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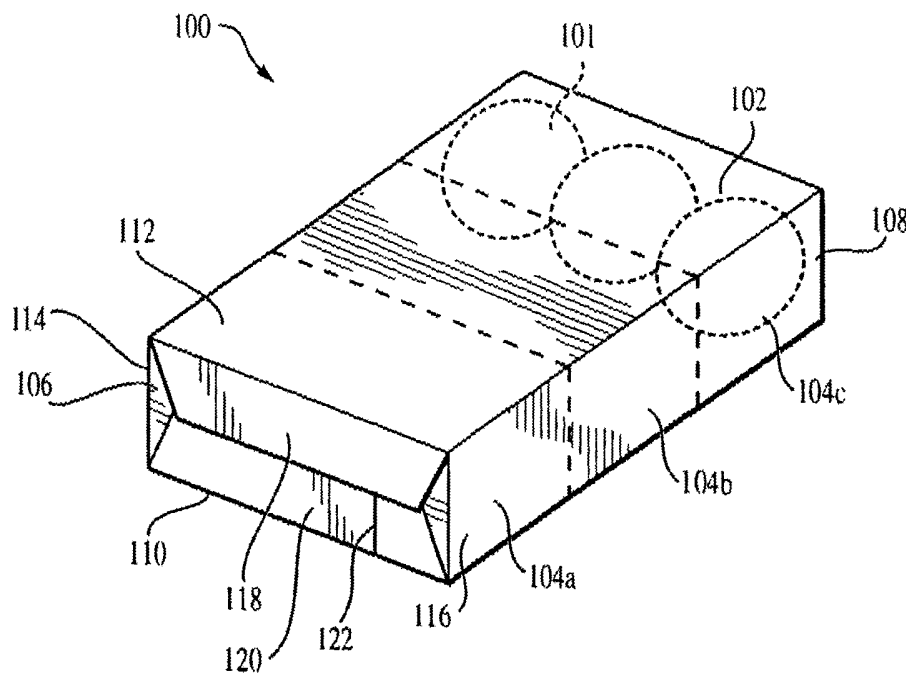
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- (71) Applicant: **SPALDING SPORTS WORLDWIDE, INC.** [US/US]; 425 Meadow Street, P.O. Box 901, Chicopee, MA 01021-0901 (US). For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PACKAGING FOR GOLF BALLS



(57) Abstract: A package and related technique is disclosed for wrapping and enclosing a collection of golf ball sleeves that avoids the use of costly retaining boxes or cartons. The package comprises an opaque, or partially transparent multi-layer overwrap. The resulting package inhibits light transmission, exhibits high strength and is economical.



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PACKAGING FOR GOLF BALLS

5 Priority for the present application is derived from U.S. Provisional Application Serial No. 60/352,104 filed on January 25, 2002 and U.S. Provisional Application Serial No. 60/370,945 filed on April 8, 2002. Additionally, the present application also claims priority to U.S. Design Patent Application Nos. 29/154,561; 29/154,630; and 29/154,562, all filed on January 25, 2002. These
10 applications are also incorporated herein by reference.

Field of the Invention

The present invention relates to novel materials, configurations, and
15 methods for the packaging of golf balls, and particularly for the packaging of multiple sleeves of golf balls. The invention is more specifically directed to the use of overwraps, such as multi-layer overwraps, for packaging various arrangements and configurations of golf ball sleeves. The present invention eliminates the need for prior art boxes and cartons that are otherwise required
20 for retaining multiple sleeves of golf balls. The present invention also relates to methods for economically and securely packaging multiple sleeves of golf balls and the resulting packaged products produced thereby.

Background of the Invention

25 Golf balls are typically packaged in small, generally rectangular cardboard boxes referred to in the industry as "sleeves." These boxes may or may not have a window, which allows for one or more of the balls to be viewed. Sleeves are customarily sized to accommodate three golf balls per sleeve, however
30 sleeves are known that accommodate greater (i.e., four or more) or lesser (i.e., two or less) numbers of balls.

The balls are generally arranged within the sleeve such that they are aligned with one another along the length or longitudinal axis of the sleeve. Examples of such golf ball sleeves are described and shown in U.S. Patent Nos.
35 5,044,548 to Olsen et al. as item 4 and 6,290,062 to Ohno et al. as item 11.

Alternative configurations are also available for arranging balls within a sleeve. Examples of such alternative configurations include arranging the balls in triangular configurations, in round packages, in tubes, and other novelty configurations.

5 Golf balls are usually sold in larger, generally rectangular cardboard retaining boxes that hold and retain multiple sleeves. Although the number of sleeves grouped within a box may vary, it is typical for groups of 4-6 sleeves to be arranged and sold together. The sleeves are generally arranged side-by-side within the box such that the widths of each sleeve are aligned with one another
10 along the length or longitudinal axis of the retaining box. This results in a retaining box having, for example, a 1 x 4, 1 x 5, 1 x 6, etc. sleeve arrangements. An example of such a retaining box is illustrated in the '062 patent as item 1 and in the '548 patent as items 2 and 3. However, retaining boxes of alternative sleeve arrangements, such as a 2 x 2 sleeve arrangement, are also available.

15 Generally, all of the balls within a particular sleeve are labeled with the same number (i.e., 0, 1, 2, 3, 4, etc.) or indicia (i.e., hearts, diamonds, spades, clubs, etc.). In turn, the balls of the various sleeves contained within a retaining box generally have differing numbers or indicia. This allows for golfers utilizing the same brand or type of ball to distinguish their balls from one another during
20 play.

