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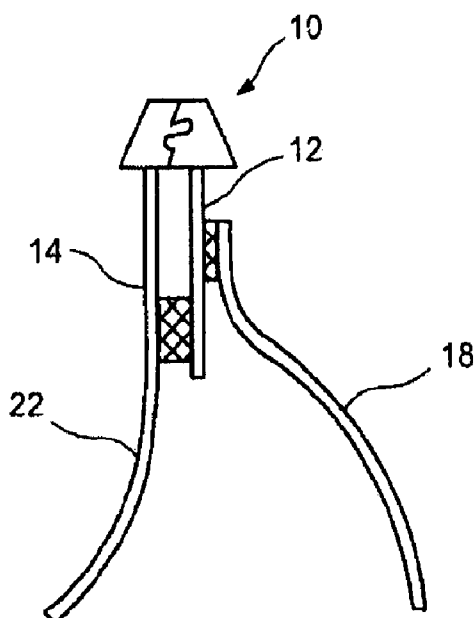


FIG. 13

(57) Abstract: The present disclosure relates to a high burst closure (10) which allows for bottom filling of packages (100), such as large bags, and further provides increased resistance to damage from the dropping or shock loading of the filled package. This is achieved by providing profiles (12,14) that combine an upper portion (16,20) of one profile and its related flange (18,22), so as to form a juncture above a peel seal (24) joining one profile to the other, so that external forces on a package or bag from bottom filling or shock loading are directed toward the juncture thereby causing a shear force against the peel seal (24) or other frangible connection, thereby increasing the resistance of the package to external forces.



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HIGH BURST CLOSURE ASSEMBLY FOR LARGE PACKAGES

This application is a continuation-in-part of application serial no. 11/728,477 filed March 26, 2007 entitled "High Burst Zipper Assembly for Large Reclosable Packages" which claims priority under 35 U.S.C. §119(e) from provisional application serial no. 60/839,447, filed on August 23, 2006, entitled "High Burst Slider Zipper for Large Bags and Method of Manufacture", the contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to closure assemblies for packages which are large bags, particularly closure assemblies which achieve high burst strengths while allowing an easy-to-open configuration, and the methods for manufacture thereof.

Description of the Prior Art

Large packages, bags or pouches, such as those used for pet food, charcoal, cat litter and similar items are typically filled and sealed shut. These packages may be formed by form fill and seal (FFS) or by other methods. Prior attempts to incorporate an easy to use closure mechanism have been unsatisfactory due to the unique requirements of a large bag with a relatively heavy load. In particular, filling from the bottom places all of the load on the closure during filling. This load can cause the closure mechanism to fail and open. Similarly, dropping

a filled bag onto a pallet or similar rough handling during transportation, as well as exposing a bag to elevated temperatures during transportation, can cause the closure mechanism to fail.

The prior art has addressed these deficiencies by folding over the end of the package, particularly a multi-wall package, using an expensive label as tape thereby allowing successful filling and transport. Similarly, the prior art has addressed these deficiencies by using a liner peel seal below the zipper and a solid tear line in the zipper flange to provide a fill and transport system that does not rupture and spill the contents. However, these methods have slow rates of production, as well as increased costs of production, and frequently do not result in a satisfactory product for the consumer.

Some further examples of the prior art which are not entirely satisfactory are found in U.S. Patent No. 6,979,482 entitled "Multiwall Bag with Zipper and Fin" issued on December 27, 2005 to Hartzell et al. and U.S. Patent No. 7,090,904 entitled "Enhanced Slider Zipper Multiwall Bag and Associated Methods" issued On August 15, 2006 to Hartzell et al.

Typical prior tamper-evident zipper assemblies are disclosed in U.S. Patent No. 6,354,738 entitled "Tamper Evident Reclosable Plastic Bag" issued on March 12, 2002 to Buckman et al.; U.S. Patent No. 4,647,063 entitled "Reclosable Bag with Laminated Liner and Method" issued on January 13, 1987 to Sullivan; and U.S. Patent No. 5,509,735 entitled "Closure Arrangement Having a Peelable Seal" issued on April 23, 1996 to May.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a closure assembly for packages, particularly large bags, formed by form fill and seal or other methods, which provides for high burst strength in bottom filling or top filling configurations, to allow the bags to withstand dropping or shock loading without the closure mechanism bursting open, while allowing for an easy to open configuration.

It is therefore a further object of the present invention to provide such a closure assembly without significant increases in manufacturing and related costs.

It is therefore a still further object of the present invention to provide a method of manufacture for a product achieving the above objects.

These and other objects are attained by providing a closure assembly for packages, particularly large bags, with a first profile with a first upper separating portion, a first flange, and an interior flange, and a second profile with a second upper separating portion and a second flange. A peel seal is formed between the lower end of the interior flange and a generally central portion of the second profile. This causes the external forces on a bag from bottom filling or shock loading (or forces from within the bag, typically created when the bag is dropped on its top or side) to be directed towards the junction of the interior flange and the first upper portion, thereby redirecting the peel seal from a peel position to a shear position. As the force required to separate a peel seal in a shear position is several times greater than the force required to separate the peel seal in a peelable position, the load-bearing capacity of the package or bag is increased to meet the requirements previously mentioned.

These and other objects are similarly obtained by providing a closure assembly for a package, particularly large bags, wherein one of the flanges is provided in two segments in a T-configuration, with the intersection of the two segments being above the peel seal.

These and other objects are similarly obtained by providing a closure assembly for a reclosable package, particularly large bags, with a flange connected to the profile above the peel seal.

DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and from the accompanying drawings, wherein:

Figure 1 is a plan view, partially in phantom, of a typical reclosable package incorporating the zipper assembly of the present invention.

Figure 2 is a cross-sectional view along the upper portion of plane 2-2 of Figure 1, showing the cross section of the zipper assembly of the present invention.

Figure 3 is a cross-sectional view along the upper portion of plane 2-2 of Figure 1, showing the cross section of an alternative embodiment of the zipper assembly of the present invention. Additionally, an alternative area of detail is shown with a variation of the alternative embodiment.

Figure 4 is a cross-sectional view along the upper portion of plane 2-2 of Figure 1, showing a cross section of a portion of the package or bag in an unstressed configuration.

Figure 5 is a cross-sectional view along the upper portion of plane 2-2 of Figure 1, showing a cross section of a portion of the package or bag when an internal load (i.e., a force from within the package or bag) is applied thereto.

Figure 6 is a cross-sectional view of the upper portion of plane 2-2 of Figure 1, showing a cross section of a portion of the package or bag and further showing the resultant forces on the zipper assembly when an internal load is applied to the package or bag.

Figure 7 is a cross-sectional view of a first alternative embodiment of the zipper.

Figure 8 is a cross-sectional view of a second alternative embodiment of the zipper.

Figure 9 is a cross-sectional view of a third alternative embodiment of the zipper showing the use of reinforcing ribs on one profile.

Figure 10 is a cross-sectional view of a fourth alternative embodiment of the zipper showing a tamper-evident removable hood.

Figure 11 is a cross-sectional view of a fifth alternative embodiment of the zipper, which substitutes a secondary zipper-type assembly for the peel seal.

Figure 12 is a cross-sectional view of the fifth alternative embodiment of the zipper, shown in a loaded position thereby putting the secondary zipper-type assembly into a shear configuration.

Figure 13 is a cross-sectional view of the zipper profile, prior to attachment to the package or bag walls, and further prior to the stomping of the ends and the insertion of the sliders.

Figure 14 is a perspective view of the zipper profile, prior to attachment to the package or bag walls, and further prior to the stomping of the ends and the insertion of the sliders.

Figure 15 is a plan view of the vacuum device used to spread the flanges of the zipper prior to the adhesive insertion step .

Figure 16 is a cross-sectional view of glue or similar adhesive being inserted onto the interior of the flanges of the zipper.

Figure 17 is a schematic of the processing of the packages or bags after the zipper has been attached.

Figures 17A and 17B are alternative plan views of the sealing of the flange ends of Figure 17.

Figure 18 is a plan view of the reclosable package or bag with the zipper attached thereto.

Figure 19 illustrates a first alternative for manufacturing the zipper.

Figure 20 illustrates a second alternative for manufacturing the zipper.

Figure 21 illustrates a third alternative for manufacturing the zipper.

Figure 22 is a cross-sectional view of a first alternative top-filling embodiment of the zipper.

Figure 23 is a perspective view of the walls of the package, with strips of polyethylene, in preparation for the second alternative top-filling embodiment of the zipper, as shown in Figure 24.

Figure 24 is a cross-sectional view showing the second alternative top-filling embodiment of the zipper attached to the package walls.

Figure 25 is a cross-sectional view showing the third alternative top-filling embodiment of the zipper attached to the package walls.

Figure 26 is a cross-sectional view showing the fourth alternative top-filling embodiment of the zipper attached to the package walls.

Figure 27 is a cross-sectional view of a first embodiment of a high burst closure without a zipper.

Figure 28 is a cross-sectional view of a second embodiment of a high burst closure without a zipper.

Figure 29 is a cross-sectional view of a third embodiment of a high burst closure without a zipper.

Figure 30 is a cross-sectional view of a first variation of the attachment of a high burst closure to package or bag walls.

Figure 31 is a cross-sectional view of a second variation of the attachment of a high burst closure to package or bag walls.

Figure 32 is a cross-sectional view of a third variation of the attachment of a high burst closure to package or bag walls.

Figure 33 is a cross-sectional view of a fourth variation of the attachment of a high burst closure to package or bag walls.

Figure 34 is a cross-sectional view of a high burst closure, including a handle structure as a bag wall extension or similar structure.

Figure 35 is an alternative cross-sectional view of a high burst closure, including a handle structure.

Figure 36 is an alternative cross-sectional view of a high burst closure, including a handle structure implemented as a flange extension.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, one sees that Figure 1 is a perspective view of a typical reclosable package 100, such as a large bag, which incorporates the zipper assembly 10 of the present invention. Reclosable package 100 may be formed by form fill and seal or by other methods.

Reclosable package 100 includes a front wall 102 and a rear wall 104. Front and rear walls 102, 104 may be separate polymeric or multi-sheet panels sealed together at edges 106, 108. Alternatively, front and rear walls 102, 104 may be provided as a single tube with or without a lap seal in the longitudinal direction. Front and rear walls 102, 104 may be formed from virtually any substrate in the packaging art – laminate films, plain polyethylene or polypropylene films, multi-wall paper, and polypropylene woven layer bags or any combination or hybrid thereof. Additionally, gussets (not shown) may be provided between front and rear walls 102, 104 at edges 106, 108, or similarly at bottom 110.

