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ARCHING ZIPPER AND METHOD OF MANUFACTURE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention pertains to an arched or curved zipper for a reclosable package or bag and the method of manufacture thereof. More specifically, the present invention relates to the use of a co-extruded layer of shrinkable or expandable material in the manufacturing of the zipper to induce the arching or curvature of the zipper. Alternative embodiments include placing the zipper at an inclined orientation on the package.

DESCRIPTION OF THE PRIOR ART

In the prior art, it is well known to use a zipper to selectively open and close a reclosable package or bag. However, the creation of shaped zipper to conform to different package styles has been difficult to achieve while maintaining a high speed manufacturing rate using standard package manufacturing equipment. Additionally, it has been difficult to find satisfactory ways to create a zipper having a self-opening characteristic. Similarly, the placement of zippers at an inclined orientation while avoiding waste of materials has been problematic.

The manufacture of successive head-to-head reclosable packages, with heads cut in the transverse machine direction, is disclosed in U.S. Patent No. 7,490,451 entitled "Method and Apparatus for Making Block Bottom Pillow Top Bags" issued on February 17, 2009 to Matthews and U.S. Patent No. 6,428,642 entitled "Transverse Directional Zipper with a Double Seal Flange Profile Configuration" issued on August 6, 2002 to Matthews and Plourde.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide shaped zippers for a reclosable package or bag, and a method for the manufacture thereof which maintains a high manufacturing rate using standard package manufacturing equipment, possibly with some modification.

It is therefore a further object of the present invention to provide shaped zippers for a reclosable package or bag, wherein the shaped zipper may possibly include a self-opening characteristic.

It is therefore a still further object of the present invention to provide for the placement of zippers at inclined orientations on the package while avoiding or minimizing waste of packaging film.

These and other objects are achieved by, during the manufacture of the zipper, co-extruding a layer of shrinkable material (or, alternatively, expandable material) in various places of the zipper in order to manipulate the curvature or shape of the zipper. This shrinkable or expandable material may be placed so that zipper has a curvature within the plane of the walls of the package or bag. Alternatively, the shrinkable material may be placed on opposite sides of the inner surfaces of the flanges (or an expandable material may be placed on opposite sides of the outer surfaces of the flanges) in order to make the profiles of the open zipper flex away from each other thereby creating a self-opening characteristic.

With respect to the placement of zippers at inclined orientations on the package, waste is avoided by manufacturing with a head-to-head configuration.

DESCRIPTION OF THE DRAWINGS

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

Figure 1A is a plan view of a reclosable package or bag with the zipper curving in a convex configuration, forming a half arch.

Figure 1B is a plan view of a reclosable package or bag with the zipper curving in a convex configuration, forming a full arch.

Figure 1C is a cross-sectional view along plane 1C-1C of Figure 1A.

Figure 1D is a first alternative cross-sectional view along plane 1C-1C of Figure 1A

Figure 1E is a second alternative cross-sectional view along plane 1C-1C of Figure 1A.

Figure 2A is a plan view of a reclosable package or bag with the zipper curving in a concave configuration, forming a half arch.

Figure 2B is a plan view of a reclosable package or bag with the zipper curving in a concave configuration, forming a full arch.

Figure 3 is a plan view illustrating the placement of the shrinkable material to achieve the self-opening characteristic shown in Figures 4 and 5.

Figure 4 is an upper view showing the arching of the zipper profile achieved by the placement of the shrinkable material in Figure 3.

Figure 5 is a perspective view of the package or bag with the self-opening characteristic achieved by the placement of the shrinkable material in Figure 3.

Figure 6 is a plan view of an embodiment of the package or bag with a concave zipper along a mouth with extends across a portion of the top edge of the package or bag.

Figure 7 is a plan view of an embodiment of the package or bag with a convex zipper along a mouth with extends across a portion of the top edge of the package or bag.

Figure 8 is plan view of an embodiment of the package or bag with an undulating zipper with concave and convex portions.

Figure 9 is a plan view of successive head-to-head reclosable packages or bags being manufactured.

