on the surface of the fastening strips.

[0014] Figure 8 is a detailed view taken of the area indicated in Figure 7 showing the sealant disposed in capillaries formed in the surface of the interlocking fastening strips.

[0015] Figure 9 is a cross-sectional view taken along line A-A of Figure 1 illustrating another "profile" embodiment of the fastening strips including sealant in an engaged arrangement.

[0016] Figure 10 is a cross-sectional view taken along line A-A of Figure 1 illustrating another "arrow-head" or "rib and groove" embodiment of the fastening strips including sealant in an engaged arrangement.

[0017] Figure 11 is a front perspective view of another embodiment of the storage bag designed in accordance with the teachings of the invention including a slider and a one-way valve element along with a nozzle connected to an evacuation device.

[0018] Figure 12 is a cross-sectional view taken along line B-B of Figure 11 illustrating a "rolling action" embodiment of the fastening strip including sealant in an engaged arrangement.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] Now referring to the drawings, wherein like reference numbers refer to like elements, there is illustrated in FIG. 1 an exemplary flexible storage bag 100 of the type typically used for storing food items. The storage bag includes a first sidewall 102 and an opposing second sidewall 104 overlaying and joined to the first sidewall to provide an internal volume 106. The first and second sidewalls 102, 104 can be made from webs of pliable thermoplastic material. Examples of suitable thermoplastic material include polyethylene (PE), high density polyethylene (HDPE), low density polyethylene (LDPE), linear low density polyethylene (LLDPE), polypropylene (PP), ethylene vinyl acetate (EVA), nylon, polyester, polyamide, ethylene vinyl alcohol, and can be formed in single or multiple layers. The thermoplastic material can be transparent, translucent, opaque, or tinted. Furthermore, the material used for the sidewalls can be a gas impermeable material.

[0020] The first and second sidewalls 102, 104 are joined together along a first side edge 110, a parallel second side edge 112, and a closed bottom edge 114 by, for example, a heat sealing operation. To access the internal volume 106, the top edge 116 of the first side wall 102 and the corresponding top edge 118 of the second sidewall 104 remain un-joined to provide an opening 120. Due to the four orthogonal edges, the illustrated storage bag 100 has a rectangular shape. However, it will be appreciated in other embodiments that the bag can have any suitable shape resulting from any number of sidewalls and edges.

[0021] To close the opening 120, a closure device including a first fastening strip 122 and an interlocking second fastening strip 124 are provided. The elongated fastening strips 122, 124 can be formed by extruding a semi-rigid thermoplastic material that demonstrates resilient characteristics. The first and second fastening strips 122, 124 are attached to an inner surface of the respective first and second sidewalls 102, 104 proximate the respective top edges 116, 118 and extend from the first side edge 110 to the second side edge 112. To attach the fastening strips, adhesive or a heat sealing operation can be utilized.

[0022] To enable the first and second fastening strips 122, 124 to interlock, there is formed continuously along the length of each strip a respective first and second closure profile 130, 132. As will be appreciated by those of skill in the art, the first and second closure profiles 130, 132 have a complementary shape such that they can engage or mate with each other in an interlocking manner. When so engaged, the complementary closure profiles function to hold the first and second top edges 116, 118 adjacent to each other to close the opening 120. To allow for repeated access to the internal volume 106, the fastening strips 122, 124 are desirably configured to releasably interlock with each other.

[0023] In accordance with an aspect of the invention, to improve the seal established by the engaged closure profiles, a sealant is applied to the interlocking fastening strips. The sealant can be a viscous fluid, a fluid-like substance, a wax-like substance, or other similar material. A typical characteristic of such materials is that they do not cure or set and therefore remain flowable or displaceable. When the closure profiles engage, the sealant displaces to fill or close crevices or other leak paths that may exist between the semi-rigid closure profiles due to imperfections or misalignment. Thus, the sealant provides an airtight or hermetic seal of the internal volume. The sealant should have a density and viscosity greater than the air or gas that is both contained in the storage bag and in the surrounding environment. Examples of suitable sealant material include silicone oil, mineral oil, monoglycerides, fatty acids,

polybutenes, petroleum jelly, and silicone gel. In those embodiments in which the invention is used with bags intended for storing food items, it is desirable that the sealant qualify as a food grade material.

[0024] One example of interlocking fastening strips designed in accordance with the invention is illustrated in FIG. 2. The illustrated fastening strips 122, 124 are commonly known as "U-channel" style fastening strips. The first fastening strip 122 is formed with a male closure profile 130 that projects from a flat base member 140 that is adapted to be attached to an inner surface of the first sidewall. The projecting male closure profile 130 includes first and second projections 142, 144 that are parallel to and spaced-apart from each other a first distance. Formed at the distal tip of each projection 142, 144 are respective first and second hooks or barbs 146, 148 that are generally directed back toward the base member 140. Moreover, the barbs 146, 148 are directed oppositely or away from each other. The distal most surface of the barbs 146, 148 are generally shaped or rounded to provide respective first and second guide surfaces 150, 152. It will be appreciated that the male closure profile 130 including the first and second projections 142, 144 extends substantially over the entire length of the first fastening strip 122.

[0025] The second fastening strip 124 of the pair illustrated in FIG. 2 is formed as a female closure profile 132 that likewise projects from a flat base member 160 adapted to be attached to an inner surface of the second sidewall. The projecting female closure profile 132 includes first and second projections 162, 164 that are parallel to and spaced-apart from each other a second distance. The second distance should be slightly greater than the first distance so that the female closure profile 132 is adapted to receive the projections 142, 144 of the male closure profile 130. Formed at the distal tip of each projection 162, 164 of the female closure profile 132 are respective first and second hooks or barbs 166, 168 that are generally directed back toward the base member 160. Furthermore, the barbs 166, 168 are facing and directed towards each other. The distal most surface of the barbs 166, 168 are generally shaped or rounded to provide respective first and second guide surfaces 170, 172. Additionally, the female closure profile 132 also includes a flange 174 projecting from the base member 160 approximately midway between the first and second projections 162, 166 that extends to approximately the same height as the first and second projections. It will be appreciated that the female closure profile 132 including the first and second projections 162, 164 extends substantially over the entire length of the second fastening strip 124.