Bottom 110 may be sealed shut, or folded over and then glued. Reclosable package 100 is typically bottom filled, so that the seal or glued fold may be formed after filling. However, other methods of filling, such as top filling before the complete application of zipper assembly 10, are equally applicable to the present invention and are disclosed herein.

A longitudinal seal or seam 111, which can be a lap or fin seal or seam, may optionally be formed in a generally central longitudinal location on rear wall 104 and is shown in phantom on Figure 1.

Mouth 112 is formed at the top of the reclosable package 100 of Figure 1, and is reclosably sealed by zipper assembly 10.

As shown in Figures 1 and 2, zipper assembly 10 is formed from polymeric materials and includes first profile 12, second profile 14 and optional slider 15 (see Figure 1). First profile 12 includes first interlocking element 16 and first flange 18. Similarly, second profile 14 includes second interlocking element 20 and second flange 22. Optional slider 15 is mounted on first and second profiles 12, 14 and operates in a conventional manner by interlocking first and second interlocking elements 16, 20 of respective first and second profiles 12, 14 when moved in a

closing direction and separating first and second interlocking elements 16, 20 of respective first and second profiles 12, 14 when moved in an opening direction.

Peel seal 24 is formed between central locations of first and second flanges 18, 22. Peel seal 24 may be replaced by other frangible (and therefore tamper-evident) seals, or even a rip-cord (either supplementing or substituting for the peel seal 24). Peel seal 24 is more resistant to shear forces than to peeling forces. Peel seal 24, or any substitutes therefor, particularly when loaded in a shear configuration, is typically sufficiently strong to support the loads required by bottom filling. Peel seal 24 is typically pre-activated, but may be activated at the time of package or bag conversion. Additionally, first flange 18 in Figure 2 includes upward fold 26 immediately or proximately below peel seal 24. First flange 18 continues upward from upward fold 26 to downward fold 28, wherein hard seal 30 is formed between a portion of first flange 18 above peel seal 24. This configuration can be considered to divide first flange 18 into three portions – first portion 34 which extends from first interlocking element 20 to upward fold 26, second portion 36 which extends from upward fold 26 to downward fold 28, and third portion 38 extends from downward fold 28 to first distal end 40 thereby providing an area for sealing, gluing, or otherwise securing to front wall 102 of package 100. Likewise, second flange 22 extends from second interlocking element 20, past peel seal 24, to second distal end 42 thereby providing an area for sealing, gluing, or otherwise securing to rear wall 104 of package 100. As shown in Figures 1, 4, 5 and 6, first and second flanges 18, 22 are typically sealed, glued or otherwise secured to the upper exterior surfaces of front and rear walls 102, 104. However, some embodiments may seal, glue or otherwise secure first and second flanges 18, 22 to upper interior surfaces of respective front and rear walls 102, 104.

In the alternative embodiment of Figure 3, second portion 36 of first flange 18 is omitted, so that first and third portions 34, 38 are separate sheets or segments of web. Third portion 38 is joined to a generally central location of first portion 34 by hard seal 30. Alternatively, hard seal 30 can be omitted if first and third portions 34, 38 are formed integrally and simultaneously by extrusion, as shown in the alternative area of detail of Figure 3.

In the configuration of either embodiment, as shown in Figures 5 and 6, the external forces on package 100 from bottom filling or shock loading (or forces from within the bag) are directed toward hard seal 30 (which is above the peel seal 24) and redirected so as to cause a shear force on peel seal 24. As a peel seal is much more resistant to a shear force than a conventional peeling force, the resistance of package 100 to external or internal forces is greatly increased.

Figures 7 and 8 disclose embodiments, wherein first flange 18 is relatively short, extending from profile 16 and terminating upwardly adjacent to gap 25. First flange 18 is sealed or otherwise joined to extension segment 46 at point 50. Second flange 22 includes proximal segment 21 which extends from profile 20. Second flange 22 further includes distal segment 23 which is joined to proximal segment 21 at fold 44 wherein a line of weakness, such as a perforated or scored line, is provided in order to provide additional tamper evidence after opening. Distal segment 23 extends upwardly from fold 44 and terminates downwardly adjacent to gap 25. Second flange 22 is sealed or otherwise joined to extension segment 48 at point 52 and distal segment 23 is sealed or otherwise joined to first extension segment at point 54 and adjacent to peel seal 24. The connections at points 50, 52, 54 are typically formed by heat sealing. Peel seal 24 is further formed between faces (or facing portions) of proximal segment 21 and distal segment 23.

Extension segments 46, 48 are typically formed with nominal 6 mil film, but those skilled in the art will recognize a range of equivalents after review of this disclosure. Extension segments 46, 48 are joined, typically by adhesive, to front and rear walls 102, 104, respectively. The embodiment of Figure 7 differs from that of Figure 8 in that the extension segment 48 of Figure 8 includes fold 56 between inner portion 57 and outer portion 59. Inner portion 57 is sealed to second flange 22 at point 52 while outer portion 59 descends past flanges 18, 22.

The alternative embodiment of Figure 9 includes reinforcing ribs 60 on flange 22 to increase the stiffness of flange 22. The alternative embodiment of Figure 10 (based on the construction of Figure 3) includes tamper-evident header 62 formed of film enclosing zipper assembly 10. Tamper-evident header 62 includes lines of weakness 64, 66, typically formed by a perforated or scored line, in order to provide access to zipper assembly 10.

The alternative embodiment of Figure 11 (unloaded) and Figure 12 (loaded) substitutes the separable connection of secondary zipper 27 for the separable connection of peel seal 24 of the previous embodiments. Secondary zipper 27 includes first interlocking profile 29 attached or sealed to first flange 18 and second interlocking profile 31 attached or sealed to second flange 22. As shown in Figure 12, the loaded configuration, or other forces from within the package 100, causes a shear force to be applied to secondary zipper 27. Secondary zipper 27, similar to peel seal 24, resists a shear force to a much greater extent than a peeling force thereby increasing the strength of the resulting package when in the loaded configuration of Figure 12. The possibility of the substitution of the secondary zipper 27 for the peel seal 24 is envisioned for all of the disclosed embodiments of zipper assembly 10.

The manufacturing process of reclosable package or bag 100 is illustrated in Figures 13-18. A continuous length of interlocked zipper profiles 12, 14 is illustrated in Figures 13 and 14

and is typically provided from a spool 190 (see Fig. 17). The flanges 18, 22 of zipper profiles 12, 14 are then spread apart, typically by a spreader apparatus 192 such as is illustrated in Figure 15 (also see Fig. 17) wherein the portion of flanges 18, 22 immediately below the interlocked profiles 12, 14 is fed into the nip 200 between rollers 202, 204. A portion of flanges 18, 22 extends therefrom and is engaged by vacuum elements 206, 208. Vacuum elements 206, 208 spread the portions of flanges 18, 22 extending from rollers 202, 204 so that adhesive, typically a hot-melt reactive adhesive such as a hot melt, cross-linkable adhesive (particularly, a hot melt cross-linkable polyurethane reactive adhesive), can be applied or otherwise placed by nozzle 210 onto the interior of flanges 18, 22 as shown in Figure 16 (those skilled in the art will recognize that some adhesives should be applied by a downwardly pointing nozzle 210 with the orientation of the flanges 18, 22 during adhesive application changed in accordance therewith). Additionally, optional plasma or corona discharge station 209 may change the surface energy (described later in detail herein) of the flanges 18, 22 prior to application of adhesive. The flanges 18, 22 are temporarily clamped by clamps 194 (see Fig. 17), or pressure similarly applied, to the outside bag walls 102, 104 of successive packages or bags 100 (typically supplied with an open bottom and free of contents).

The adhesive layer is typically applied to flanges 18, 22 in a path divergent or parallel to the bag supply so that the flanges 18, 22 are subsequently guided from the divergent or parallel path to a position wherein the bag walls are captured within the flanges 18, 22.

Zipper 10 is stomped at stomp locations 68 at package-width intervals, typically two stomps 68 at a time, by stomper 220 and slider 15 is inserted therebetween by slider inserter 222 as shown in Figure 17. The laterally extending excess portions of the flanges are heat sealed, glued, or ultrasonically bonded to each other by bonding station 224.

Figure 17A illustrates a possible configuration for the flanges 18, 22 to be sealed to each other in an inverted T-shaped area 400 below end stomp 68 between successive bags 100 by bonding station 224. Figure 17B illustrates a possible configuration for the flanges 18, 22 to be glued to each other in rectangular area 402 between edges of successive bags 100 and below end stomp 68.

The zippers are then cut at cutting station 226 to achieve the package 100 illustrated in Figure 18 (with the phantom lines illustrating a gusset between the front and rear walls). The resulting packages or bags 100 are typically unfilled and have an open bottom. Optional filling station 225 is illustrated prior to cutting station 226. Optional filling station 225 may be top filling (in which case, zippers such as illustrated in Figures 22 or 24-26 may be used) or bottom filling (in which case, the packages or bags are inverted and a bottom sealer is included with the filling station 225). However, separate subsequent filling steps may be performed at a different location to fill packages or bags 100 with contents and seal the bottom 110 of the package or bag 100.

Alternative embodiments may cut the zippers prior to the application of the adhesive, may include pre-mounted sliders, or sliders inserted and stomps formed prior to the gluing process. Walls 102, 104 may be folded to form gussets prior to the securing of the zipper assembly 10 thereto. Similarly, gussets may be attached below or within the flanges 18, 22 by glue dots or similar connection methods. To reinforce the gussets underneath the zipper assembly 10, glue may be applied in between the inside faces of the gussets or in between the outside faces of the gussets.

Figures 19, 20 and 21 illustrate variations in the formation of the zipper assembly 10. Figure 19 illustrates how first and second sheets of web 300, 302 can be joined by peel seal 24, a

fold 28 formed in second sheet of web 302 and then sealed to first and second flanges 18, 22 thereby achieving a construction similar to Figure 2. Similarly, Figure 20 illustrates first and second profiles 12, 14 being joined by peel seal 24 and first sheet of web 300 being slit into two pieces which are sealed to flanges 18, 22 thereby forming a construction similar to that illustrated in Figure 3. In Figure 21, a lower portion of first flange 18 is removed and then resealed to an upper portion of first flange 18 thereby likewise forming a construction similar to that illustrated in Figure 3. Alternatively, first flange 18 can be folded to achieve the construction of Figure 2. Further alternatively, the T-shaped configuration of first flange 18 can be achieved by simultaneous extrusion of a single T-shaped flange.