Figure 10 is a plan view of successive head-to-head reclosable packages or bags being manufactured wherein the header seals and the zipper shapes are sinusoidal or otherwise undulating.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail, wherein like numerals indicate like elements throughout the several views, one sees that Figure 1A is a plan view of a reclosable package or bag 100 forming an upwardly extending or convex half arch while Figure 1B is a plan view of a reclosable package or bag 100 forming an upwardly extending or convex full arch. The package or bag 100 includes front and rear walls 102, 104, typically made from a thermoplastic polymer such as polyethylene or polypropylene, but those skilled in the art will recognize after review of the present disclosure that other materials can be used.

Front and rear walls 102, 104 are typically joined, sealed or folded to form the bottom 106 and the side edges 108, 110, forming an upper curved mouth 112. Curved mouth 112 is selectively opened and closed by zipper 10 which is curved to accommodate the shape of the curved mouth. Zipper 10 includes first and second profiles 12, 14 which are likewise curved and sealed to respective front and rear walls 102, 104 along upper curved mouth 112. As shown in more detail in Figure 1C, the first profile 12 typically includes a first interlocking element 16 with a first flange 20 extending therefrom. Likewise, the second profile 14 typically includes a second interlocking element 18 and a second flange 22 extending therefrom. First flange 20 is sealed to front wall 102 and second flange 22 is sealed to rear

wall 104. The package or bag 100 is closed by joining first and second interlocking elements 16, 18 with each other, and is opened by separating first and second interlocking elements 16, 18 from each other. This joining and separating can be done manually or can be done by moving a slider 24 in a conventional manner.

Figure 1D illustrates a first alternative configuration of zipper 10, wherein flanges 20, 22 extend both above and below the respective first and second interlocking elements 16, 18 and are sealed to the top edge of respective front and rear walls 102, 104 above the interlocking elements 16, 18 as well as to respective first and second seal lines 120, 122 below the interlocking elements 16, 18. Similarly, Figure 1E illustrates a second alternative configuration of zipper 10, wherein flanges 20, 22 extend above the respective first and second interlocking elements 16, 18 and are sealed to the top edge of respective front and rear walls 102, 104.

First and second profiles 12, 14 are formed by extrusion. By selectively co-extruding both the base thermoplastic polymer along with a shrinkable material, the curvature in first and second profiles 12, 14 may be formed. A typical example of the shrinkable material would be polyolefin-based shrink-wrap material which is a thermoplastic polymer which is shrunk by exposure to heat. For example, as shown in Figures 1A and 1B, by selectively co-extruding the first and second flanges 20, 22 with shrinkable material (as illustrated with the x's marked on the first and second flanges 20, 22) while co-extruding the first and second interlocking elements 16, 18 with the standard base thermoplastic or other dimensionally stable material and by subsequently activating the shrinkable material forming the flanges to shrink, such as by heat, the convex or upwardly arching shape of the zipper 10 of Figures 1A and 1B is achieved.

An alternative way of achieving shrinkage in a film is to stretch the film while it is cool, and subsequently to heat the film thereby allowing the molecules to relax thereby

causing the film to return to its original length. For example, a flange material could be stretched, then a zipper profile attached to the flange. When the flange material is subsequently heated, the film will tend to shrink to its original length, resulting in an arched zipper configuration.

Similarly, as shown in Figures 2A and 2B (a concave or downwardly extending half arch and full arch, respectively), by selectively co-extruding the first and second interlocking elements 16, 18 with shrinkable material (as illustrated with the x's marked on the first and second interlocking elements 16, 18) while co-extruding the first and second flanges 20, 22 with the standard base thermoplastic or other dimensionally stable material and by subsequently activating the shrinkable material forming the interlocking elements 16, 18 to shrink, such as by heat, the concave or downwardly arching shape of the zipper 10 of Figures 2A and 2B is achieved.