Most of the boxes for retaining sleeves of golf balls have a top with four downwardly extending sides, sometimes referred to as a lid, and a bottom with four upwardly extending sides. The top and bottom components are sized such that the top is slightly larger than the bottom, and such that the top closely fits
25 over and about the bottom when the box is closed.

Furthermore, it is customary for at least the top or lid of the retaining box to contain decorative artwork, printing and/or labeling. Sometimes, one or more sides of the top also contain such printing. And, it is also known to provide decorative printing, logos, or product information on the bottom component of the
30 box. Although aesthetically pleasing, such printing increases the cost of packaging and further adds to the overall manufacturing time of the final packaged product.

Prior to shipping and distributing retaining boxes containing multiple sleeves for retail sale, the boxes are often further wrapped in a thin protective plastic layer. Typically, these thin layers are in the form of conventional shrink-wrapping. This is a technique of packaging with plastic film in which strains in the plastic are released by raising the temperature of the film, causing it to shrink-fit over the object being packaged. Although not significantly increasing the overall strength and rigidity of the package, the protective layer assists in decreasing the ingress of moisture, dust, etc. into the package, and it also reduces theft of sleeves or individual golf balls from the package. Such protective layers further add to the overall cost and manufacturing time for the final packaged product.

In view of the desire to reduce packaging costs and time to complete the final packaged product, it would be desirable to eliminate one or more of these packaging components. It would also be desirable to eliminate one or more of these packaging components in order to reduce the overall process time for packaging the final multi-sleeve package.

Additionally, elimination of the retaining boxes would also result in a smaller and lighter packaged product. This will reduce storage space, reduce transportation costs, increase the amount of multi-sleeve packages available for limited in-store shelf space, etc.

As previously noted, it is known to pack multiple cartons or containers within a layer of shrink wrapping. However, such wrapping, which deforms and generally contracts upon application of heat, is not typically amenable to receiving printing and other markings. Moreover, shrink-wrapping materials generally exhibit relatively low blocking or masking characteristics. Consequently, they are not all that useful in minimizing viewing of a package's internal contents, etc. Furthermore, such wrapping is, in many instances, not strong enough to retain its contents without the use of a stronger, more rigid retaining box. Additionally, such wrapping is considered by some consumers to be aesthetically unattractive.

It is also known to package cartons or containers within a layer of other material besides shrink-wrap. Examples of this practice include gift wrapping as described in U.S. Patent Nos. 3,311,289 to French, and 5,337,943 to Hendren.

However, as far as is known, previous practices involving the wrapping of cartons were merely for either covering the carton to mask its contents, or merely for decorative purposes.

Accordingly, there is a need for an improved packaging for golf balls, one which serves to promote the aesthetics and attractiveness of the final wrapped package, and furthermore, one which also serves to sufficiently increase the resulting strength and rigidity of the wrapped package such that various packaging components, otherwise necessary, can be eliminated. It would be particularly desirable to provide such a package and a method for producing such a package, that are both adapted for the golf ball field.

Summary of the Invention

In one aspect, the present invention provides a package for economically and securely retaining multiple sleeves of golf balls. The package comprises a collection of golf ball sleeves, which is directly enclosed by an opaque, partially opaque, transparent, or partially transparent overwrap, preferably a multi-layer sheet. The sheet is substantially resistant to shrinkage. The resulting package is non-rigid but sufficiently strong such that an intermediate retaining box for holding the collection of sleeves is not required. The invention results in a uniform, symmetrical, semi-flexible package, which is conducive to packaging in larger transportation packages or for stacking or display.

In another aspect, the present invention provides a package that is particularly adapted for distribution and retail display of a plurality of golf ball sleeves. The package comprises a collection of golf ball sleeves and a sheet of opaque, partially opaque, transparent, or partially transparent multi-layer film disposed about and enclosing the collection of sleeves. The multi-layer film includes an inner layer adjacent to the sleeves that is formed from a polymer and a thin metallic foil overlay. The multi-layer film also includes an outer layer formed from a polymer. The interior surface of the outer layer also contains decorative artwork, printing, painting and/or labeling indicia. This results in the metallic foil and printing indicia being sandwiched between two polymer layers.

In yet another aspect, the present invention provides a multi-sleeve golf ball pack having a generally rectangular shape and comprising a plurality of

sleeves and an opaque, or partially opaque, multi-layer sheet enclosing the sleeves. The multi-layer sheet includes an inner layer immediately adjacent to the sleeves and formed from a polyolefin material and a thin metallic foil overlay, and an outer layer comprising a second polyolefin material. Printing indicia
5 reversibly applied may also be present on the interior surface of the outer polyolefin material next to the thin metallic overlay of the inner layer. The multi-layer sheet is resistant to shrinkage, exhibiting a shrinkage rate of about 2% or less.

In a further aspect, the present invention provides a method for packaging
10 a plurality of golf ball sleeves. The method comprises providing an opaque, partially opaque, transparent, or partially transparent multi-layer film having an inner layer of a polyolefin and a metal foil, and an outer layer of a polyolefin. The outer polyolefin contains on its interior surface, reversibly printed display or print indicia. The method also includes a step of enclosing the sleeves with the multi-
15 layer film such that the metal foil of the inner layer of the multi-layer film contacts the deposited print indicia. The enclosing operation is performed by securing together two opposite edges of the film by cold seal, hot seal, etc.