With respect to the adhesive used by nozzle 210 to fasten the zipper assembly 10 to the walls 102, 104 of package 100, it has been found that hot melt, cross-linkable adhesives (such as hot melt polyurethane reactive adhesive which are cross-linkable) have been found to be superior to ordinary hot melt adhesives, both for multi-wall paper and woven polypropylene walls. Likewise, this adhesive has been found superior for the construction of all seams of package or bag 100, including bottom seam 110 and longitudinal seam 111. This was determined by tests in which the package 100 was loaded with 2.5 times its rated load and hung upside down (that is, with the load bearing on the zipper assembly 10) and placed in 140 degree Fahrenheit environment (which is representative of temperatures which may be encountered during shipping) for seventy-two hours. The package 100 was considered to have passed this test if the package 100 maintained its integrity during this period.

Likewise, this test can be performed for the same load (2.5 times rated load) and period (seventy-two hours) at negative 20 degrees Fahrenheit (-20°F.) for simulation of cold environments which may be encountered during transportation and storage in some climates.

The hot melt, cross-linkable adhesives (such as hot melt polyurethane reactive adhesive which are cross-linkable) have likewise been found to be superior under these tests and can be applied to all seams of packages, with or without a reclosable zipper.

Similarly, it has been found that pre-treatment of the olefin structures of the walls 102, 104 (particularly if made from woven polypropylene) and zipper flanges, typically by corona discharge or plasma treatment of the walls and flanges, improves the adhesion bond of the hot melt, cross-linkable adhesive (such as hot melt cross-linkable polyurethane reactive adhesive) between the walls and zipper flanges, particularly for film structures having a non-polar surface energy of less than 40 dynes per square centimeter.

Additionally, heat sealing may be effective in instances wherein the bag surface includes resin binder type inks.

As shown in Figure 22, in the first alternative top-filling embodiment of zipper assembly 10, distal ends 40, 42 of respective segment 38 and second flange 22 are attached to respective front and rear walls 102, 104 prior to the attachment or sealing of segment 38 to first flange 18. Segment 38 is typically a polyethylene strip that is attached by glue to the bag wall prior to the filling of the package or bag and by a heat seal to flange 18 after the package or bag is filled. This allows the package to be filled with contents through the gap or opening 37 between segment 38 and first flange 18 prior to the joining or sealing of segment 38 to first flange 18. This top filling eliminates the bottom filling typically associated with many of the other disclosed embodiments.

As shown in Figure 23, in the second alternative top-filling embodiment of zipper assembly 10, polyethylene strips 103, 105 are attached to the exterior of front and rear walls 102, 104 immediately adjacent to mouth 112. Extension segment 46 is typically heat sealed or

otherwise attached to polyethylene strip 103 prior to filling of the package 100 and extension segment 48 is typically heat sealed or otherwise attached to polyethylene strip 105 after filling of the package 100 to reach the configuration shown in Figure 24. While Figure 24, as well as Figure 25, is illustrated with the zipper assembly 10 of Figure 7, other equivalent zipper configurations could be substituted for this zipper assembly 10, as would be recognized by those skilled in the art after review of this disclosure.

Figure 25 shows a third alternative top-filling embodiment of zipper assembly 10, similar to that shown in Figure 24, except that extension segment 46 is glued to front wall 102, typically by hot melt, cross-linkable adhesive (such as hot melt cross-linkable polyurethane reactive adhesive) 107 prior to filling of the package 100, thereby obviating the need for polyethylene strip 103. After filling of package 100 with contents, similar to the embodiment shown in Figure 23, extension segment 48 is heat sealed to polyethylene strip 105 on rear wall 104.

Figure 26 illustrates a zipper assembly 10, similar to that of Figure 3, wherein flange 22 and segment 38 are glued or otherwise sealed or attached to front and rear walls 102, 104 prior to the formation of peel seal 24. Peel seal 24 is formed and activated thereby joining first and second flanges 18, 22 to each other after the filling of package 100 with contents between first and second interlocking elements 16, 20 as shown by arrow labeled as "fill". This filling may be done by using the slider (see Fig. 1) to separate the first and second interlocking elements 16, 20, filling between first and second interlocking elements, and then using the slider to interlock first and second interlocking elements 16, 20.

Figure 27 is a cross-sectional view of a first embodiment of high burst closure 11. High burst closure 11 includes first profile 12 and second profile 14. First profile 12 includes first upper separating portion 17 and first flange 18, integral with each other, formed from a single

sheet of polymeric web or similar material. First profile 12 further includes interior flange 19 integrally formed with upper separating portion 17 or attached by a hard seal to the interior surface thereof. Second profile 14 includes second upper separating portion 21 and second flange 22. First peel seal 24 is formed between the lower end of interior flange 19 and a generally central portion of second profile 14. Alternatives for closing first and second upper separating portions 17, 21 are shown in Figures 31 and 32. In this, as well as the other embodiments of high burst closures, similar to the previously disclosed zippered embodiments, loads on the package walls or flanges cause a shear force on the peel seal, as shown in Figure 12, thereby increasing the load resistance of the closure and the package in order to meet the required high burst strength.

Figure 28 is a cross-sectional view of a second embodiment of high burst closure 11. In this embodiment, the first profile 12 is formed from a first upper separating portion 17 which extends to first peel seal 24. First flange 18 is sealed to a generally central portion of first upper separating portion 17. Again, alternatives for closing first and second upper separating portions 17, 21 are shown in Figures 31 and 32.

Figure 29 is a cross-sectional view of a third embodiment of high burst closure 11. A single sheet of polymeric web or similar material is used to form first profile 12. This sheet forms upper separating portion 17 and is folded adjacent to a bottom of peel seal 24 and is then sealed to a generally central exterior portion of first upper separating portion 17, with the remaining portion of the sheet forming first flange 18.

Figure 30 is a cross-section view of the first embodiment of the high burst closure of Figure 27 (equally applicable to the embodiments of Figures 28 and 29) with the exterior of first and second flanges 18, 22 sealed to the interior of respective first and second bag walls 102, 104.

Alternatively, the interior of the first and second flanges 18, 22 can be attached by adhesive or other means to the exterior of bag walls 102, 104.

Figure 31 is a cross-sectional view of the first embodiment of the high burst closure of Figures 27 and 30 (equally applicable to the embodiments of Figures 28 and 29) wherein second peel seal 31 is added between first and second upper separating portions 17, 21 so that first and second upper ends 17', 21' of respective first and second upper separating portions 17, 21 protrude therefrom thereby providing grips for the user to grasp and peel apart the first and second peel seals 24, 31 in order to open closure 11.

Figure 32 is a cross-sectional view of the first embodiment of the high burst closure of Figures 27, 30 (equally applicable to the embodiments of Figure 28 and 29) wherein the first and second upper ends 17', 21' of respective first and second upper separating portions 17, 21 are sealed together by hard seal 29. Furthermore, first and second lines of weakness 33, 35 (typically formed by perforated lines or scored lines) are formed in respective first and second upper ends 17', 21' under hard seal 29 whereby a user opens closure 11 by grasping an area proximate to hard seal 29 and tearing along the first and second lines of weakness 33, 35 thereby removing the resulting header-like portion of first and second upper ends 17', 21' above the first and second lines of weakness 33, 35 thereby gaining access to first peel seal 24 which is opened by the user by further separating first and second upper separating portions 17, 21.

Figure 33 is a cross-sectional view of an embodiment similar to that of Figure 28 wherein first wall 102 extends upwardly and is sealed directly to the generally central portion of first upper separating portion 17, thereby fulfilling the function of first flange 18. Identical to the configuration of Figure 32, first and second upper separating portions 17, 21 are sealed together by hard seal 29 and first and second lines of weakness 33, 35 are formed in respective first and

second upper ends 17', 21'. Alternately, a second peel seal, as shown in Figure 31, can replace hard seal 29, or the first and second upper ends 17', 21' can remain unsealed as shown in Figure 30.

Figure 34 is a cross-sectional view of an embodiment similar to that of Figure 31 wherein first flange 18 is sealed to first bag wall 102 and first bag wall 102 extends above closure 11 and includes aperture 37 which serves as a handle. In other words, aperture 37 is formed in a portion of first bag wall 102 which extends above first flange 18. Alternately, first bag wall 102 can be integral with first flange 18 (i.e., first bag wall 102 sealed directly to first upper separating portion 17 thereby eliminating the need for a separate first flange 18) and a separate bag wall extension is sealed to the exterior thereof and aperture 37 formed in this separate bag wall extension.

Figure 35 is a cross-sectional view of an embodiment similar to that of Figure 32 wherein first bag wall 102 extends above closure 11 and includes aperture 37 which serves as a handle. Furthermore, second peel seal 31 is formed between first upper separating portion 17' (proximate to hard seal 29) and first bag wall 102 (downwardly adjacent from aperture 37).

Figure 36 is a cross-sectional view of an embodiment similar to that of Figure 32 wherein an extension 41 of upper separating portion 17 is provided, with an aperture 43 serving as a handle. This is equally application to upper separating portion 21, or both upper separating portions 17, 21. Likewise, extension 41 may be implemented in combination with, or in lieu of, the upward extension of first wall 102 illustrated in Figure 34 and the aperture 37 formed therein.

Those skilled in the art will recognize a broad range of possible contents for the packages 100, including, but certainly not limited to, charcoal, pet food, livestock or other animal food, cat litter, fertilizer, seeds, plant bulbs, rock salt, and foodstuffs.

Thus the several aforementioned objects and advantages are most effectively attained. Although preferred embodiments of the invention have been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

CLAIMS

What is Claimed is:

1. A closure for a package, including:
 - a first profile with a first upper portion and a first flange, further including an interior flange with a first end and a second end, the first end being attached to an interior of the first upper portion;
 - a second profile with a second upper portion and a second flange; and
 - a separable connection connecting the second end of the interior flange and a generally central area of the second profile, wherein the separable connection is more resistant to a shear force than to a peeling force.
2. The closure of Claim 1 wherein a load on the first and second flanges applies a shear force to the separable connection.
3. The closure of Claim 2 wherein the separable connection is a first peel seal.
4. The closure of Claim 1 wherein a load on the first and second flanges is redirected away from the separable connection to a location above the separable connection.
5. The closure of Claim 1 wherein the first and second upper portions are sealed together by a hard seal.