[0026] On the male closure profile 130, sealant 136 is deposited into the three-sided gap or channel existing between the first and second projections 142, 144 and the base member 140. Sealant 136 is likewise deposited on the female closure profile 132 into the gap created between the first projection 162 and the flange 174 and between the flange and the second projection 164. In the illustrated embodiment, the sealant should be sufficiently viscous so that it remains in the closure profiles and does not otherwise freely flow out of the gaps.

[0027] To engage the male and female closure profiles 130, 132 as illustrated in FIG. 3, the first and second interlocking fastening strips 122, 124 are pressed toward each other until the guide surface 150, 152 on the male projections 142, 144 contact the guide surfaces 170, 172 on the female projections 160, 162. Due to the semi-rigid characteristic of the fastening strip material, contact between the guide surfaces causes the male projections 142, 144 to flex inwardly and the female projections 162, 164 to flex outwardly. The barbs 146, 148 on the male projections 142, 144 and the barbs 166, 168 on the female projections 162, 164 can thereby slide past each other. Once past each other, the resilient characteristic of the fastening strip material cause the male and female projections to flex back moving the barbs into an interlocking engagement with each other. Because of the semi-rigid and resilient characteristics of the fastening strip material, a sufficient, oppositely applied pulling force can disengage the male and female closure profiles.

[0028] Referring to FIG. 3, when the male and female closure profiles 132, 134 are thus engaged, the sealant 136 disposed on the male closure profile contacts and interacts with the sealant disposed on the female profile. The sealant thereby provides an airtight barrier or seal across the closure profiles. The provided seal is further facilitated by the flange 174 that is inserted into the sealant 136 deposited into the gap between the male projections 142, 144. Moreover, the sealant 136 can displace or wick via capillary action into crevices or leak paths between the engaged barbs.

[0029] In other embodiments, the sealant need not be provided on both the first and second fastening strips. For example, referring to FIG. 4, the sealant 136 is only provided on the male closure profile 130 between the first and second projections 142, 144 of the first fastening strip 122. When the first and second "U-channel" style fastening strips 122, 124 are pressed together, the flange 174 of the female closure profile 132 is inserted into the sealant 136 to provide the air tight barrier preventing air or other fluids or gases from leaking into or out of the internal volume of the storage bag.

[0030] Referring to FIG. 5, the sealant 136 is only provided on the female closure profile 132 in between the gaps provided by the first and second projections 162, 164 and the flange 174. When the first and second "U-channel" style fastening strips 122, 124 are pressed together, the guide surfaces 150, 152 of the male projections 142, 144 are pressed into the sealant 136 thereby providing the hermetic barrier preventing air or other fluids or gases from leaking into or out of the internal volume of the storage bag. Moreover, the sealant 136 can displace or wick by capillary action into crevices or leak paths between the engaged barbs.

[0031] In other embodiments, the sealant can be located in other areas besides the closure profiles. For example, referring to FIG. 6, in addition to the male closure profile 130, the first fastening strip 122 can include a first flange 176 and a spaced-apart second flange 178 projecting from the flat base member 140. The flanges 176, 178 are located on opposite sides of and spaced-apart from the male profile 130 and extend substantially along the length of the first fastening strip 122. The spacing provides a gap between the first flange 176 and the first male projection 142 and another gap between the second flange 178 and the second male projection 144 into which sealant 136 can be deposited. When the first and second fastening strips 122, 124 are pressed together, the first and second projections 162, 164 of the female closure profile 132 can move around the respective first and second projections 142, 144 of the male closure profile 130 to contact the sealant 136, thereby providing the airtight barrier preventing air from leaking into or out of the internal volume.

[0032] Referring to FIG. 7, there is illustrated another embodiment of the "U-channel" style fastening strips where the sealant is disposed on the surfaces of the male and female closure profiles 130, 132. Specifically, sealant 136 is disposed on the surfaces of both the male projections 142, 144 and the female projections 162, 164. The sealant 136 is preferably a gel or viscous oil such that the sealant remains in place as a film on the surfaces of the closure profiles. When the first and second fastening strips 122, 124 are pressed together, the sealant 136 on the male profile 130 contacts and interacts with the sealant on the female profile 132 thereby providing the hermetic barrier. Moreover, sealant can creep or wick via capillary action into crevices or leak paths that exist between the engaged barbs. In other embodiments, sealant may be disposed only on the surface of the male closure profile or only on the surface of the female closure profile.

[0033] In other embodiments, the sealant can be impregnated into the material of the closure profiles. Referring to FIG. 8, in an aspect, to impregnate the closure profiles with sealant 136, a plurality of capillaries 180 can be disposed into unengaged

closure profiles. The capillaries 180 can be formed as small grooves or channels disposed along the surface of the closure profiles 130, 132. Sealant 136 is then received into the capillaries 180 by any suitable method. During engagement, when the first and second fastening strips are pressed together, the flexing that the male and female closure profiles undergo to accommodate each other causes sealant 136 to be excreted from the capillaries 180. The sealant can thereafter displace or wick via capillary action to fill or close crevices or leak paths between the engaged closure profiles. In other embodiments, the capillaries can be formed as a plurality of small diameter bores or worm-holes disposed into the material of the closure profiles by, for example, etching. The closure profiles can then be impregnated by receiving sealant into the capillaries.

[0034] In another aspect, to impregnate the closure profiles with sealant, the sealant can be blended into the material of the closure profile itself. Distortion of the male and female closure profiles during engagement will cause the sealant to bloom to the surfaces of the closure profiles where the sealant can displace or wick to fill or close leak paths.

[0035] The invention, including those embodiments in which the sealant is provided by deposit into gaps, as a film, in capillaries, or as blended into the closure profile material, can be utilized with a variety of different interlocking fastening strips. For example, illustrated in FIG. 9 is a cross-sectional view of "profile" style interlocking fastening strips such as those disclosed and described in U.S. Patent 5,664,299, herein incorporated by reference in its entirety. The interlocking fastening strips 222, 224 of the "profile" style include a first closure profile 230 projecting from a base member 240 of the first fastening strip 222 adapted to engage a corresponding second closure profile 232 projecting from a base member 260 of the second fastening strip 234.