In an additional aspect, there is provided a new and improved package for shipping, storing, and/or displaying golf ball sleeves. Preferably, the packaging
20 material is relatively non-rigid and opaque to avoid, or minimize, light transmittal. More preferably, the sleeves are packaged in arrangements of 1 x 2, 1 x 3, 1 x 4, 1 x 5, and 1 x 6. Other arrangements are also possible such as 2 x 2, 3 x 3, etc. The package provides protection during shipment and storage, and also provides a surface for the aesthetically pleasing presentation of advertising,
25 graphic or display information and the like. Moreover, the resulting package has the rigidity necessary for subsequent shipping and handling without the necessity of utilizing boxes or cartons that are otherwise required for retaining multiple sleeves of golf balls.

These and other objects and features of the present invention will be
30 apparent from the following description of the drawings and the detailed description of the preferred embodiments.

Brief Description of the Drawings

The invention may take form in various components and arrangements of components and in various steps and arrangements of steps. The drawings are only for purposes of illustrating preferred embodiments and are not to be construed as limiting the invention.

Fig. 1 is a perspective view illustrating a preferred three-sleeve pack (i.e., 1 x 3) embodiment in accordance with the present invention;

Fig. 2 is a perspective view of a preferred four-sleeve pack (i.e., 1 x 4) embodiment in accordance with the present invention;

Fig. 3 is a perspective view of a preferred five-sleeve pack (i.e., 1 x 5) embodiment in accordance with the present invention;

Fig. 4 is a perspective view of a preferred six-sleeve pack (i.e., 1 x 6) embodiment in accordance with the present invention;

Figs. 5-9 are perspective views illustrating a first end of a preferred multi-sleeve pack embodiment undergoing various stages of wrapping in accordance with a preferred technique of the present invention;

Fig. 10 is a perspective view of a preferred multi-sleeve pack embodiment illustrating in greater detail the multi-layers of the preferred embodiment overwrap and exemplary printing and marking configurations deposited upon the overwrap;

Fig. 11 is a perspective view illustrating an end and a bottom surface of a preferred multi-sleeve pack embodiment in accordance with the present invention;

Fig. 12 is a perspective view of another preferred multi-sleeve pack embodiment in accordance with the present invention;

Fig. 13 is a perspective view of yet another preferred multi-sleeve pack embodiment in accordance with the present invention; and

Figs. 14A, B, and C are perspective views of three, four, and six pack embodiments of the invention respectively showing the interior sleeves and balls in phantom.

Detailed Description of the Preferred Embodiments

The present invention provides a unique and novel packaging configuration for multiple sleeves of golf balls. The present invention encompasses multi-sleeve packs such as a three-sleeve pack, a four-sleeve pack, a five-sleeve pack, and a six-sleeve pack. These preferred embodiments are illustrated in **Figures 1-4**, respectively. The present invention further encompasses packages containing more than six sleeves such as eight, nine, or more sleeves. The present invention also includes packages containing two sleeves.

Fig. 1 is a perspective view illustrating a preferred three-sleeve pack embodiment in accordance with the present invention. The three-sleeve pack **100** comprises overwrap **102** which surrounds and encloses three sleeves, sleeve **104a**, sleeve **104b**, and sleeve **104c**. It will be appreciated that each of the sleeves contains one or more golf balls **101**. As an example, **Fig. 1** illustrates sleeve **104c** containing three golf balls **101**. The three-sleeve pack **100** includes a first end **106**, a second opposite end **108**, and a top **112**, and a bottom **110** extending therebetween. Also extending between the first and second ends **106** and **108**, respectively, are a first longitudinal side **114** and a second opposite longitudinal side **116**. The first longitudinal side **114** and the second longitudinal side **116** also extend between the top **112** and the bottom **110**. Defined along each end of the preferred embodiment pack **100** are an upper flap **118** of folded overwrap and a lower flap **120** of folded overwrap. As explained in greater detail herein, a seam **122** extends along a portion of the first end **106**, along the entire length of the bottom **110**, and along a portion of the second end **108**. Preferably, the seam **122** is relatively transparent.

Fig. 2 is a perspective view illustrating a preferred four-sleeve pack embodiment in accordance with the present invention. The four-sleeve pack **200** comprises overwrap **202** which surrounds and encloses four sleeves, sleeve **204a**, sleeve **204b**, sleeve **204c**, and sleeve **204d**. The four-sleeve pack **200** includes a first end **206**, a second opposite end **208**, and a top **212**, and a bottom **210** extending therebetween. Also extending between the first and second ends **206** and **208**, respectively, are a first longitudinal side **214** and a second opposite longitudinal side **216**. The first longitudinal side **214** and the

second longitudinal side **216** also extend between the top and bottom **212** and **210**, respectively. Defined along each end of the preferred embodiment pack **200** are an upper flap **218** of folded overwrap and a lower flap **220** of folded overwrap. As explained in greater detail herein, a seam **222**, preferably
5 relatively transparent, extends along a portion of the first end **206**, along the entire length of the bottom **210**, and along a portion of the second end **208**. This is described in greater detail herein.