6. The closure of Claim 5 wherein the first and second upper portions include respective first and second lines of weakness.
7. The closure of Claim 6 wherein the first and second lines of weakness are perforated lines.
8. The closure of Claim 6 wherein the first and second lines of weakness are scored lines.
9. The closure of Claim 1 wherein the first and second upper portions are joined by a second peel seal.
10. The closure of Claim 1 wherein the second profile is made from a single sheet of web material.
11. The closure of Claim 1 wherein the first and second flanges are attached to an exterior of respective first and second package walls.
12. The closure of Claim 1 wherein the first and second flanges are attached to an interior of respective first and second package walls.
13. The closure of Claim 1 further including an extension extending from one of the first and second flanges, the extension including an aperture thereby serving as a handle.

14. A closure for a package, including:

a first profile with a first upper portion and a first flange, the first upper portion having an upper end and a lower end, wherein the first flange is connected to a generally central area of the first upper portion;

a second profile with a second upper portion and a second flange, the second upper portion having an upper end; and

a separable connection connecting the lower end of the first upper portion and a generally central area of the second profile, wherein the separable connection is more resistant to a shear force than to a peeling force.

15. The closure of Claim 14 wherein a load on the first and second flanges applies a shear force to the separable connection.

16. The closure of Claim 15 wherein the separable connection is a first peel seal.

17. The closure of Claim 14 wherein a load on the first and second flanges is redirected away from the separable connection to a location above the separable connection.

18. The closure of Claim 14 wherein the upper ends of the first and second upper portions are sealed together by a hard seal.

19. The closure of Claim 18 wherein the first and second upper portions include respective first and second lines of weakness.
20. The closure of Claim 19 wherein the first and second lines of weakness are perforated lines.
21. The closure of Claim 19 wherein the first and second lines of weakness are scored lines.
22. The closure of Claim 14 wherein the upper ends of the first and second upper portions are joined by a second peel seal.
23. The closure of Claim 14 wherein the second profile is made from a single sheet of web material.
24. The closure of Claim 14 wherein the first and second flanges are attached to an exterior of respective first and second package walls.
25. The closure of Claim 14 wherein the first and second flanges are attached to an interior of respective first and second package walls.
26. The closure of Claim 14 further including an extension extending from one of the first and second flanges, the extension including an aperture thereby serving as a handle.

27. A closure for a package, including:

a first profile with a first upper portion and a first flange formed from a single sheet of web, wherein the single sheet is folded below the first upper portion and connected to a generally central area of the first upper portion thereby forming a second fold and the first flange;

a second profile with a second upper portion and a second flange; and

a separable connection connecting the first upper portion and a generally central area of the second profile, wherein the separable connection is more resistant to a shear force than to a peeling force.

28. The closure of Claim 27 wherein a load on the first and second flanges applies a shear force to the separable connection.

29. The closure of Claim 28 wherein the separable connection is a first peel seal.

30. The closure of Claim 27 wherein a load on the first and second flanges is redirected away from the separable connection to a location above the separable connection.

31. The closure of Claim 27 wherein the first and second upper portions are sealed together by a hard seal.

32. The closure of Claim 31 wherein the first and second upper portions include respective first and second lines of weakness.

33. The closure of Claim 32 wherein the first and second lines of weakness are perforated lines.
34. The closure of Claim 32 wherein the first and second lines of weakness are scored lines.
35. The closure of Claim 27 wherein the first and second upper portions are joined by a second peel seal.
36. The closure of Claim 27 wherein the second profile is made from a single sheet of web material.
37. The closure of Claim 27 wherein the first and second flanges are attached to an exterior of respective first and second package walls.
38. The closure of Claim 27 wherein the first and second flanges are attached to an interior of respective first and second package walls.
39. The closure of Claim 27 further including an extension extending from one of the first and second flanges, the extension including an aperture thereby serving as a handle.
40. The closure of Claim 1 wherein at least a portion of the first flange is formed by at least a portion of a bag wall.

41. The closure of Claim 14 wherein at least a portion of the first flange is formed by at least a portion of a bag wall.
42. The closure of Claim 1 wherein the interior flange and the first upper portion are integral with each other.
43. The closure of Claim 1 wherein the interior flange and the first upper portion are joined by a hard seal.
44. The closure of Claim 1 wherein at least one of the first and second upper portions are extended and include a handle-sized aperture therein.
45. The closure of Claim 14 wherein at least one of the first and second upper portions includes a handle-sized aperture therein.
46. The closure of Claim 27 wherein at least one of the first and second upper portions includes a handle-sized aperture therein.
47. The closure of Claim 27 wherein the first flange is formed by a portion of a bag wall.
48. The closure of Claim 14 wherein the first flange is sealed to the generally central area of the first upper portion.

49. The closure of Claim 14 wherein the first flange is integral with the generally central area of the first upper portion.

50. The closure of Claim 27 wherein the single sheet is folded below the first upper portion and sealed to a generally central area of the first upper portion.

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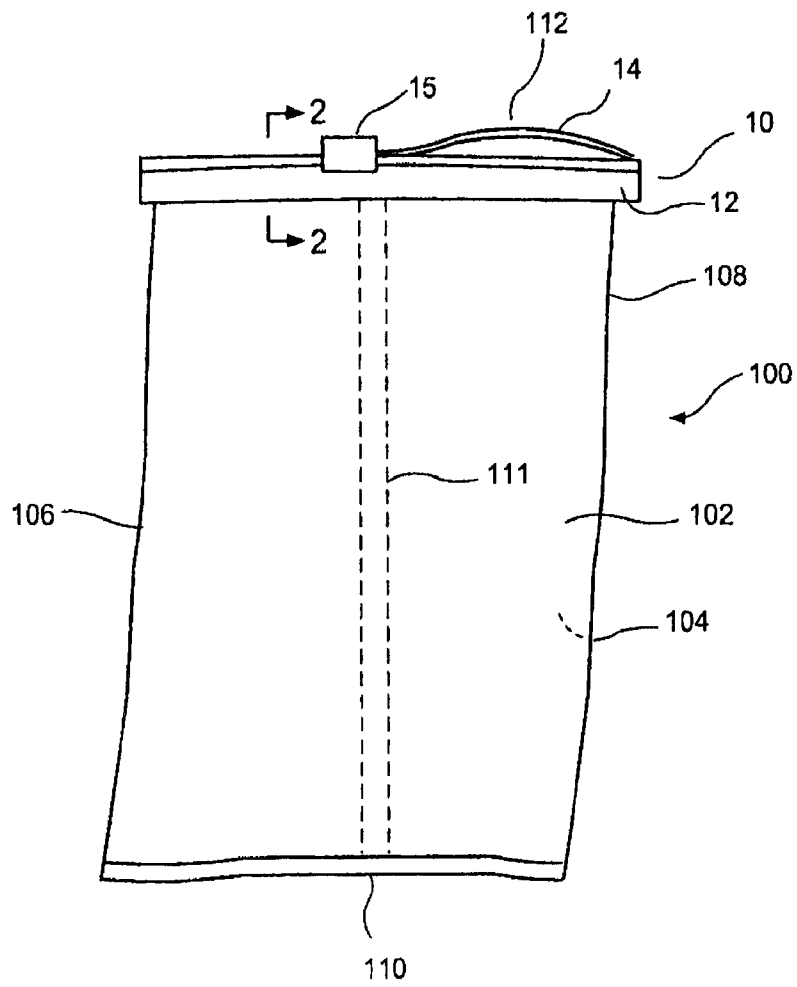