Alternately, an expandable foam or other expandable polymer can be co-extruded in the locations marked by x's in Figures 1A and 1B to obtain a configuration similar to that shown in Figures 2A and 2B. Conversely, an expandable foam or other expandable polymer can be co-extruded in the locations marked by x's in Figures 2A and 2B to obtain a configuration similar to that shown in Figures 1A and 1B. Further, cross-cuts may be formed in the first and second flanges 20, 22, typically perpendicular to the interlocking elements 16, 18, and then seals formed between the portions of the zipper to provide the curvature of the zipper.

Similarly, as shown in Figures 3, 4 and 5, by selectively co-extruding the inner surfaces 30, 32 of the first and second flanges 20, 22, respectively, with shrinkable material while co-extruding the remainder of first and second profiles 12, 14 with the standard base thermoplastic or other dimensionally stable material and by subsequently activating the shrinkable material to shrink (or in the alternative embodiment, to expand), the self-opening

shape of the zipper of Figures 4 and 5 can be obtained. That is, when the first and second interlocking elements 16, 18 of respective first and second profiles 12, 14 have been separated from each other, either manually or by the movement of slider 24, the prior shrinkage of the shrinkable material forming the inner surfaces 30, 32 of the respective first and second flanges 20, 22 causes the outward springing of the central portions (i.e., generally midway between side edge 108 and side edge 110) thereby holding mouth 112 of package or bag 100 open.

Figures 6 and 7 illustrate packages or bags 100 with a curved mouth 112 extending approximately half way across the width of the package or bag 100. A curved zipper 10 follows the curved mouth 112 in a downwardly extending or concave shape in Figure 6 and an upwardly extending or convex shape in Figure 7.

Figure 8 illustrates a package or bag 100 with a zipper 10 with an undulating shape which includes concave and convex portions across a mouth 112 of a conforming undulating shape.

In Figure 9, package 200 with zipper 202 is shown being manufactured with successive package 204 with zipper 206. A header seal 208 at a 45 degree angle to the transverse machine direction separates package 200 from package 204. While the header seal is illustrated at a 45 degree angle to the transverse machine direction, other angles such as, but not limited to, 30 degrees or 60 degrees are possible. The zippers 202, 206, as well as the successive mouths of respective packages 200, 204 face each other thereby resulting in a complementary head-to-head configuration. The zippers 202, 206 are parallel to, and offset from, the header seal 208. This complementary head-to-head configuration results in the elimination or reduction of waste of film material during the manufacturing process.

Similarly in Figure 10, package 300 with sinusoidal (or otherwise undulating) zipper 302 is shown being manufactured with sequential opposing package 304 with sinusoidal (or

otherwise undulating) zipper 306. A sinusoidal (or otherwise undulating) header seal 308 is generally directed at a 45 degree angle (which may be in the range of 30 to 60 degrees but is not limited thereto) to the transverse machine direction, thereby separating package 300 from package 304. The zippers 302, 306, as well as the successive mouths of the respective packages 300, 304 face each other thereby resulting in a complementary head-to-head configuration. Ideally, the sinusoidal zippers 302, 306 are uniformly offset from the sinusoidal header seal 308. The sinusoidal shape of zippers 302, 306 is typically achieved by alternating co-extrusion of shrinkable material or expandable material. In other words, the upward arching portions of the sinusoidal shapes are achieved by co-extruding the shrinkable material on a first segment (upwardly arching) of the upper portion of the zippers 302, 306, while the downwardly arching portions of the sinusoidal shapes are achieved by co-extruding the shrinkable material on a second segment (downwardly arching) of the lower portion of zippers 302, 306, with the subsequent application of heat or other method of giving rise to the desired shrinkage. Moreover, in some embodiments, heat may be applied at selected locations or even alternating locations to provide the desired contour. Film waste is reduced by the embodiment of Figure 10.

In all of the illustrated embodiments, it is envisioned that the activation of shrinkage can be done at various stage of the manufacture of the package or bag 100, such as prior to, during, or after the application of the zipper 10 to the package or bag 100.