Fig. 3 is a perspective view illustrating a preferred five-sleeve pack embodiment in accordance with the present invention. The five-sleeve pack **300**
10 comprises overwrap **302** which surrounds and encloses five sleeves, sleeve **304a**, sleeve **304b**, sleeve **304c**, sleeve **304d**, and sleeve **304e**. The five-sleeve pack **300** includes a first end **306**, a second opposite end **308**, and a top **312**, and a bottom **310** extending therebetween. Also extending between the first and second ends **306** and **308**, respectively, are a first longitudinal side **314** and a
15 second opposite longitudinal side **316**. The first longitudinal side **314** and the second longitudinal side **316** also extend between the top and bottom **312** and **310**, respectively. Defined along each end of the preferred embodiment pack **300** are an upper flap **318** of folded overwrap and a lower flap **320** of folded overwrap. As referenced below, a seam **322** extends along a portion of the first
20 end **306**, along the entire length of the bottom **310**, and along a portion of the second end **308**.

Fig. 4 is a perspective view illustrating a preferred six-sleeve pack embodiment in accordance with the present invention. The six-sleeve pack **400**
25 comprises overwrap **402** which surrounds and encloses six sleeves, sleeve **404a**, sleeve **404b**, sleeve **404c**, sleeve **404d**, sleeve **404e**, and sleeve **404f**. The six-sleeve pack **400** includes a first end **406**, a second opposite end **408**, and a top **412**, and a bottom **410** extending therebetween. Also extending between the first and second ends **406** and **408**, respectively, are a first longitudinal side **414** and a second opposite longitudinal side **416**. The first
30 longitudinal side **414** and the second longitudinal side **416** also extend between the top and bottom **412** and **410**, respectively. Defined along each end of the preferred embodiment pack **400** are an upper flap **418** of folded overwrap and a lower flap **420** of folded overwrap. A seam **422** extends along a portion of the

first end **406**, along the entire length of the bottom **410**, and along a portion of the second end **408**. This is again described in greater detail herein.

Figs. 5-9 illustrate a first end of a multi-sleeve pack, which is undergoing packaging by use of the overwrap in accordance with the present invention.

5 These figures also illustrate a preferred technique for enclosing a collection of sleeves with overwrap in accordance with the present invention. Specifically, **Fig. 5** illustrates an end **506** of a preferred embodiment multi-sleeve pack **500**. The multi-sleeve pack **500** includes a plurality of sleeves, such as sleeves **504a**, **504b**, etc. which are arranged in a side-by-side configuration. Other
10 configurations are also possible for arranging the sleeves and are encompassed by the present invention.

An effective amount of overwrap **502** is placed over the collection of sleeves. The overwrap is arranged such that it is fitted over the collection of sleeves, around their exposed ends, and joined along the opposite side of the
15 sleeves. As previously described herein, the resulting pack **500** includes a top and bottom **512** and **510**, respectively, that extend between a first and a second longitudinal side **514** and **516**, respectively. The overwrap **502** is in a sheet or layer form and is defined by two opposing edges referred to herein as a first longitudinal overwrap edge **530** and a second opposite longitudinal overwrap
20 edge **532**. The overwrap is oriented relative to the collection of sleeves such that these edges **530**, **532** extend along the length of the collection of sleeves. Restated, the overwrap is oriented relative to the collection of sleeves such that the edges **530**, **532** extend in a direction that is perpendicular to the longitudinal dimension of each of the sleeves (for sleeves containing at least two balls). The
25 term "longitudinal dimension" as used herein refers to the length as measured along the longitudinal sides of the multi-sleeve packs described herein.

As described in greater detail herein, the edges **530** and **532** are joined together to form a seam. That seam extends along the bottom of the resulting multi-sleeve pack and further extends along portions of the first and second
30 ends. It is most preferred to locate the seam of the multi-sleeve packs described herein along the bottom or underside of the package. And, it is most preferred to orient the seam so that it is parallel to the longitudinal dimension of the resulting multi-sleeve pack. However, other variations and configurations for the seam

are encompassed by the present invention. For example, it is contemplated to define the seam directly along one of the longitudinal sides of the pack.

As further illustrated in **Fig. 5**, it is preferred that the overwrap **502** extend beyond each of the ends of the collection of sleeves, such as the end **506**. The amount of overwrap **502** that extends beyond an end is herein designated as distance **E** and is generally at least about one-half the height of the multi-sleeve pack **500**, as measured along either of the sides **514** and **516**, or the end **506**. As shown in **Fig. 5**, this height dimension would extend vertically along side **514** for instance.

Fig. 6 illustrates the preferred embodiment multi-sleeve pack **500** in which the overwrap **502** has been joined along the previously noted edges **530** and **532** to thereby form a seam **522**. At this stage, the overwrap **502** extends over the top and bottom of the collection of sleeves and thereby forms the top and bottom **512** and **510**, respectively, of the pack **500** and also extends about the first and second longitudinal sides **514** and **516**, respectively. However, each end of the pack **500** is open and one side of each of the two outermost sleeves is exposed. One such exposed end is first end **506**.

Fig. 7 illustrates a preferred folding configuration for enclosing each of the ends of the multi-sleeve pack **500**. In this configuration, the portion of overwrap **502** which extends beyond the first end **506** and located adjacent the first and second longitudinal sides **514** and **516** is pushed inward toward the center of the multi-sleeve pack **500** against the first end **506**. This is depicted by arrow **A**. Each of the folded regions of overwrap is then further contacted along the side of the exposed sleeve such as at end **506**. This defines an upper flap **518** and a lower flap **520**.