FIG. 1

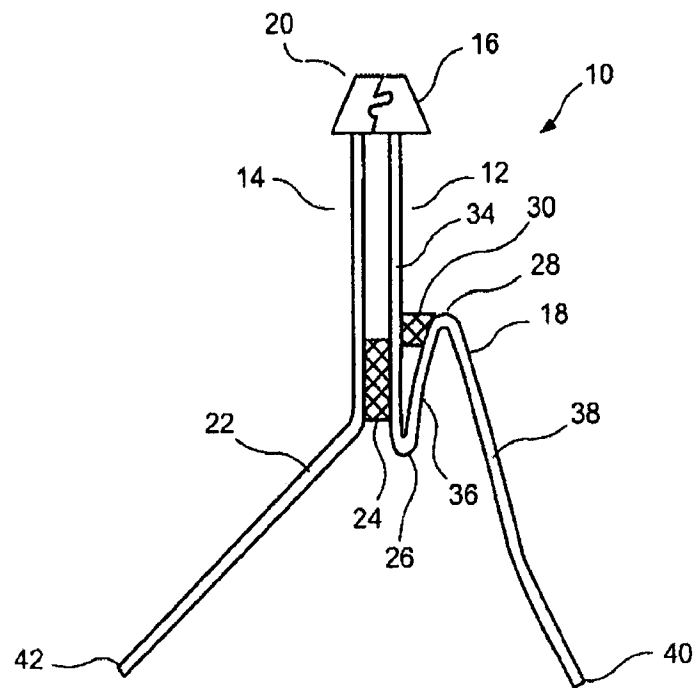


FIG. 2

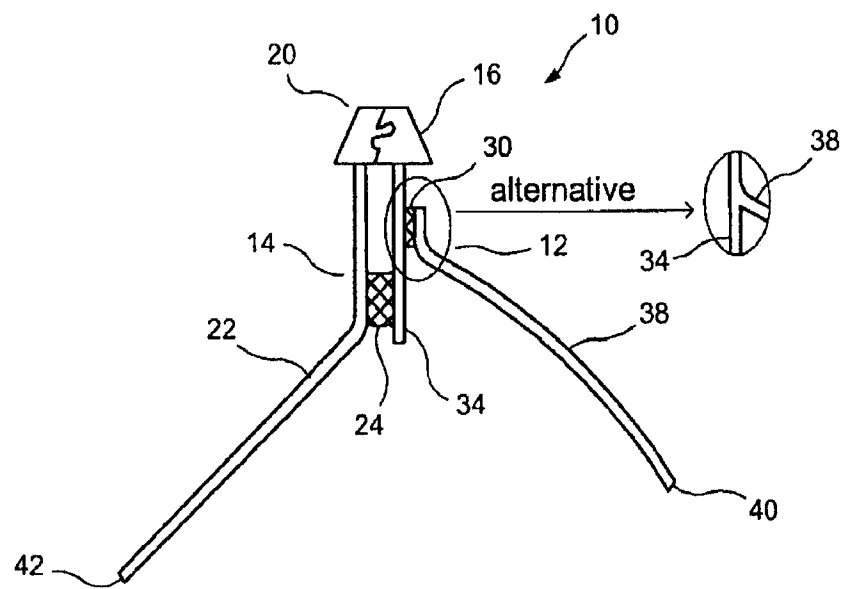


FIG. 3

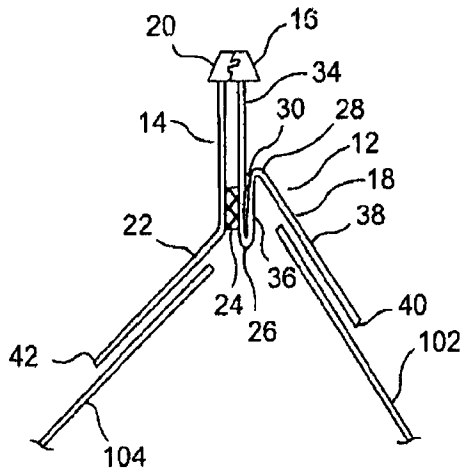


FIG. 4

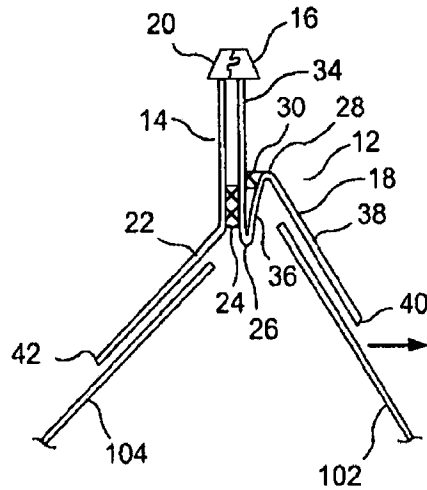


FIG. 5

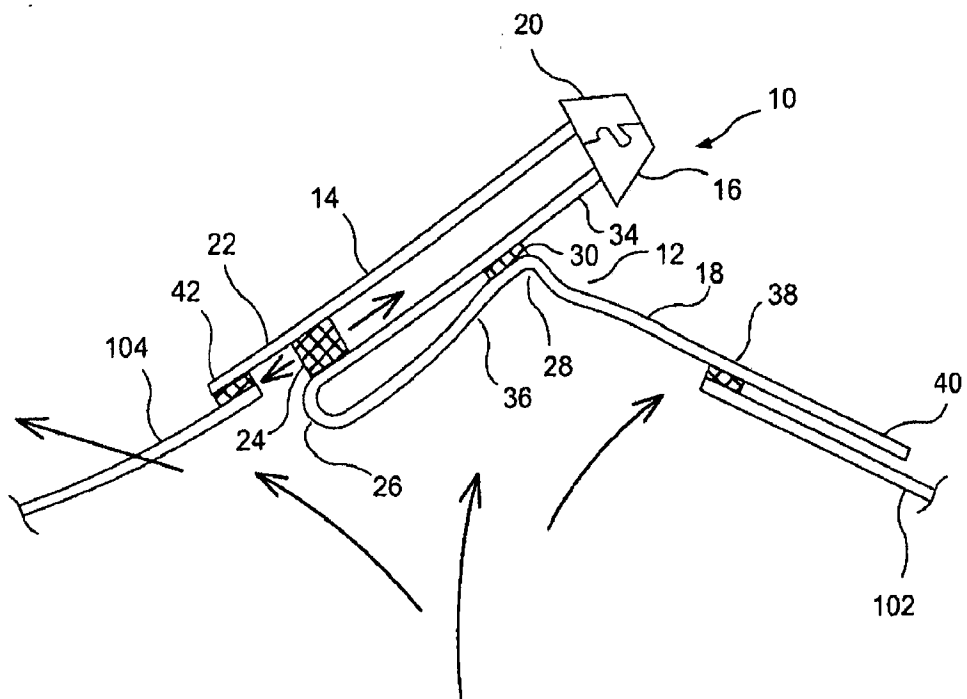


FIG. 6

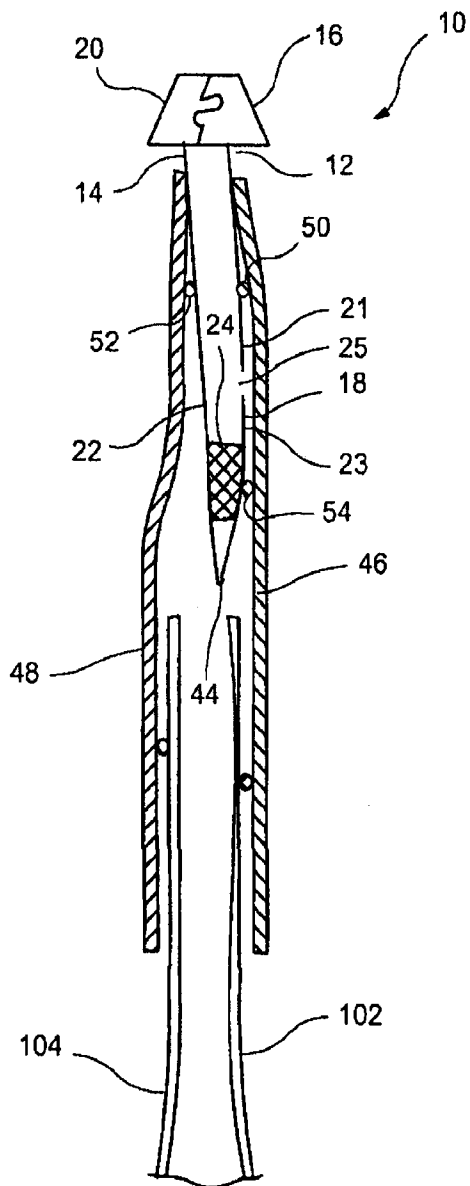


FIG. 7

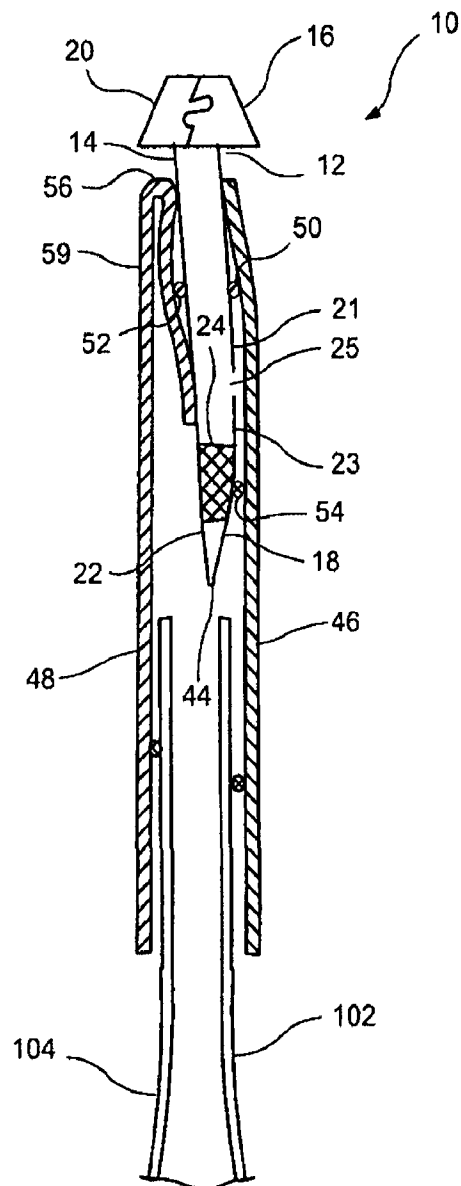


FIG. 8

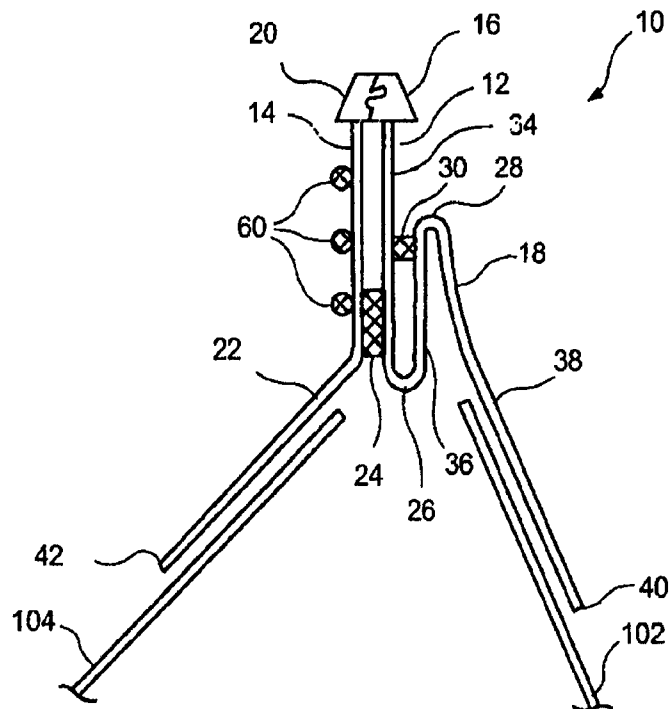


FIG. 9

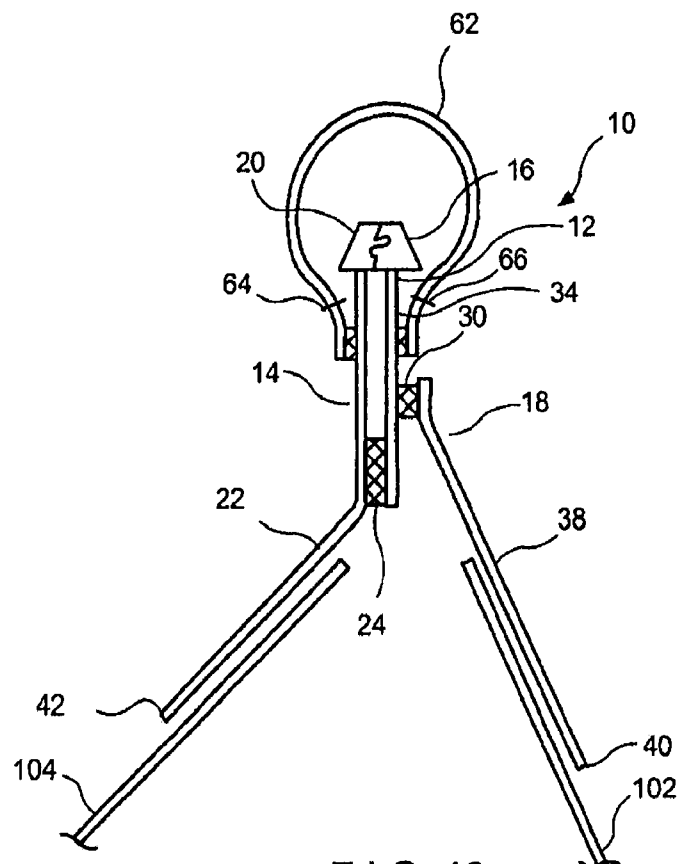