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 reclosable package including front and rear package walls with an opening forming a mouth, the mouth having a curved shaped in the plane of the front and rear package walls and being reclosable by a zipper, wherein the zipper includes first and second profiles with a shape which conforms to the curved shape of the mouth.
2. The reclosable package of Claim 1 wherein the mouth extends substantially a width of the reclosable package.
3. The reclosable package of Claim 1 wherein the mouth extends less than a width of the reclosable package.
4. The reclosable package of Claim 1 wherein the curved shape is upwardly arching.
5. The reclosable package of Claim 1 wherein the curved shape is downwardly arching.
6. The reclosable package of Claim 1 wherein the curved shape includes a first portion which is upwardly arching and a second portion which is downwardly arching.
7. The reclosable package of Claim 1 further including a slider to selectively interlock or separate the first and second interlocking elements.

8. The reclosable package of Claim 1 wherein the first and second interlocking elements flex away from each other when the first and second interlocking elements are not interlocked with each other.
9. A zipper for a reclosable package or bag, including:
a first zipper profile and a second zipper profile; and
wherein a first portion of at least one of the first and second zipper profiles is formed with a shrinkable material and wherein a second portion of at least one of the first and second zipper profiles is formed with a dimensionally stable material, whereby shrinkage of the shrinkable material causes the zipper to change shape.
10. The zipper of Claim 9 wherein the first zipper profile includes a first interlocking element and a first flange and wherein the second zipper profile includes a second interlocking element and a second flange.
11. The zipper of Claim 10 wherein the first portion of at least one of the first and second zipper profiles includes the first and second flanges.
12. The zipper of Claim 11 wherein the dimensionally stable material is a thermoplastic polymer.
13. The zipper of Claim 11 wherein the shrinkable material is polyolefin-based material which shrinks in response to heat.

14. The zipper of Claim 9 further including a slider to selectively interlock or separate the first and second interlocking elements.
15. A zipper for a reclosable package or bag, including:
 - a first zipper profile and a second zipper profile; and
 - wherein a first portion of at least one of the first and second zipper profiles is formed with an expandable material and wherein a second portion of at least one of the first and second zipper profiles is formed with a dimensionally stable material, whereby expansion of the expandable material causes the zipper to change shape.
16. The zipper of Claim 15 wherein the first zipper profile includes a first interlocking element and a first flange and wherein the second zipper profile includes a second interlocking element and a second flange.
17. The zipper of Claim 16 wherein the first portion of at least one of the first and second zipper profiles includes the first and second flanges.
18. The zipper of Claim 17 wherein the dimensionally stable material is a thermoplastic polymer.
19. The zipper of Claim 15 wherein the expandable material is a foam which expands in response to heat.
20. The zipper of Claim 15 further including a slider to selectively interlock or separate the first and second interlocking elements.

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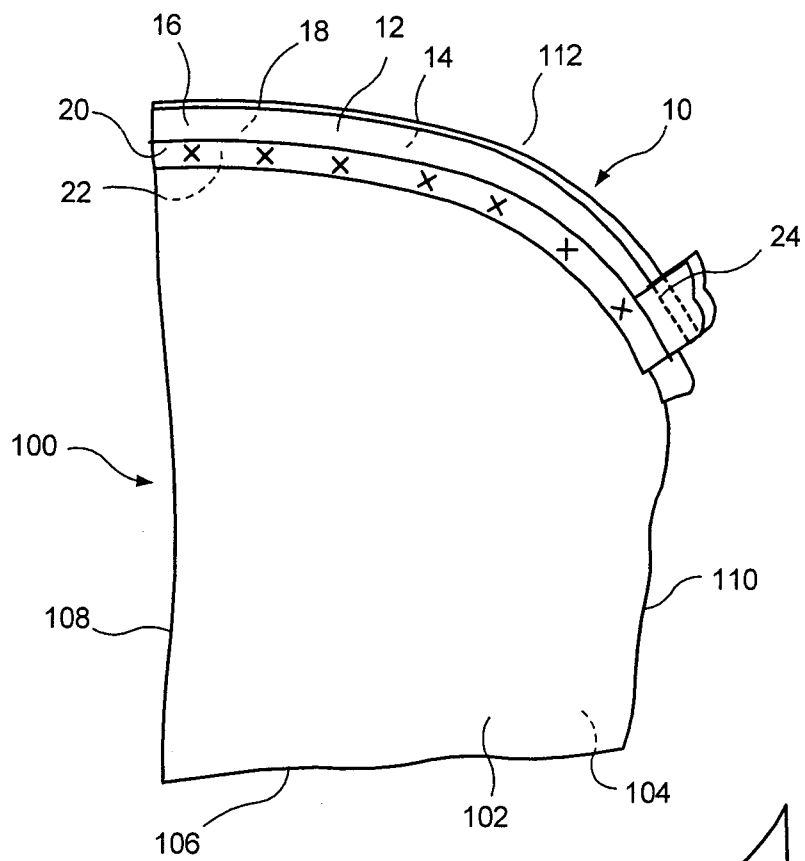