Fig. 8 illustrates the next step of the preferred embodiment folding technique in which the lower flap **520** is folded upward until it contacts the exposed side of the sleeve along first end **506**.

Fig. 9 illustrates the next step in which the upper flap **518** is folded downward and over at least a portion of the lower flap **520**. Preferably, adhesive is not used to seal the end of the multi-sleeve pack **500**. Instead, localized heat is preferably used to partially melt and bond the various flaps and folded edges to themselves and thereby effectively seal the end of the resulting package.

Fig. 10 illustrates an end **606**, which is open and unsealed, of another preferred embodiment multi-sleeve pack **600**. **Fig. 10** also illustrates, in an exploded view fashion, a plurality of layers constituting the overwrap **602**. The pack **600** includes an effective amount of overwrap **602** that encloses and seals a plurality of sleeves as described herein. **Fig. 10** further illustrates the multi-sleeve pack **600** prior to the overwrap being entirely sealed around the plurality of sleeves. Accordingly, the overwrap defines a first longitudinal overwrap edge **630** and a second longitudinal overwrap edge **632**. Edges **630** and **632** are joined together to thereby form a seal as described herein. Other variations of the packaging operation are also possible. Most preferably, the seam is aligned with the longitudinal axis of the package. Moreover, in order to preserve the preferred style of graphics, the seam is preferably on the bottom and the other seals are on the ends. However, the seam can also exist on one of the longitudinal sides.

Fig. 10 additionally illustrates that the overwrap **602** preferably includes a plurality of layers. In a most preferred aspect, the overwrap **602** includes an inner layer of material **650** and an outer layer of material **652**. This is described in greater detail herein. Deposited upon the inner surface area of outer layer **652** of the overwrap **602**, are various printing and marking designations. These are illustrated in **Fig. 10** as **654a**, **654b**, and **654c**. These regions may be colored (i.e., four-color, etc.) and are reverse-printed upon the inner surface area of the outer layer of the overwrap as desired. Although optional, the inner layer **650** preferably includes a metallic foil or liner. This is also described in greater detail herein.

As previously noted, in closing or sealing each of the exposed ends of the multi-sleeve packs described herein, it is preferred that adhesive not be used. Instead, application to a localized heat source is preferably employed to close off or seal each end of the resulting package. However, the present invention includes the use of an adhesive at one or both ends to seal the resulting package. Depending upon the adhesive selected, various degrees of sealing and permeability may be obtained.

Preferably, the overwrap is an opaque, or partially opaque, transparent, or partially transparent multi-layer flexible wrapping material. The multi-layer material includes an outer layer of polymeric or plastic material that, upon the overwrap being wrapped about a collection of sleeves, constitutes the outermost layer of the overwrap. The polymeric or plastic material is preferably a polyolefin such as polypropylene, but it may comprise other materials including, but not limited to, acrylonitrile-butadiene-styrenes, acrylics, cellophane, cellulose, fluoropolymers, ionomers, polyamides, polycarbonates, polyesters, polyimides, polyethylenes, polystyrenes, vinyls, and polyurethanes. On the inner surface of the outer layer, print indicia, such as designs, drawings, graphics, type, etc., may be deposited in reverse format. The preferred thickness of the first outer layer is from about 0.01 mm to about 0.25 mm. The preferred gauges of the first, or outer layer are from about 50 to about 200; more preferably 80 to 160; and most preferably about 120 gauge.

The multi-layer material further includes an inner layer of a polymeric or plastic material. The inner layer also includes a thin layer of metal or foil. The thin layer of metal or foil is desirable in order to block out, or mask, visibility of underlying material, to add strength, etc. The inner layer is oriented such that the metal or foil layer is directed outwardly and most preferably contacting the print indicia of the outer layer. The inner layer is preferably a polyolefin and most preferably polypropylene in combination with a thin metal film. As a result of the inclusion of the thin metal film, the material shrinks only a minimal amount (i.e. about 2%). A preferred thickness for the second layer is from about 0.01 mm to about 0.25 mm. The preferred gauge of the second, or inner layer, is from about 60 to about 100; more preferably 70 to 90; and most preferably about 80 gauge.

An example of a commercially available material suitable for use as the outer layer of the overwrap as described herein, is available from AET Films, of New Castle, Delaware, under the designation PST-2 Transparent OPP film. PST-2 is a transparent, coextruded, biaxially oriented polypropylene (OPP) film. It has a sealant layer on one side and a treated bonding/print layer on the other side. The non-sealable side is surface treated for adhesions of inks, etc., to provide high-quality graphics. The PST-2 multi-layer film is available in a wide

range of thicknesses, such as from 60 gauge to 140 gauge. Properties of this preferred material are set forth below:

Physical Properties of PST-2 Film

Physical Properties	Machine Direction	Transverse Direction
Tensile strength, psi	21,000	40,000
Tensile modulus, psi	300,000	550,000
Elongation, %	170	60
Shrinkage at 248°F, % ⁽¹⁾	<10	<10
Optical Properties		
Haze, % ⁽²⁾	2.2	
45° Gloss ⁽³⁾	87	
Surface Properties		
COF		
Sealant to Sealant (kinetic)		
0.26		
Barrier Properties		
Gauge	WVTR ⁽⁴⁾	
60	0.54	
70	0.49	
80	0.40	
100	0.34	
120	0.27	
Seal Properties		
Seal strength at 240°F (g/in.)		
230		
20 psi, 1/2 second		