FIG. 10

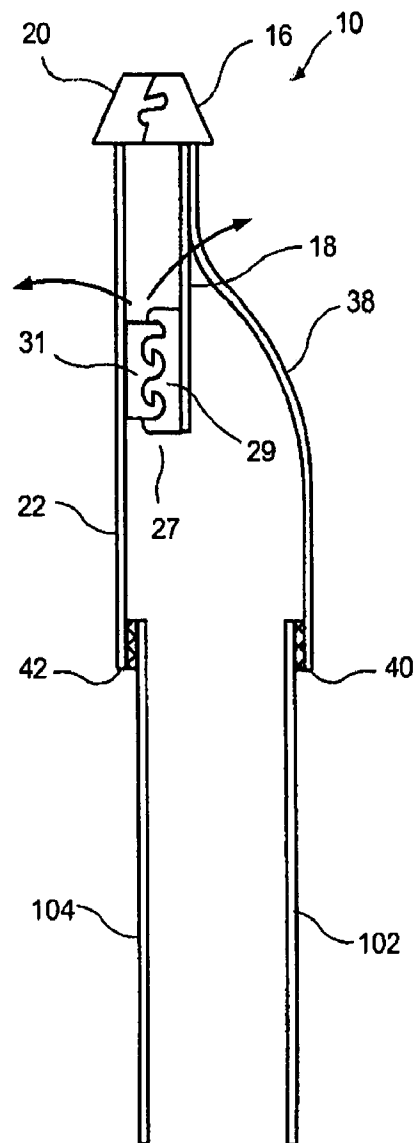


FIG. 11

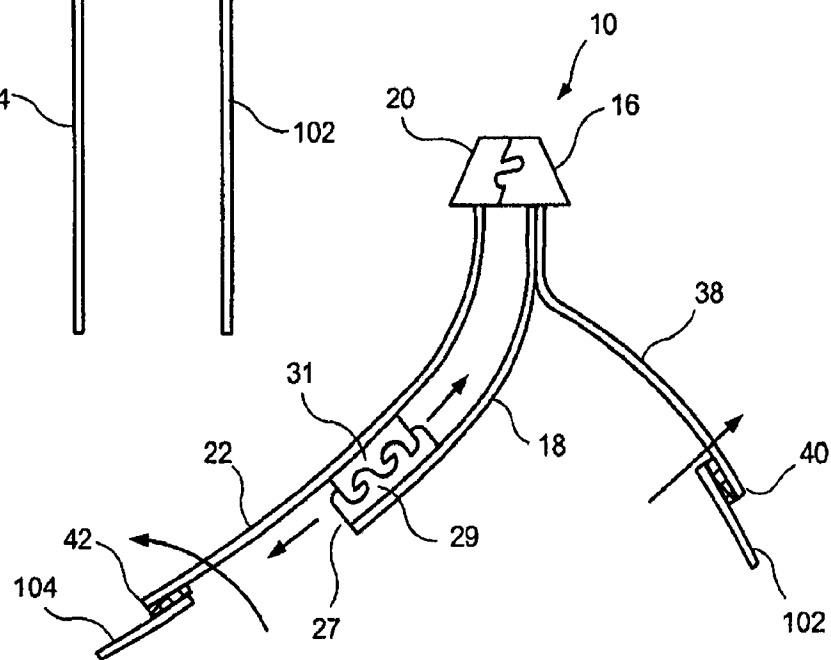


FIG. 12

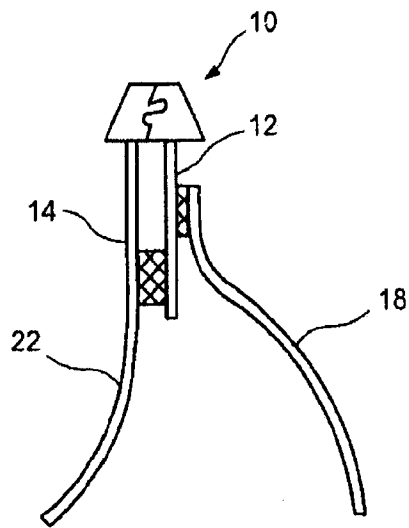


FIG. 13

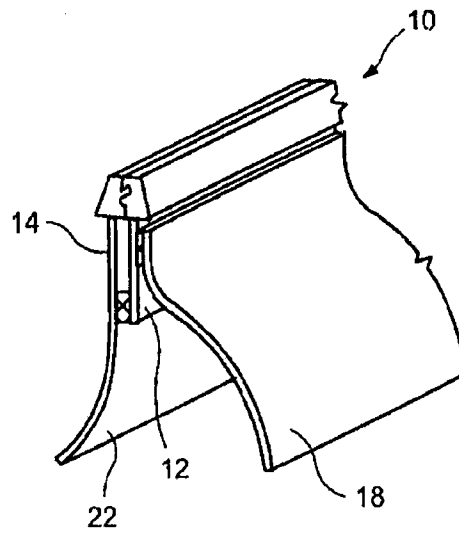


FIG. 14

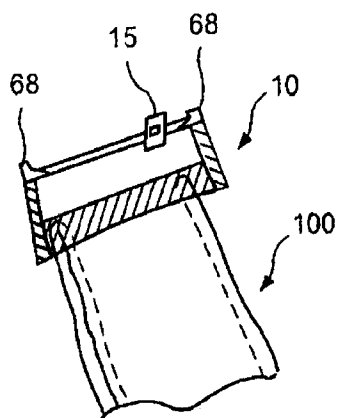


FIG. 18

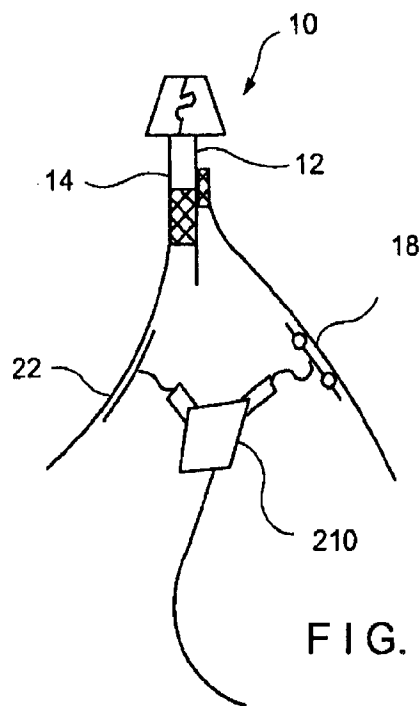


FIG. 16

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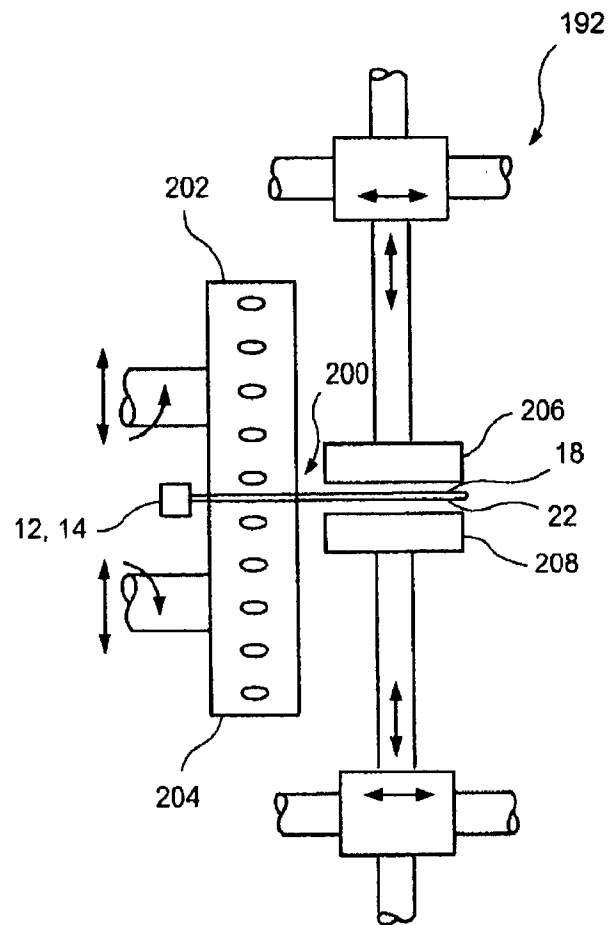
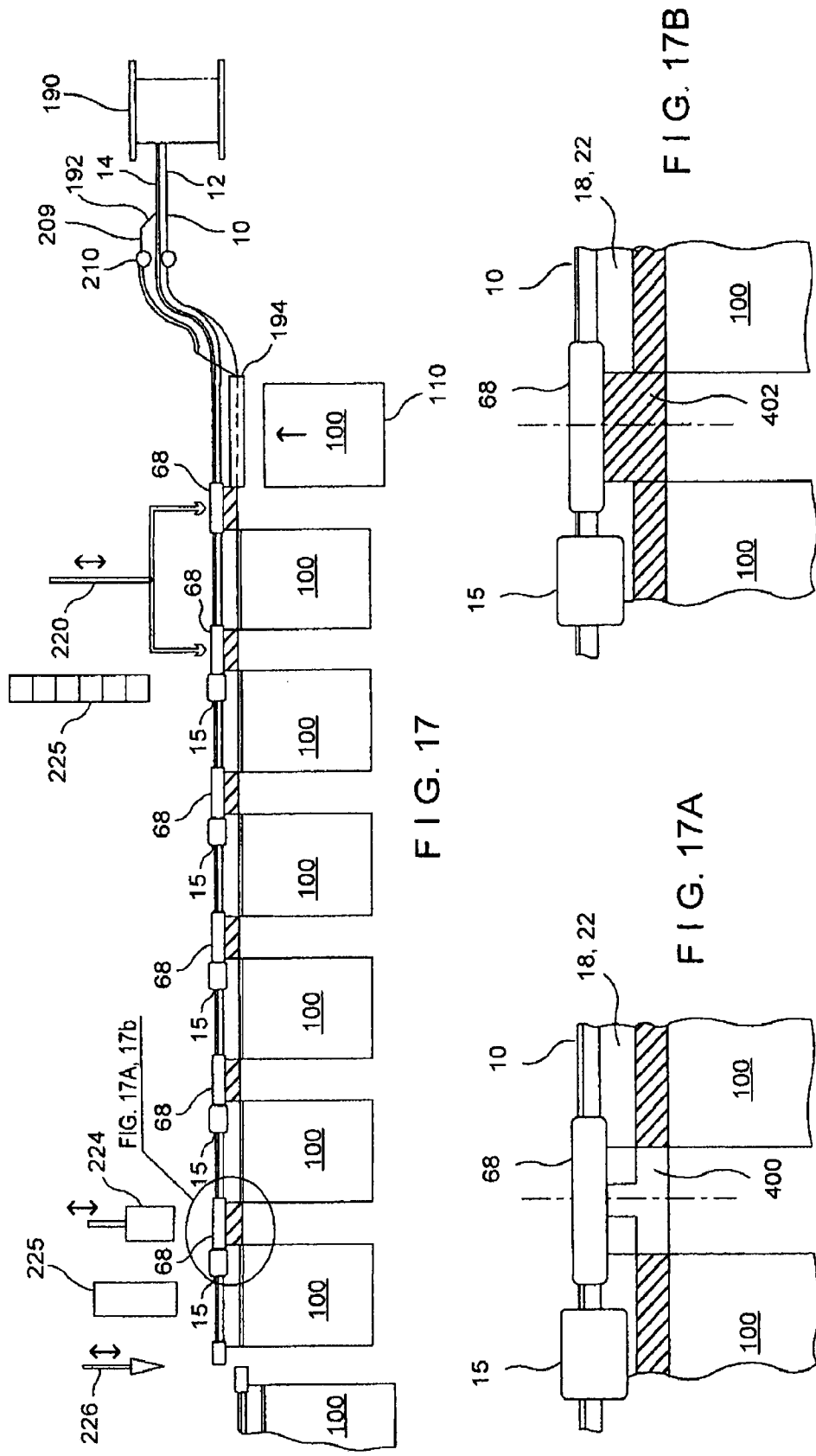