[0036] The first closure profile 230 includes a first pair of projections 242, 244 that are parallel and spaced-apart from each other a first distance. Formed on the distal ends of each of the first projections 242, 244 are respective first hook-like barbs 246, 248 which are pointed generally back toward the base member 240. Moreover, the projections are shaped so that the barbs are arranged in the same direction. The distal most surface of the first projections are generally rounded or shaped to provide first guide surfaces 250, 252.

[0037] The second closure profile 232 also includes a pair of second projections 262, 264 that are parallel and spaced-apart from each other a second distance. The second distance between the second projections 262, 264 dimensionally corresponds to

the first distance between the first projections 242, 244. Formed on the distal ends of the second projections 262, 264 are respective second hook-like barbs 266, 268 which are generally pointed back toward the base member 240. Moreover, the second projections 262, 264 are shaped so that the second barbs are arranged in the same direction and opposite the direction of the first barbs 246, 248. The distal most surfaces of the second projections are generally rounded or shaped to provide second guide surfaces 270, 272.

[0038] In the illustrated embodiment of the "profile" fastening strips 222, 224, sealant 236 can be disposed on the first strip in the gap created between the spaced-apart first projections 242, 244 and the first base member 240. Likewise, sealant 236 can also be disposed on the second strip in the gap created between the spaced-apart second projections 262, 266 and the second base member 260. The particular sealant 236 may be viscous enough to remain located in the closure profiles 232, 236 and not freely leak from the gaps.

[0039] To engage the first and second closure profiles of FIG. 9, the first and second fastening strips 222, 224 are pressed together so that the first projections 242, 244 abut the correspondingly spaced-apart second projections 262, 264. Particularly, the first guide surfaces 250, 252 contact the second guide surfaces 270, 272 causing the first projections 242, 244 and second projections 262, 264 to flex such that the first barbs 246, 248 and oppositely directed second barbs 266, 268 slide about each other and engage. When so engaged, the sealant 236 located between both the first projections 242, 244 and the second projections 262, 264 contacts and interacts to provide the hermetic barrier between the interlocking fastening strips. Moreover, the sealant 236 can displace to fill or close leak paths existing between the engaged barbs.

[0040] Referring to FIG. 9, separately or in addition to providing the sealant in the gaps between the projections, sealant may be provided as a film, in capillaries, or blended into the material of the closure profiles of the "profile" style interlocking fastening strips. In addition, the sealant can be provided on either or both of the closure profiles.

[0041] Referring to FIG. 10, there is illustrated in cross-section an "arrow-head" or "rib and groove" style fastening strips 322, 324 such as those disclosed in U.S. Patent 3,806,998, herein incorporated by reference in its entirety. Fastening strips of the "arrow-head" style include a first fastening strip 322 that has a projecting head portion 342 extending from a flat base member 340. The head portion includes a mushroom-shaped head 344 that is located at the end of a reduced neck portion 346 that is connected to the base member 340. The projecting head portion 342 is receivable in a

corresponding C-shaped groove portion 362 formed along a second flat bag member 360. Through this arrangement, the fastening strips 322, 324 are adapted to be interlockingly engaged when pressed together and separated by being forcibly pulled apart.

[0042] In the illustrated embodiment of the "arrow-head" type fastening strips, sealant 336 can be deposited in the groove portion 362. Hence, inserting the projecting head portion 342 into the groove portion 362 simultaneously causes the displaceable sealant 336 to flow around the head portion thereby providing the hermetic barrier between the engaged fastening strips 322, 324.

[0043] Referring to FIG. 10, separately or in addition to providing the sealant in the gaps between the projections, sealant may be provided as a film, in capillaries, or blended into the material of the closure profiles of the "profile" style interlocking fastening strips.

[0044] Referring to FIG. 11, there is illustrated another embodiment of a storage bag designed in accordance with the teachings of the invention. The illustrated storage bag 400 includes a pliable first sidewall 402 overlaid and joined to a second sidewall 404 to provide an internal volume 406. To access the internal volume 406, the respective first and second top edges 416, 418 of the first and second sidewalls 402, 404 remain un-joined to provide an opening 420. To close the opening 420, first and second interlocking fastening strips 422, 424 are attached proximate the respective top edges 416, 418. In the particular storage bag 400 illustrated in FIG. 11, to occlude and de-occlude the fastening strips 416, 418, the storage bag 400 includes a slider 426. The slider 426 is a generally U-shaped structure that straddles the top edges 416, 418 of the sidewalls 402, 404. Moving the slider 426 along the top edges 416, 418 engages or disengages the interlocking fastening strips 422, 424.

[0045] In addition to including the slider 426, the storage bag 400 illustrated in FIG. 11 includes a one-valve element 427 for removing latent air from the storage bag. The one-way valve element 427 is attached to the first sidewall 402 and communicates with the internal volume 406. To evacuate the internal volume 406 via the one-way valve element 427, a nozzle 428 connected to a vacuum source 429 can be placed against the valve element or against the first sidewall 402 about the valve element and activated. The vacuum source connected to the nozzle 428 can be any suitable vacuum source including, for example, hand-operated pumps, mechanical pumps, water aspirators, oral suction, and the like. In other embodiments, latent air can be evacuated by pressing the sidewalls 402, 404 together.

[0046] The interlocking fastening strips 422, 424 may be of the "rolling action" style as illustrated in FIG. 12 and described in U.S. Patent 5,007,143, herein incorporated by reference in its entirety. The strips 422, 424 include profiled tracks 430 and 432 extending along the length thereof parallel to rib and groove elements 436 and 438. The rib and groove elements 436, 438 have complementary cross-sectional shapes such that they are closed by pressing the bottom of the elements together first and then rolling the elements to a closed position toward the top thereof. The rib element 436 is hook shaped and projects from the inner face of strip 422. The complementary groove element 438 includes a lower hook shaped projection 440 and a relatively straight projection 442 which extend from the inner face of the second strip 424. Sealant 434 can be received and held in the groove element 438 as described above. The profiled tracks 430, 432 are inclined inwardly toward each other from their respective strips 422, 424.