FIG. 1A

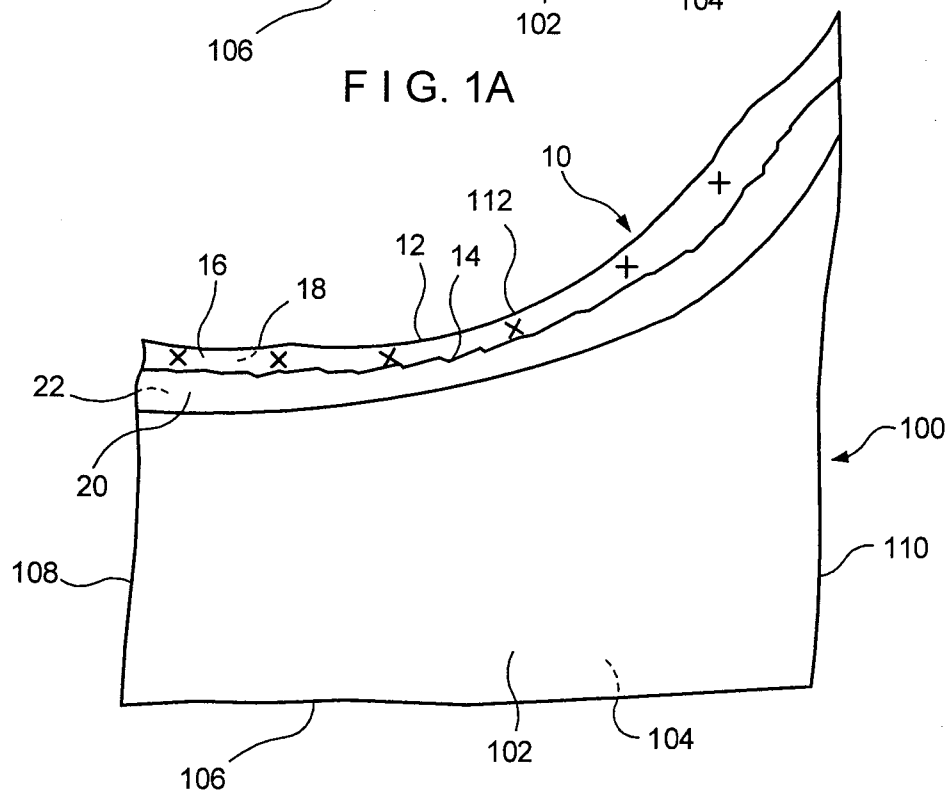


FIG. 2A

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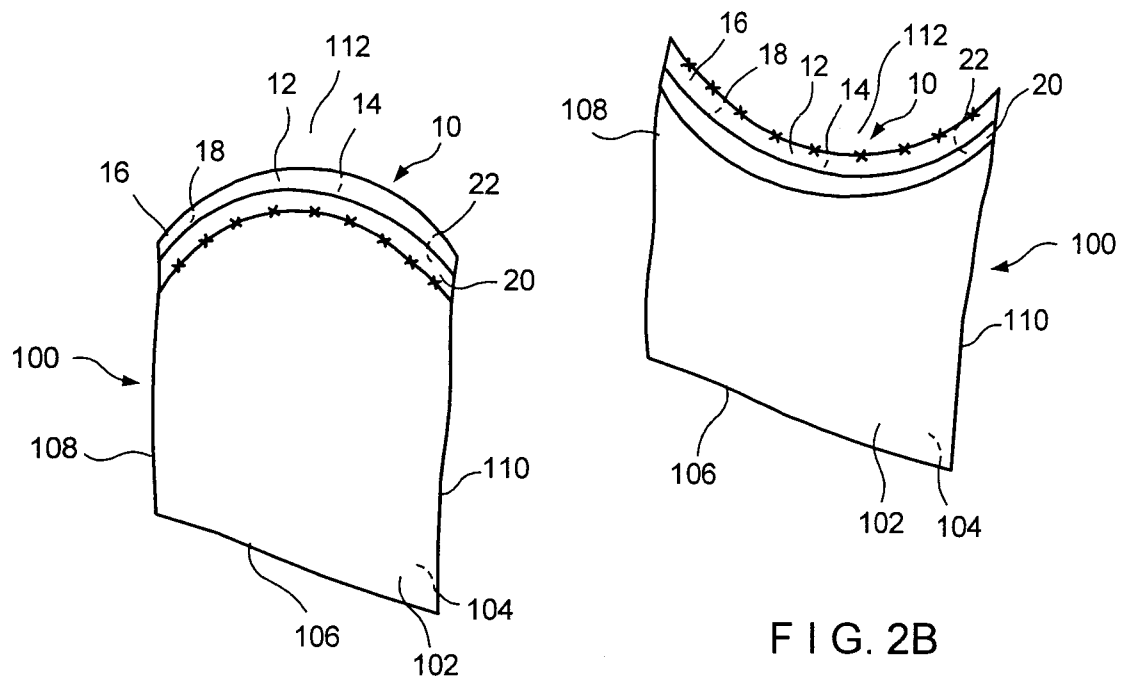