FIG. 15



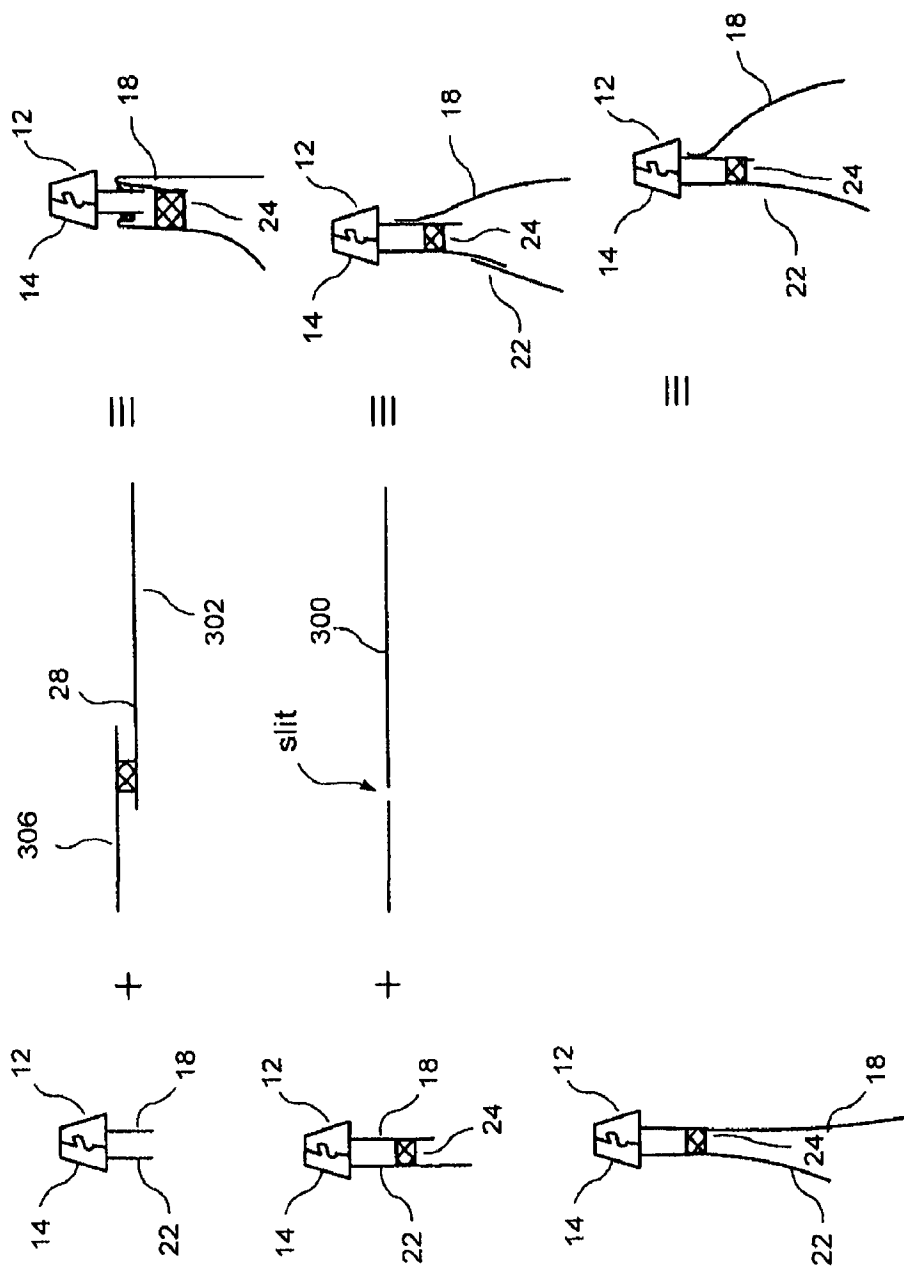


FIG. 19

FIG. 20

FIG. 21

FIG. 23

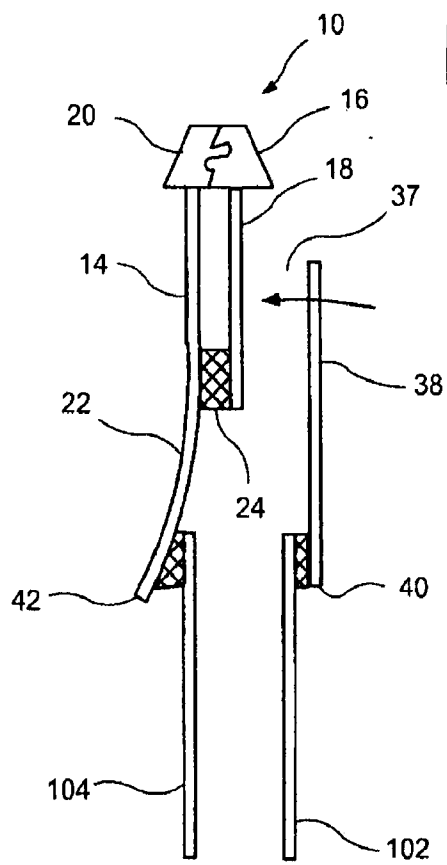
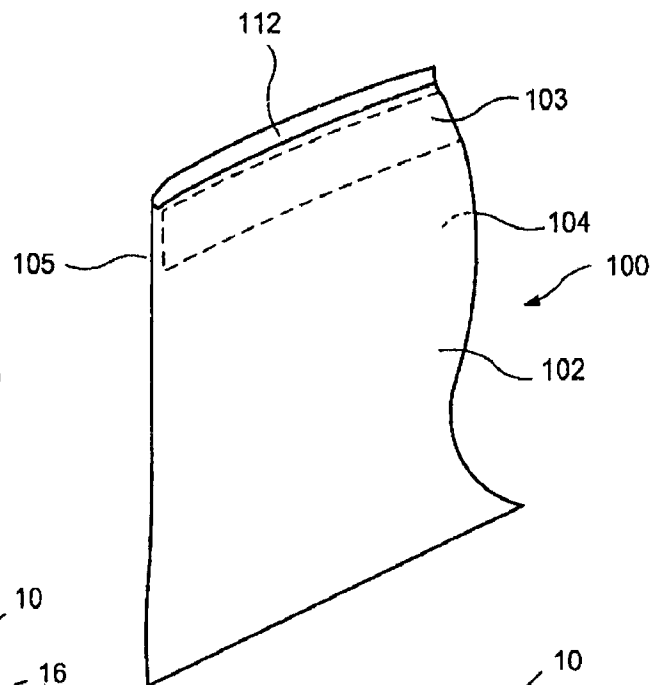