[0047] The straddling slider 428 comprises an inverted U-shaped plastic member having a back 450 for moving along the top edges of the tracks 430, 432 and with two parallel side walls 452, 454 depending therefrom for cooperating with the tracks and extending from an opening end of the slider to a closing end. A separator finger 456 depends from the back 450 between the side walls 452, 454 and is inserted between the inclined tracks 430, 432. The slider 428 has shoulders 458, 460 projecting inwardly from the depending side walls 452, 454 which are shaped throughout the length thereof for cooperation with the depending separator finger 456 in creating the rolling action in opening and closing the reclosable interlocking rib and groove profile elements 436, 438. Inserting the rib 436 into the groove 438 simultaneously causes the displaceable sealant 434 to flow around the rib thereby providing the hermetic barrier between the engaged fastening strips 422, 424. Furthermore, in those embodiments in which the storage bag 400 includes a valve element 427 for evacuating the internal volume 406, the sealant can help maintain the storage bag in an evacuated state.

[0048] Referring to FIG. 12, separately or in addition to providing the sealant in the groove element 436, sealant may be provided as a film, in capillaries, or blended into the material of the closure profiles of the "rolling action" style interlocking fastening strips.

[0049] Thus, the invention provides a closure device for a storage bag that includes releasably interlocking fastening strips. To provide an air-tight seal, a sealant is included on at least a portion of the fastening strips. The sealant can be a viscous fluid, fluid-like substance, or a wax-like substance. In addition to providing an airtight seal,

the sealant can prevent air from entering the internal volume after evacuation, thereby helping to preserve food items contained in the storage bag.

[0050] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein.

[0051] The use of the terms “a” and “an” and “the” and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms “comprising,” “having,” “including,” and “containing” are to be construed as open-ended terms (i.e., meaning “including, but not limited to,”) unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., “such as”) provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0052] Preferred embodiments of this invention are described herein, including the best mode known to the inventor(s) for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventor(s) expect skilled artisans to employ such variations as appropriate, and the inventor(s) intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

CLAIM(S):

1. 1. A closure device comprising:
a first interlocking fastening strip including a first closure profile extending substantially along the length of the first fastening strip;
a second interlocking fastening strip including a second closure profile extending substantially along the length of the second fastening strip, the first and second closure profiles engagable to interlock the first and second fastening strips;
wherein at least a portion of the first closure profile includes a sealant.
2. The closure device of Claim 1, wherein at least a portion of the second closure profile includes a sealant.
3. The closure device of Claim 1, wherein the sealant is disposed on a surface of the first closure profile.
4. The closure device of Claim 1, wherein the sealant is impregnated in the first closure profile.
5. The closure device of Claim 4, wherein the sealant is received in capillaries disposed into the first closure profile.
6. The closure device of Claim 4, wherein the sealant is blended into the material of the first closure profile.
7. The closure device of Claim 1, wherein the sealant is an oil.
8. The closure device of Claim 1, wherein the sealant is a gel.
9. The closure device of Claim 1, wherein the sealant is selected from the group consisting of silicone oil, mineral oil, monoglycerides, fatty acids, polybutenes, petroleum jelly, and silicone gel.
10. The closure device of Claim 1, wherein the fastening strips comprise U-channel style fastening strips.

11. The closure device of Claim 1, wherein the fastening strips comprise arrowhead style fastening strips.
12. The closure device of Claim 1, wherein the fastening strips comprise profile style fastening strips.
13. The closure device of Claim 1, wherein the closure device further includes a slider movably disposed on the fastening strips.
14. A flexible storage bag comprising:
 - a first pliable sidewall;
 - a second pliable sidewall overlaying and joined to the first sidewall to provide an internal volume, the internal volume accessible via an opening disposed between the first and second sidewalls;
 - a first interlocking fastening strip attached to the first sidewall proximate the opening, the first fastening strip including a first closure profile;
 - a second interlocking fastening strip attached to the second sidewall proximate the opening, the second fastening strip including a second closure profile engagable with the first closure profile; and
 - a sealant disposed on at least a portion of the first closure profile.
15. The storage bag of Claim 14, wherein the sealant is disposed on a surface of the first closure profile.
16. The storage bag of Claim 14, wherein the sealant is impregnated in the first closure profile.
17. The storage bag of Claim 14, wherein the sealant is an oil.
18. The storage bag of Claim 14, wherein the sealant is a gel.
19. The storage bag of Claim 14, wherein the sealant is selected from the group consisting of silicone oil, mineral oil, monoglycerides, fatty acids, polybutenes, petroleum jelly, and silicone gel.
20. The storage bag of claim 14, wherein a valve element is attached to at least one of the first sidewall or the second sidewall.

21. A method of sealing a storage bag comprising:
- (i) providing a storage bag including a pliable sidewall providing an internal volume accessible via an opening, the storage bag further including first and second interlocking fastening strips proximate the opening, the first and second fastening strips including respective engagable first and second closure profiles;
 - (ii) disposing along at least a portion of the first closure profile a sealant;
 - (iii) pressing the first and second fastening strips together to engage the first and second closure profiles; and
 - (iv) sealing the first and second closure profiles against the passage of air with the sealant.
22. The method of Claim 21, wherein the sealant is an oil.
23. The method of Claim 21, wherein the sealant is a gel.
24. The method of Claim 21, wherein the sealant is selected from the group consisting of silicone oil, mineral oil, monoglycerides, fatty acids, polybutenes, petroleum jelly, and silicone gel.
25. The method of Claim 21, wherein the storage bag is further provided with a one-way valve element attached to the sidewall and communicating with the internal volume.