- 5 ⁽¹⁾ AET Method
- ⁽²⁾ ASTM D-1003
- ⁽³⁾ ASTM D-2457
- ⁽⁴⁾ g/100 in²/24 hr at 100°F., 90% RH

10 Another preferred commercially available material for forming the outer layer of the overwrap is SPW-L (Bicor®), available from Exxon Mobil Chemical Company (Films Business) of Macedon, New York. Bicor SPW-L is a one-side treated, one side sealable, coextruded OPP film. The treated surface side provides for

15 enhanced ink adhesion. It is available in the following gauges:

Product	Gauge (mil)	Gauge (micron)	Yield (in ² /lb)	Yield (m ² /kg)
70 SPW-L	.70	18	44,000	62.5
90 SPW-L	.90	23	34,000	48.3
120 SPW-L	1.20	30	25,400	36.1

These OPP films have the following properties:

PROPERTY	UNITS	TEST PROC. #	70 SPW-L	90 SPW-L	120 SPW-L
Average Values of Critical Properties					
Yield	in ² /lb	520	44,000	34,000	25,400
	m ² /kg	520	62.5	48.3	36.1
Unit Weight	lb/ream	520	9.8	12.7	17.0
	g/m ²	520	16.0	20.7	27.7
Haze	%	444	2.0	2.0	2.0
COF	untr/untr	430	.25	.25	.25
Descriptive Properties					
Gauge	mil	nominal	.70	.90	1.20
	micron	nominal	18	23	30
Tensile Strength	MD	lb/in ²	20,000	20,000	20,000
		N/mm ²	140	140	140
	TD	lb/in ²	36,000	36,000	36,000
		N/mm ²	250	250	250
Dimensional Stability @ 275°F (135°C)	MD	% change	-4.5	-4.5	-4.5
	TD	% change	-5.0	-5.0	-5.0
Gloss (45°)		442	88	88	88
WVTR @ 100°F (38°C), 90% RH	g/100 in ² /24 hr	518	.47	.36	.26
	g/m ² /24 hr	518	7.3	5.6	4.0
Crimp Seal MST to achieve a 200 g/in seal to achieve a 200 g/2.5 cm seal	°F	490	225	225	225
	°C	490	107	107	107

5

An alternative, and currently somewhat less preferred OPP film for use as the outer layer in the overwrap of the present invention is AmTopp-VA produced by AmTopp[®] Division of Interplast Group, Ltd. of Livingston, New Jersey. The AmTopp-VA film is a co-extruded, two side sealable, one side treated for ink adhesion, biaxially oriented film. It is available in the following gauges:

10

	VA18	VA20	VA22	VA25	VA30	VA35
Thickness (mils)	0.7	0.8	0.9	1.0	1.2	1.4
Yield (sq in/lb)	44,000	38,700	34,300	31,000	25,700	22,000
WVTR* (g/100 in ² /24 hrs)	0.52	0.48	0.45	0.41	0.38	0.28
OTR** (cc/100 in ² /24 hrs)	140	013	120	110	95	80

* ASTM F1249 (100 deg F, 100% RH)

** ASTM D3985 (72 deg F, 0% RH)

5 Additionally, AmTopp-VA has the following basic physical properties:

Physical Properties	Test Method	Unit	Typical Value
Haze	ASTM D1003-	%	2-3
Gloss (45°)	61	G.U.	85
Tensile Strength	ASTM D2457-77	PSI	MD 17,000 TD 30,000
Secant Modulus	ASTM D882	PSI	MD 250,000 TD 450,000
Elongation	ASTM D882	%	MD 190 TD 70
Coefficient of Friction (untreated)	ASTM D1894		Kinetic 0.25 Static 0.40
Shrinkage	5min., 266°F (air oven)	%	MD < 5 TD < 3
Heat Seal Range	½ sec., 30 PSI	Deg. F	Untreated 200-300 Treated 250-300

10 An example of a commercially available material suitable for use as the inner layer of the overwrap of the present invention is MT Metallized OPP Film from AET Films. MT is a metallized, biaxially oriented polypropylene (OPP) film. It is sealable on one side and metallized on the other side. The multi-layer film is available in a range of thicknesses, such as from about 60 gauge to about 80 gauge. Properties of this preferred multi-layer film are set forth below:

Physical Properties of MT Film™

Physical Properties	Machine Direction	Transverse Direction
Tensile strength, psi	18,700	36,000
Tensile modulus, psi	204,000	325,000
Elongation, %	210	75
Barrier Properties (MT)		
Gauge	WVTR⁽¹⁾	O₂TR⁽²⁾
70 gauge OPP/60 MT Lamination	0.012	6.0
70 gauge OPP/70 MT Lamination	0.01	6.0
70 gauge OPP/80 MT Lamination	0.01	6.0
Seal Properties		
Seal Strength at 240°F. g/in., Film 20 psi, 1/2 second	250	
Hot tack ⁽³⁾ g/in. at 255°F	200	

⁽¹⁾ g/100 in²/24 hr at 100°F. 90% RH
⁽²⁾ cc/100 in²/24 hr at 73°F., 0% RH
⁽³⁾ AET Method

5

A further preferred commercially available material for forming the inner layer of the overwrap is Exxon Mobile's Mellalyte™ MET. It is a moderate barrier, metallized OPP film available in 70 gauge film as shown below:

Product	Gauge (mil)	Gauge (micron)	Yield (in ² /lb)	Yield (m ² /kg)
70 MET	70	18	44,000	62.5

10

70 MET possesses the following characteristics:

Property		Units	Test Proc. #	70 MET
Average Values of Critical Properties				
Yield		in ² /lb	520	44,000
		m ² /kg	520	62.5
Unit Weight		lb/ream	520	9.8
		g/m ²	520	16.0
WVTR, flat sheet ^a @ 100°F (38°C), 90% RH		g/100 in ² /24 hr	518	.02
		g/m ² /24 hr	518	.31
Descriptive Properties				
Gauge		mil	nominal	.70
		micron	nominal	18
Tensile Strength	MD	lb/in ²	510	22,000
		N/mm ²	510	150
	TD	lb/in ²	510	34,000
		N/mm ²	510	235
Dimensional Stability @ 275°F (135°C)	MD	% change	438	-4.5
	TD	% change	438	-2.5
Light Transmission		%	456	0.4
Optical Density			474	2.4
Crimp Seal Strength ^b @205°F, 20 psi, ¼ sec @ 96°, 1.4 bars, .75 s		g/in	490	400
		g/2.5 cm	490	400
Crimp Seal MST ^b to achieve a 200 g/in seal to achieve a 200 g/2.5 cm seal		°F	490	185
		°C	490	85

- 5 Moreover, an alternative, and currently somewhat less preferred metallized OPP film for use as the inner layer in the overwrap is DF-MG_{xx}, available from DOR Film of Carmiel, Israel. DF-MG_{xx} exhibits the following properties:

PROPERTIES	UNIT	TYPICAL VALUES								TEST METHODS
Name		MG ₁₅	MG ₁₈	MG ₂₀	MG ₂₅	MG ₃₀	MG ₃₅	MG ₄₀	MG ₅₀	
Thickness	μm	15	18	20	25	30	35	40	50	
Yield	m ² /kg	72.5	60.2	54.6	43.7	36.5	31.3	27.4	22	
Tensile Strength	N/mm ²									ASTM D 882
-MD		170	165	165	165	165	165	165	165	DIN 53455
-TD		310	300	300	300	300	290	290	290	
Elongation at Break	%									ASTM D 882
-MD		160	170	175	175	175	185	185	185	882DIN 53455
-TD		60	60	65	65	65	60	60	60	
Coefficient of Friction Film/Film (Treated to Untreated)	-	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	ASTM D 1894
WVTR	Gr/m ² /24 hr	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	ASTM E 96 38°C, 90% R.H.
Oxygen Permeability	Cm ³ /m ² /24 hr (1at)	150	150	150	150	150	150	150	150	ASTM D 1434 25°C, 0% R.H.H.
Optical Density	O.D.	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	MACBETH FD 932
Heat Seal Range	°C	110°C – 150C								DOR FILM'S STNDARDS
Seal Strength	N/15mm	2.2	2.4	2.5	2.5	4.0	4.7	5.5	6.5	DOR FILM'S STANDARDS

Most preferably, the multi-layer overwrap packaging material comprises

5 an outer layer of 120 gauge oriented polypropylene (OPP) that contains print indicia on its interior surface. The inner layer of the overwrap of most packaging consists of 70-80 gauge striped metallized OPP. The metal side of the inner layer faces the printed side of the outer layer, and the two are laminated together. As a result, both the metal and the printing are protected by OPP

10 because they are sandwiched between layers. This material shrinks only about 2% because of the foil layer. Optimally included in exterior surfaces of the outer and inner layers are one or more sealant laminates or layers.

The multi-layer film may comprise layers in addition to the inner and outer layers described herein. The present invention encompasses the use of multi-

15 layer films having three, four, or greater numbers of layers. A variety of layers may be utilized depending upon the desired application and anticipated

environmental conditions to which the final multi-sleeve package will be exposed.

It is also contemplated that a wide array of materials may be used in the multi-layer sheets, such as for example acrylonitrile-butadiene-styrenes, acrylics, cellophane, cellulose, fluoropolymers, ionomers, polyamides, polycarbonates, polyesters, polyimides, polyethylenes, polypropylenes, polystyrenes, vinyls, polyurethanes, and certain engineered specialty plastics. An informative discussion of the design characteristics, physical properties, and processing factors for film and sheeting materials is provided in Kirk-Othmer, *Encyclopedia of Chemical Technology*, fourth edition, Volume 10, pages 761-787, herein incorporated by reference.

Alternatively, and less preferably, single layer sheets can also be utilized in the present invention. Although a single layer may not be as opaque, it is less expensive and fairly functional. Generally, such single layer sheets are used to package sleeves of less-expensive golf balls, such as X-outs. Examples of such single layer sheets include, but are not limited to, Bicolor™, OPPalite™ and Metallyte™ families of films available from Exxon Mobile, and BNL, BX® 323, BXT® and CHZ films available from AET. The single layer sheets are printable (treated on one or both sides) and sealable, preferably two side heat sealable, and would function in a manner similar to the multi-layer sheets previously described.