FIG. 22

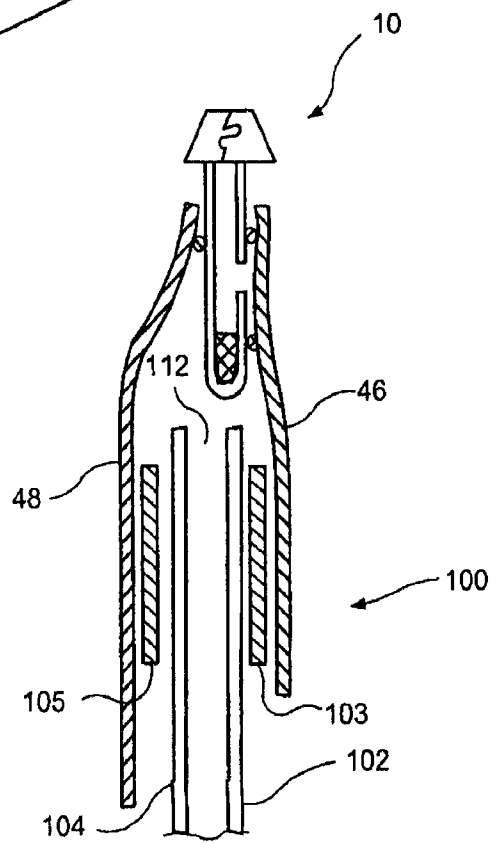


FIG. 24

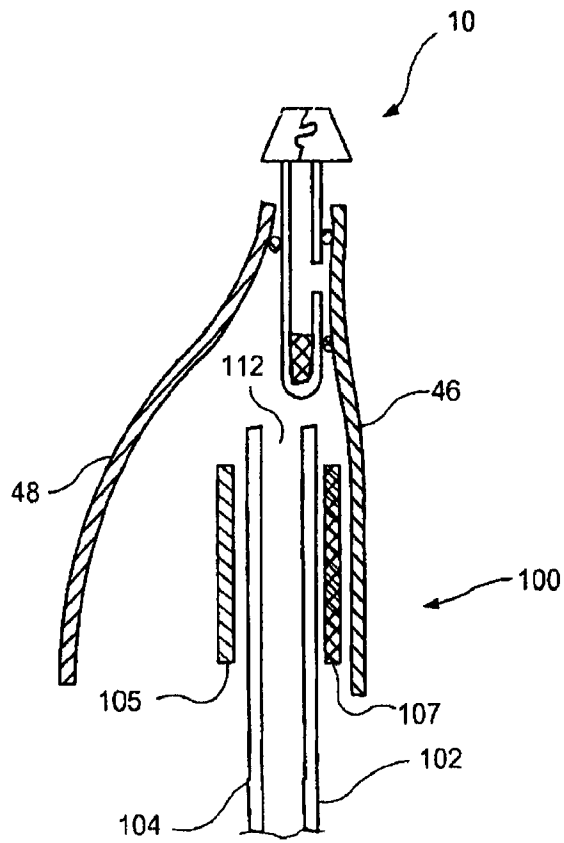


FIG. 25

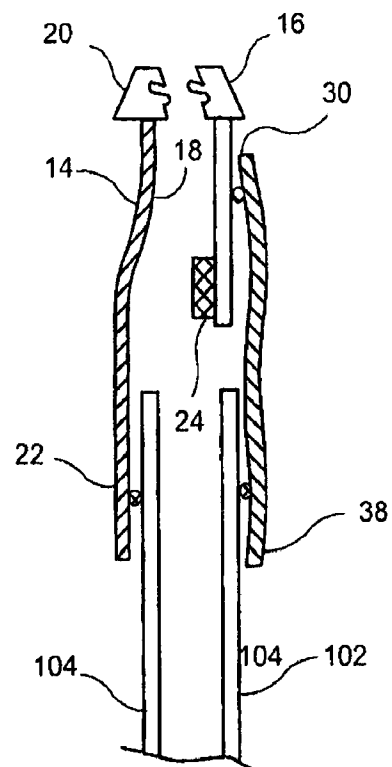


FIG. 26

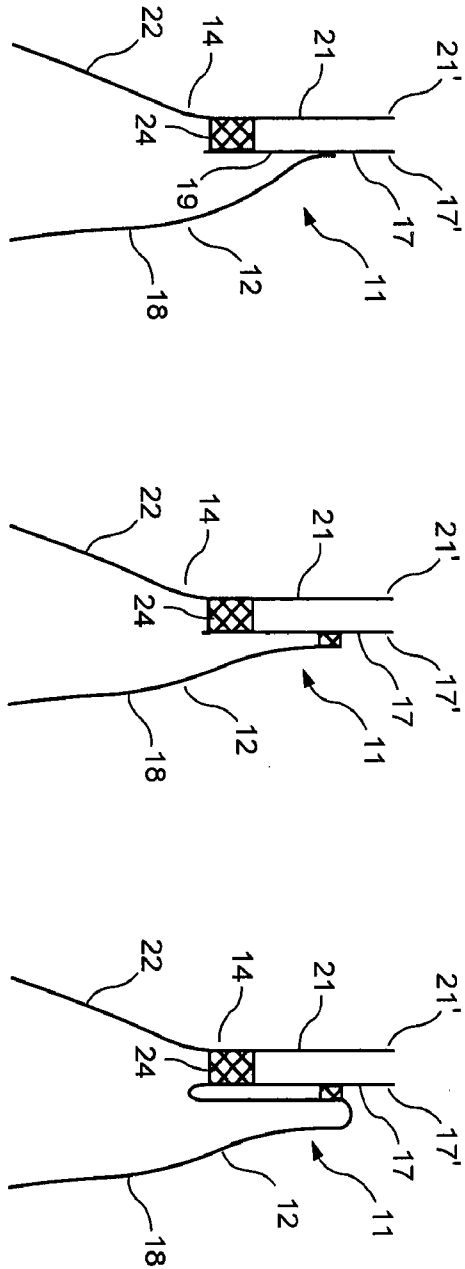


FIG. 27

FIG. 28

FIG. 29

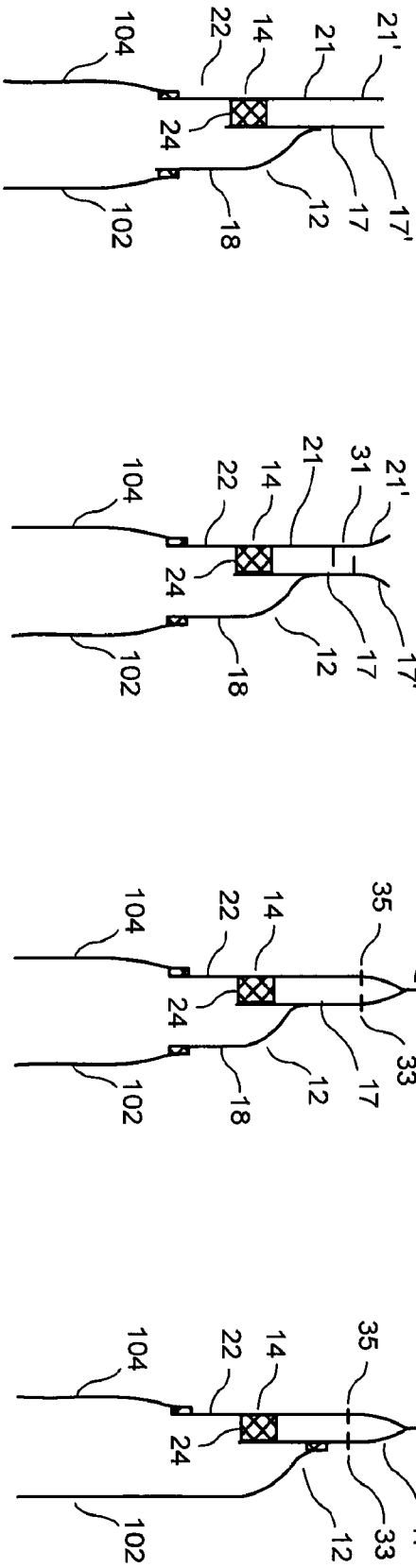
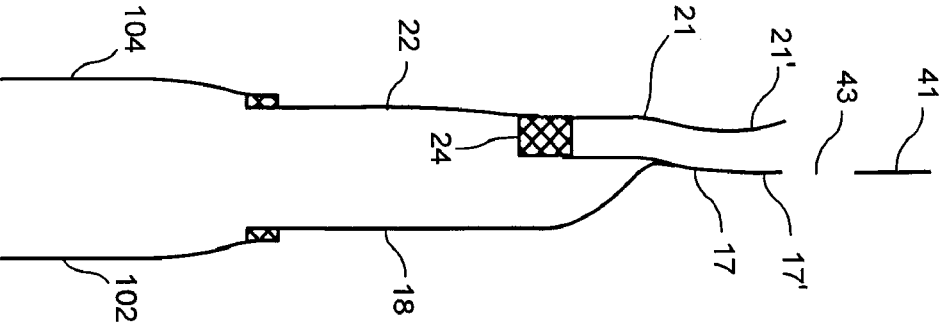
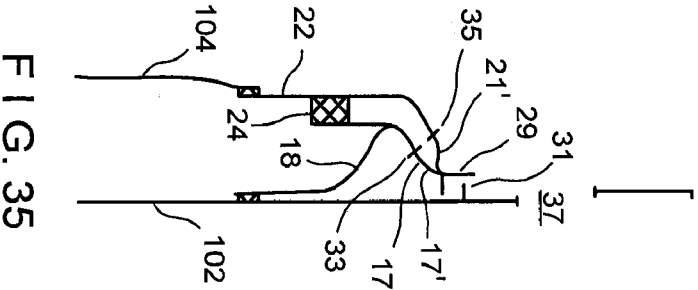
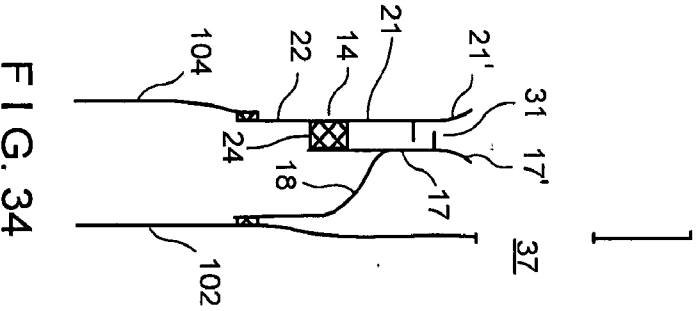


FIG. 30

FIG. 31

FIG. 32

FIG. 33



INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/059331

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D33/25

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 2008/024157 A (ILLINOIS TOOL WORKS [US]; KOENIGKRAMER RUSTY [US]; ANZINI DAVID J [US]) 28 February 2008 (2008-02-28) page 6, line 9 - page 13, line 16; claims 1-77; figures 1-26 -----	1-50
X	WO 2008/118574 A (ILLINOIS TOOL WORKS [US]; MCCracken KENNY E [US]; RUSSELL GLYN [US]; A) 2 October 2008 (2008-10-02) page 3, line 19 - page 6, line 4; claims 1-3,6,19,20; figures 1-5 -----	1-4,10
X	US 2002/100144 A1 (MACHACEK ZDENEK [US] ET AL) 1 August 2002 (2002-08-01) paragraph [0015] - paragraph [0021]; claims 1-12; figures 1-6 -----	1-7,9, 11-13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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- *&* document member of the same patent family

Date of the actual completion of the international search

17 November 2009

Date of mailing of the international search report

04/12/2009

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Authorized officer

Janosch, Joachim

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2009/059331

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