FIG. 1

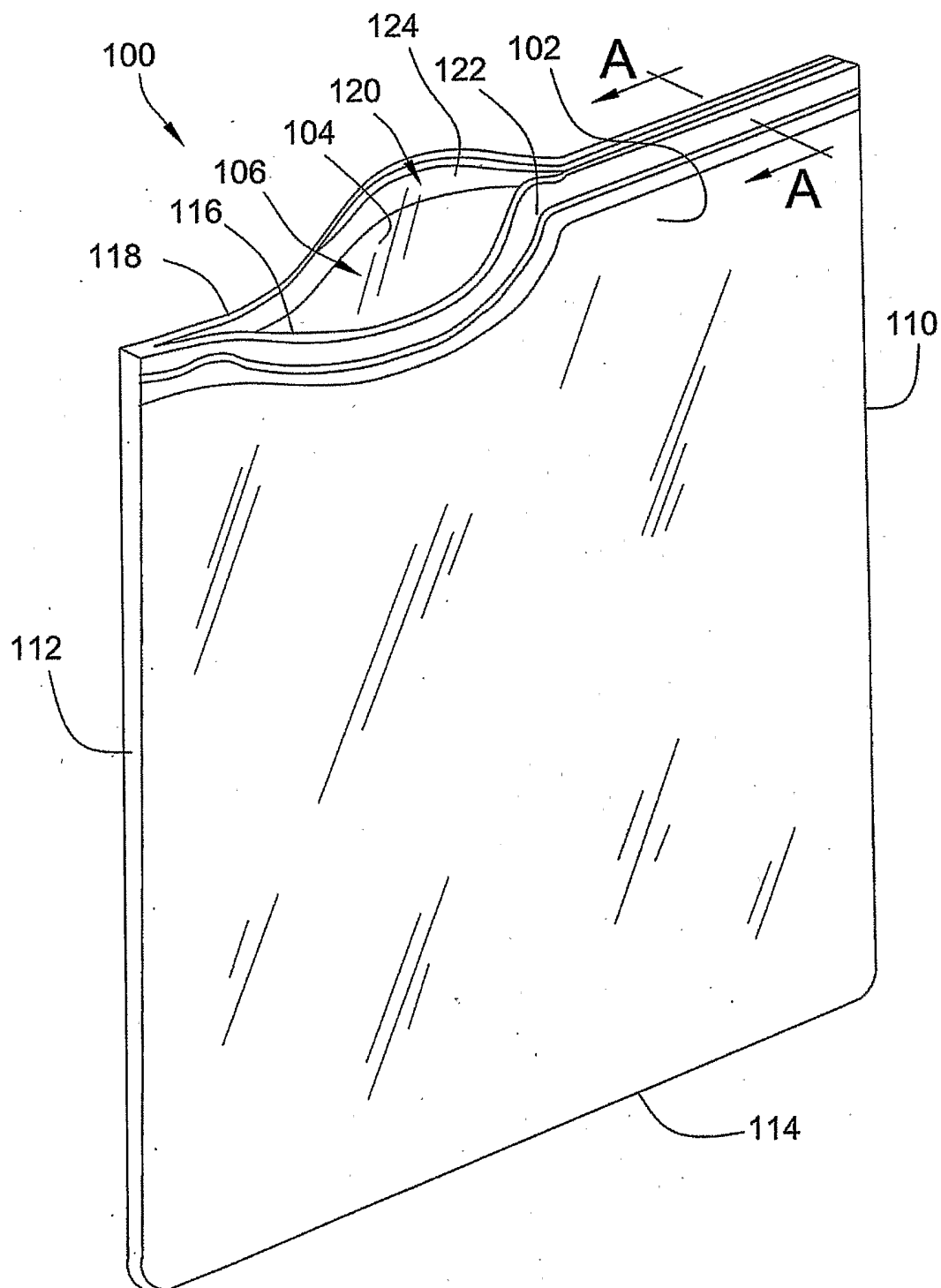


FIG. 3

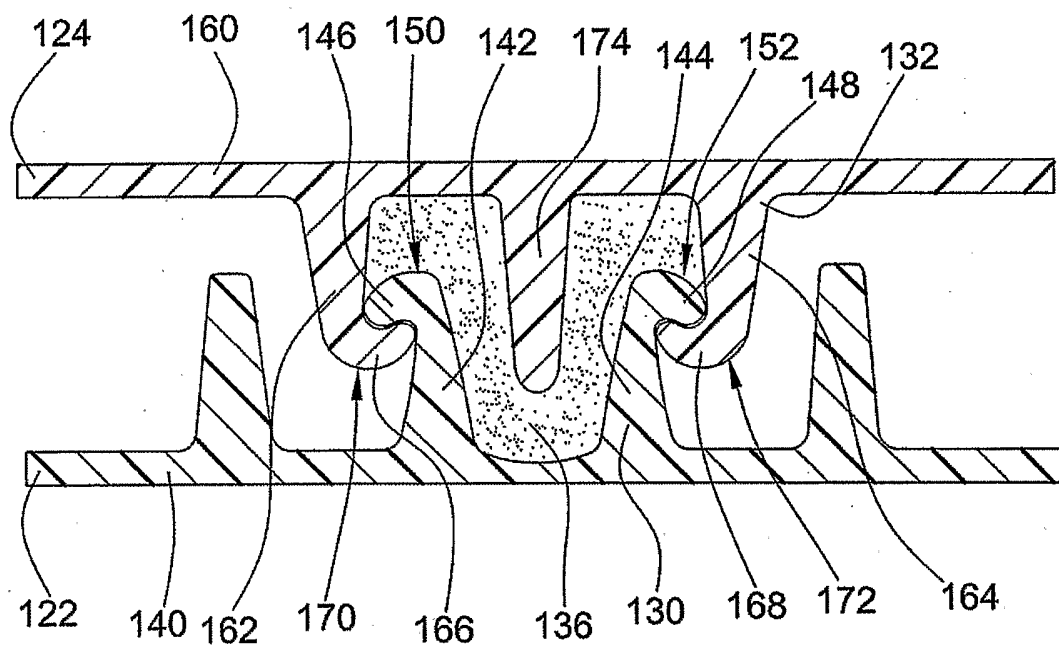


FIG. 4