FIG. 1B

FIG. 2B

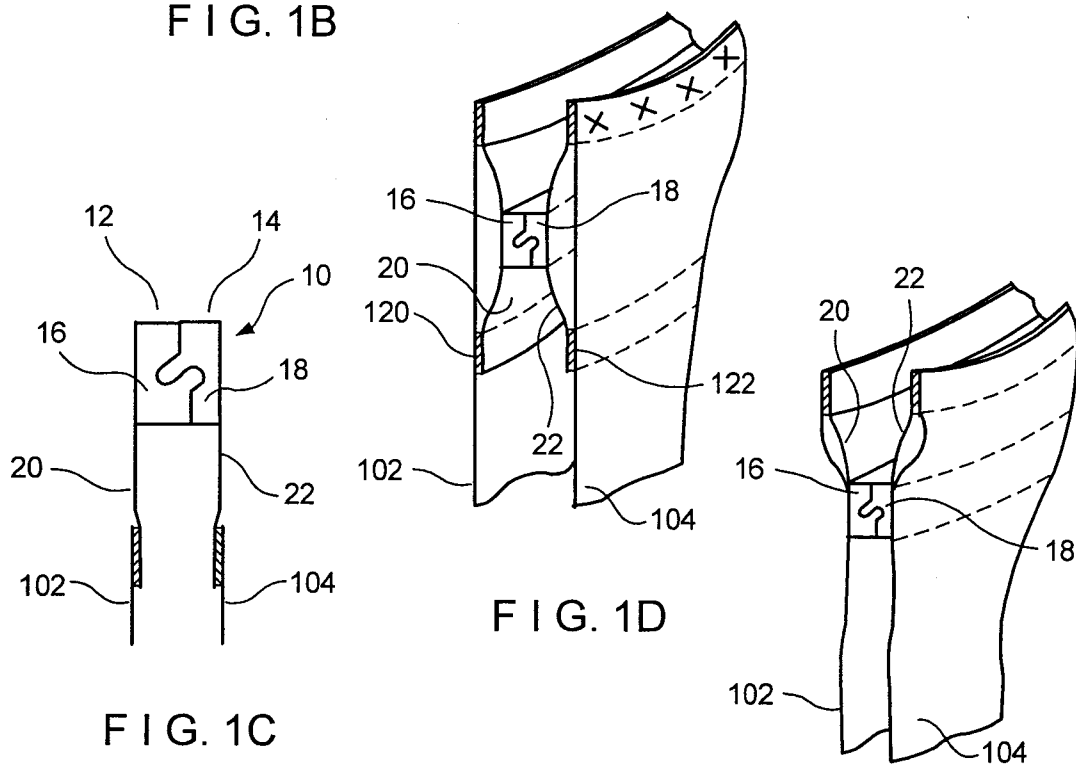


FIG. 1C

FIG. 1D

FIG. 1E

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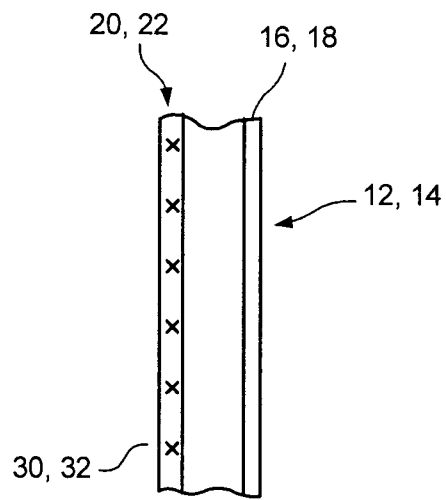