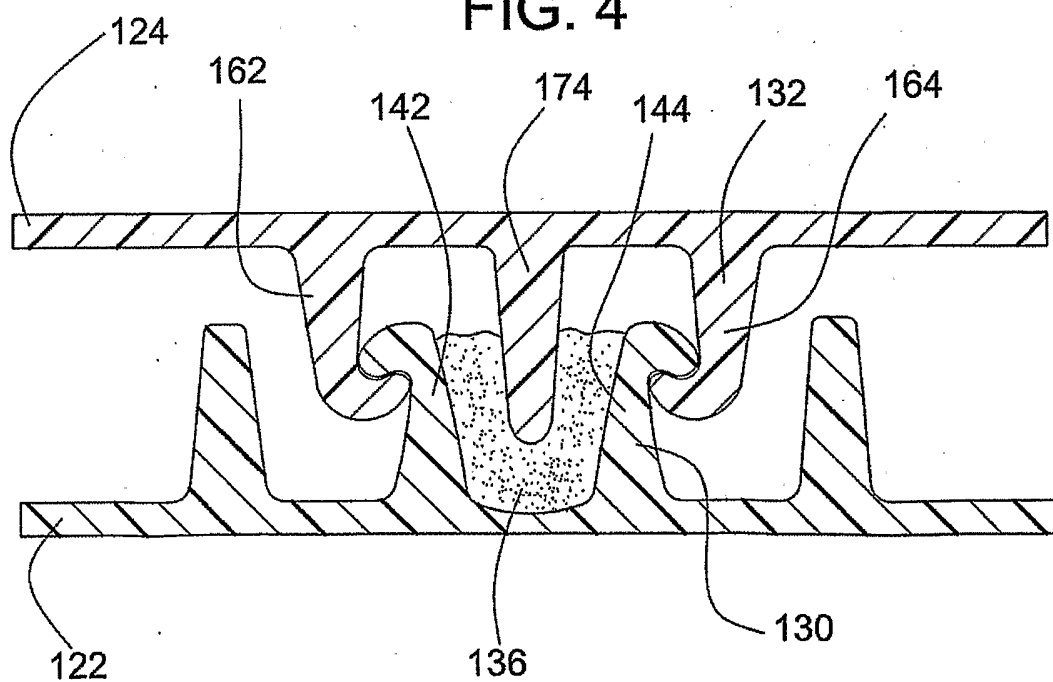


FIG. 5

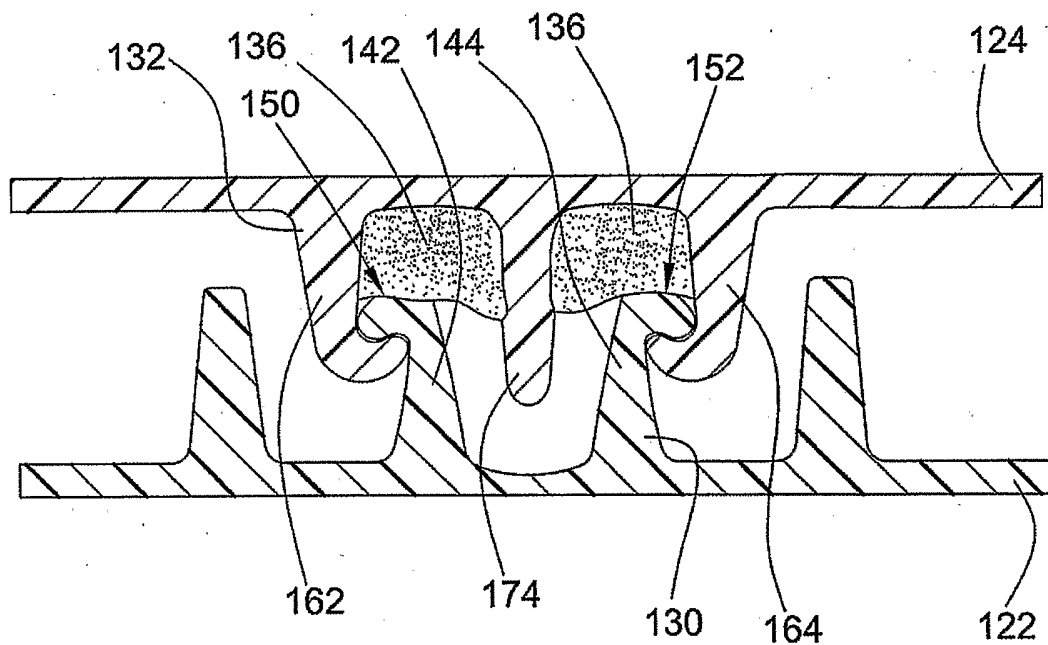


FIG. 6

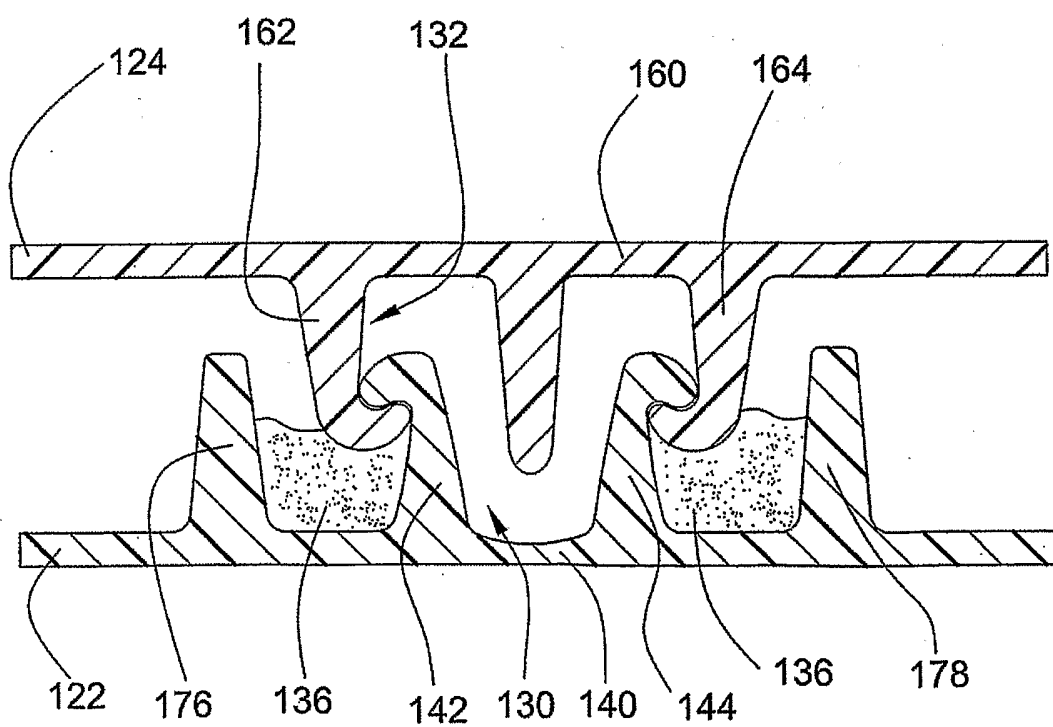


FIG. 7