FIG. 3



FIG. 4

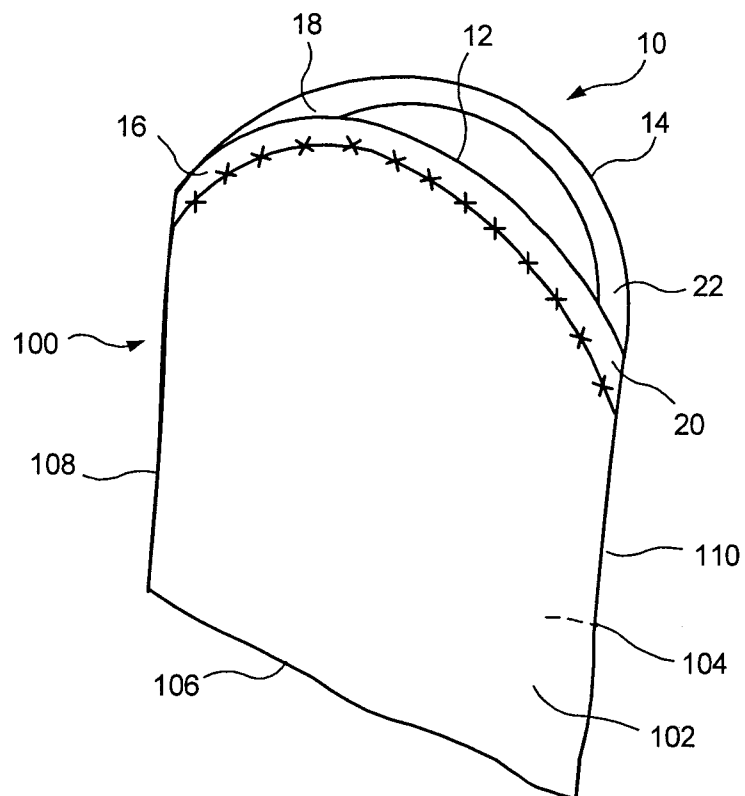


FIG. 5

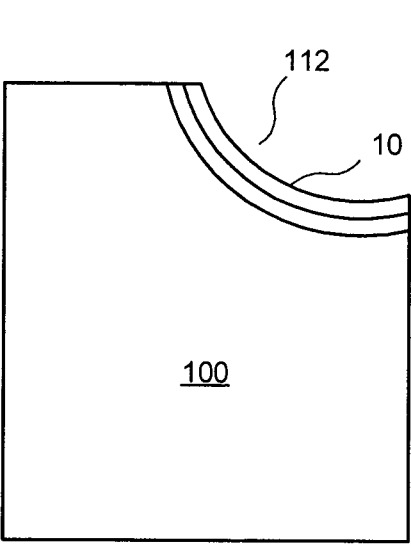


FIG. 6

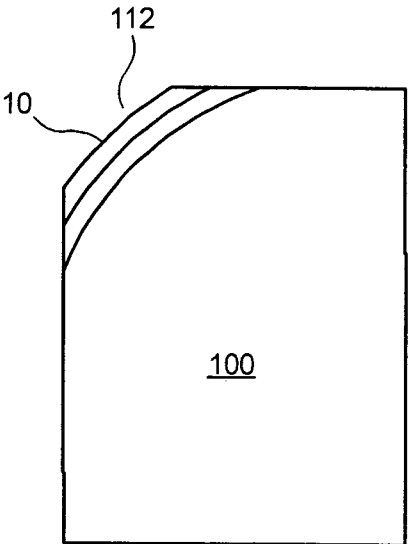


FIG. 7

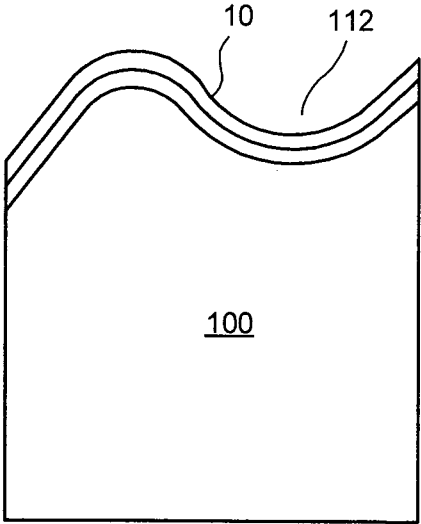


FIG. 8

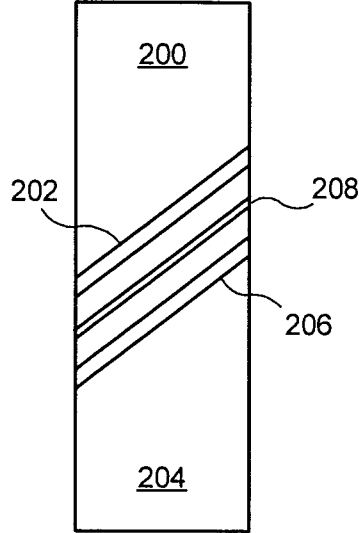


FIG. 9

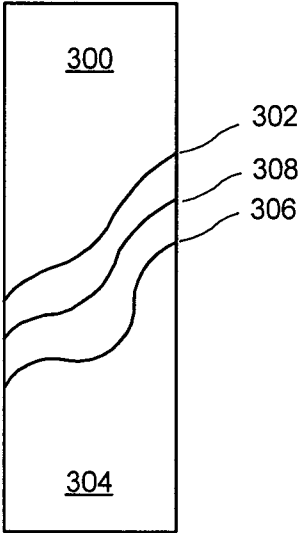


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2010/029120

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B31B 1/90 (2010.01)

USPC - 383/61.3

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)

IPC(8) - B31B 1/90; B65D 33/16 (2010.01)

USPC - 24/399; 383/5, 61.3, 63, 64, 66, 203, 210.1; 493/212, 213, 214

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/0285777 A1 (HOWELL et al) 21 December 2006 (21.12.2006) entire document	1-20
A	US 2002/0033396 A1 (HUPP et al) 21 March 2002 (21.03.2002) entire document	1-20
A	US 7,011,448 B2 (OLIN) 14 March 2006 (14.03.2006) entire document	1-20
A	US 6,719,678 B1 (STERN) 13 April 2004 (13.04.2004) entire document	1-20



Further documents are listed in the continuation of Box C.



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

"&" document member of the same patent family

Date of the actual completion of the international search

10 May 2010

Date of mailing of the international search report

24 MAY 2010

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