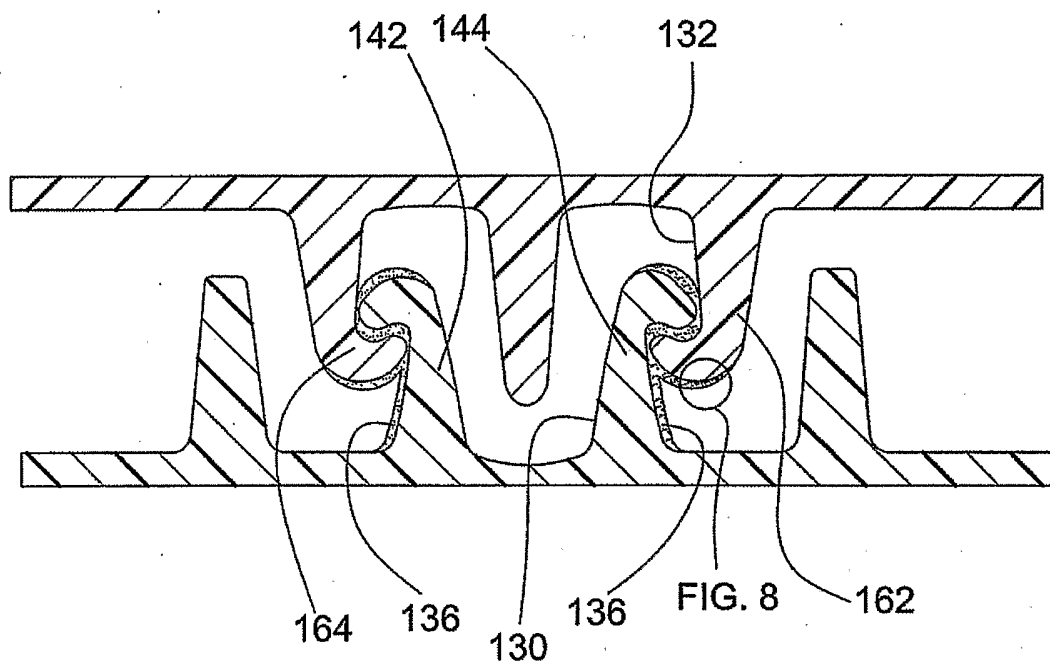


FIG. 8

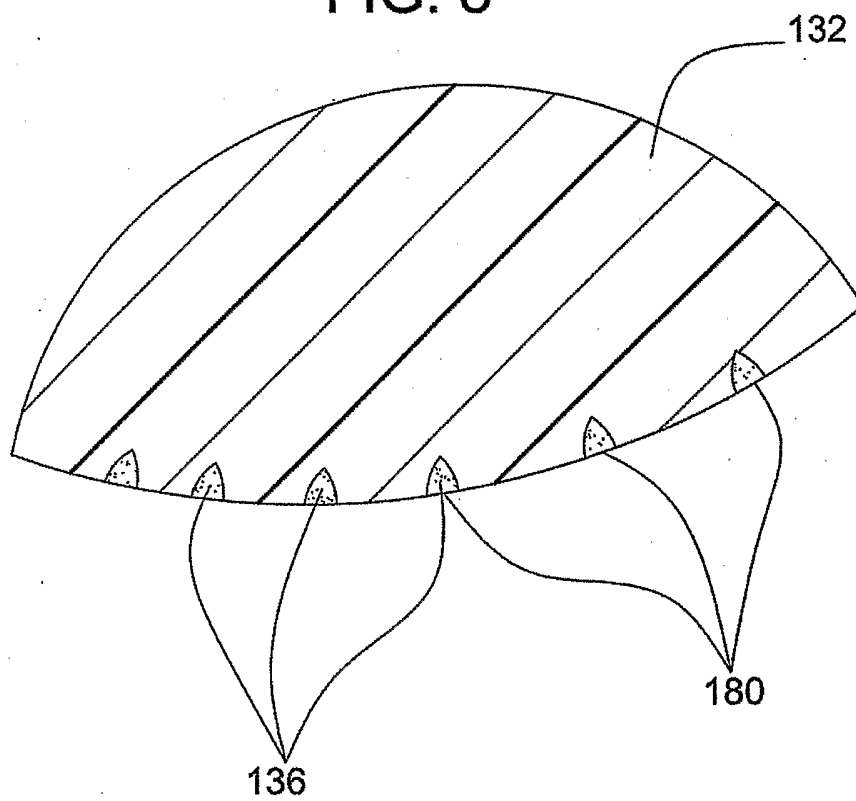


FIG. 9

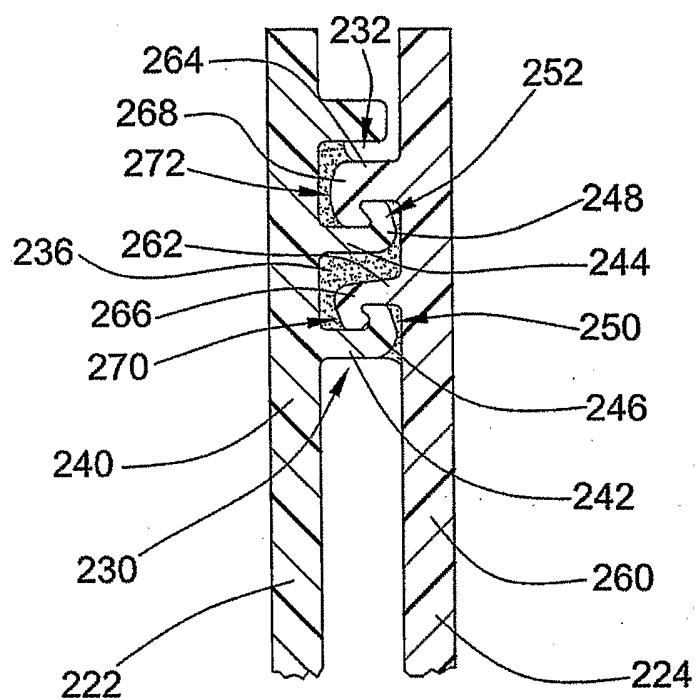


FIG. 10

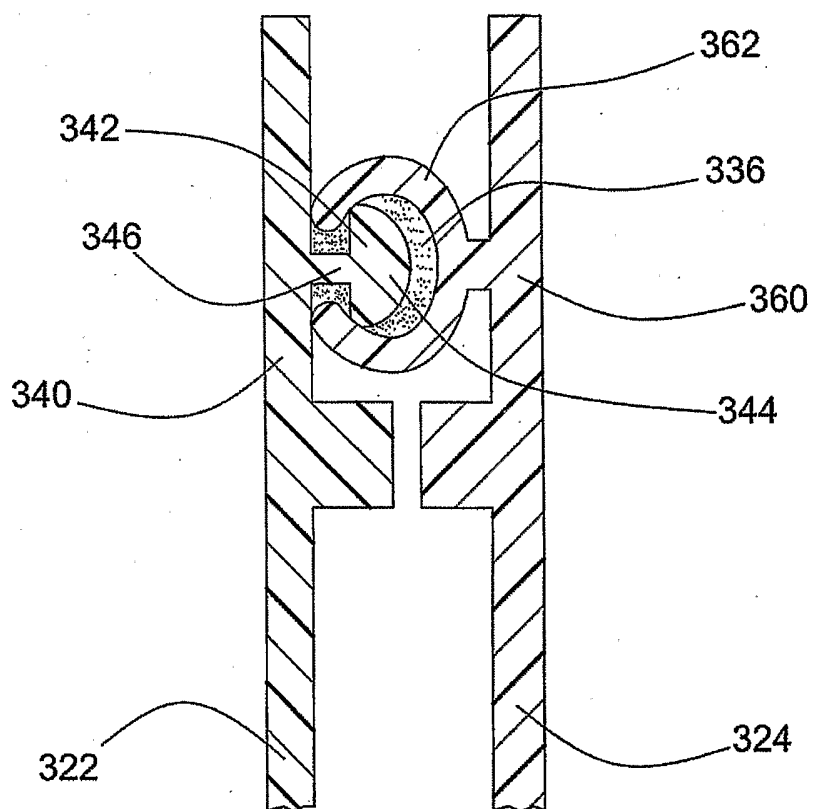


FIG. 11

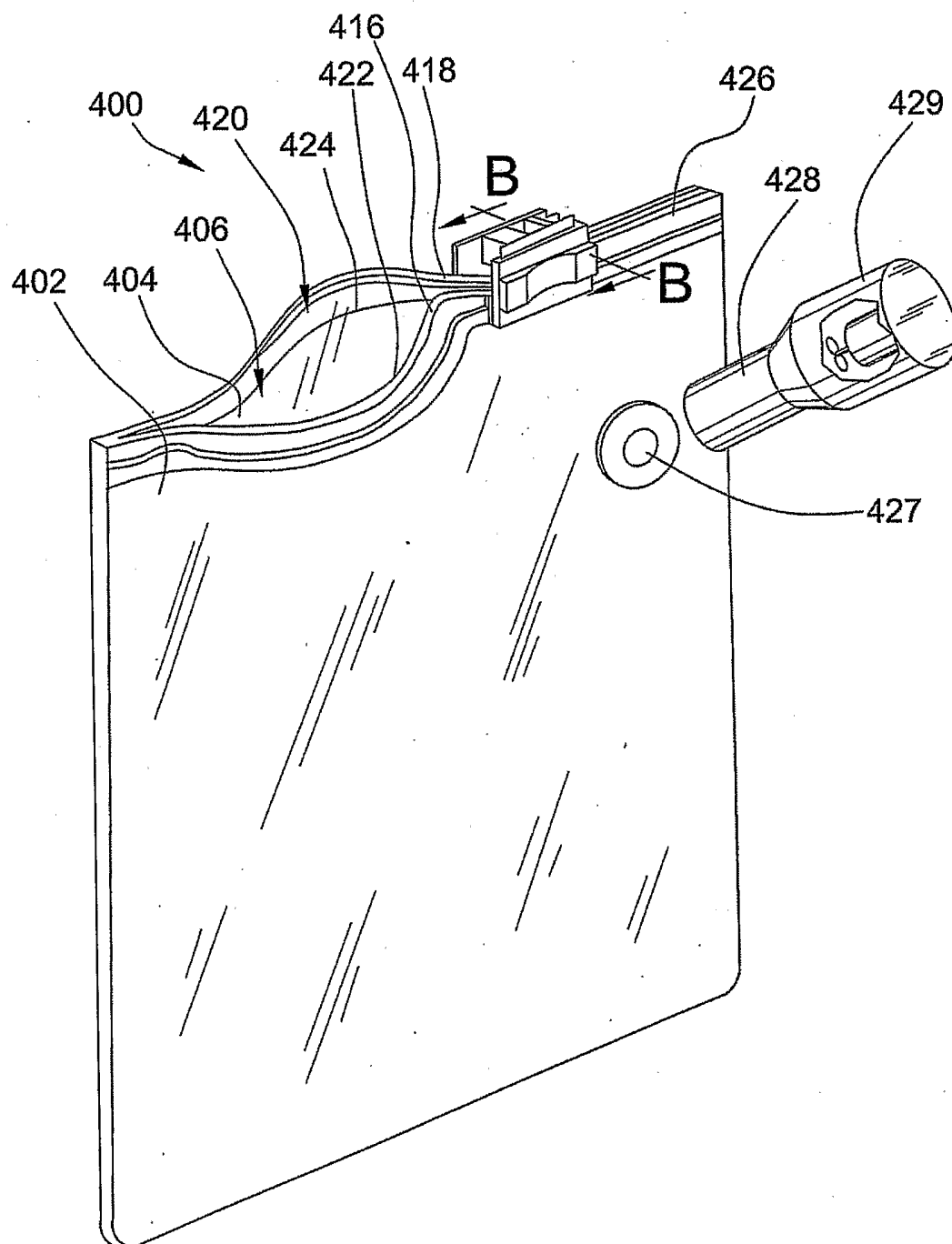


FIG. 12