Fig. 11 illustrates a sealed end of another preferred embodiment multi-sleeve pack **700**. **Fig. 11** also illustrates the bottom of the multi-sleeve pack **700**. The pack **700** includes an overwrap **702**, which encloses a plurality of golf ball sleeves. The pack **700** includes a first end **706**, a bottom **710**, and opposite first and second longitudinal sides **714** and **716** as described herein. The first end **706** of the multi-sleeve pack **700** includes an upper flap **718** and a lower flap **720**. It will be noted that the seam **722** that extends along the bottom **710** of the multi-sleeve pack **700** also extends along a portion of the first end **706**. Specifically, the seam **722** extends only within the lower flap **720** and not within the upper flap **718**. The resulting package may be airtight, waterproof, and/or impermeable to other environmental factors or agents as desired.

Fig. 12 illustrates another preferred multi-sleeve pack embodiment **800** in accordance with the present invention. In this embodiment, the overwrap **802** is formed from materials that are transparent or non-opaque. In this embodiment, the preferred pack **800** comprises a plurality of golf ball sleeves **804a**, **804b**, etc. that are enclosed within the overwrap **802**. Pack **800** further features a seam **822** extending along its underside and preferably partially along both of its ends as previously described herein. The pack **800** additionally features a layer of coloring or other agent to provide an opaque region **850**. Preferably, the opaque region **850** extends over the entirety of the overwrap **802**, except for a transparent window region **852**. As a result of the transparency of window region **852**, one or more sleeves **804**, e.g. **804a** and **804b**, are visible. In the event that the overwrap **802** comprises a metal foil layer (which is generally opaque), it is preferred that the metal foil layer not extend within the region of the window **852**.

Fig. 12 further illustrates another significant feature of the present invention, the provision of a perforated or otherwise weakened tear line **860** and a pull tab **862** in the overwrap **802**. Preferably, the tear line **860** is defined in the overwrap **802** such that upon packaging the desired golf sleeves in the overwrap **802**, the tear line is defined near one of the ends of the resulting package, such as shown in **Fig. 12**. Most preferably, the tear line **860** extends about the entire perimeter of the pack **800** and is oriented generally perpendicular to the portion of the seam **822** that extends along the bottom of the pack **800**. As will be appreciated, by providing tear line **860** and pull tab **862** in the overwrap, the pack **800** may be readily opened by merely pulling the tab **862**. Variations as to the orientation and placement of the tear line **860**, pull tab **862**, and window region **852** are contemplated and encompassed by the present invention.

Fig. 13 illustrates another preferred multi-sleeve pack **900** in accordance with the present invention. The pack **900** parallels the previously described pack **800**. The pack **900** comprises an overwrap **902**, a seam **922**, a tear line **960**, and a pull tab **962**. The pack **900** further includes a plurality of opaque regions, preferably of different colors, that define a transparent window. Specifically, different colored regions **950a**, **950b**, **950c**, and **950d** are provided that define a

transparent window 952. As will be understood, the various colored regions may also define various letters, words, trademarks, and identifying markings.

Details of forming and design of tear lines and pull tabs are provided in the prior art. See for example, U.S. Patents 4,947,994 to Newsome; 5,921,464
5 to Seki; and 6,006,907 to Sato et al; all of which are herein incorporated by reference.

It is also envisioned to provide a resealable feature for any of the multi-sleeve packs described herein. Specifically, it is contemplated to provide such a resealable feature along one of the ends of a multi-sleeve pack. Details as to
10 the design and construction of a resealable closure are provided in U.S. Patents 5,944,425 to Formann; 5,983,594 to Formann; 6,076,969 to Jaisle et al.; and 6,318,894 to Derenthal; all of which are hereby incorporated by reference.

Several commercially available machines have been identified which, if appropriately configured by one skilled in the packaging art, can wrap multiple
15 sleeves as described herein. The preferred machine is a "FA-ST" Series High Speed Wrapping Machine, available from Package Machinery Company of West Springfield, MA. Particularly preferred wrapping machines include those referred to as "FA-ST" having model numbers FA-ST, FA-ST2, and FA-ST4. Additional systems contemplated include PRB Penta Overwrapping machine, available
20 from Penta Packaging Systems of Fairfield, NJ; a Marden Edwards Wrapper from Marden Edwards Ltd. of the United Kingdom; and a wrapping system from Klockner of Germany and Sollas Packaging Machinery of the Netherlands.

Preferably, the FA-ST wrapping machine has certain preferred features. The following features are preferred for the wrapping machine, however, it will be
25 understood that the present invention includes the use of wrapping machines having none, some, or all of these features. Specifically, the preferred embodiment wrapping machine that is utilized in the present invention has an electronically driven dual servo film and knife assembly. In addition, the machine has a high speed color registration mark sensor and a film static eliminator bar.
30 Additionally, it is preferred that the elevator and folder and pusher assemblies are all servo driven and, most preferably with adjustable speed settings. Furthermore, the preferred embodiment machine includes an adjustable tack bar assembly and a quick-change folding line with conventional bottom plate and

adjustable side folders. Furthermore, the present invention includes machines having adjustable side heaters and anti-friction coated film path components. Furthermore, it is preferred that jam sensors be provided along the product path and include a film run-out sensor. Such machines also preferably contain a fault indicator stack light assembly and a central lubrication block. All conventional safety components and safety interlocks are preferably provided on the machine. A self-sharpening rotary knife is utilized by the machine for cutting operations. It is also preferred that the machine be automated with varying levels of operation. Conventional automation controls are typically interfaced with the machine such as those provided by Allen-Bradley under the designation Control Logix PLC and Ultra Series components. It is further contemplated that various operator control panels and touch screen color operator terminals may be provided.

A preferred speed range for a preferred embodiment machine utilized in conjunction with the present invention is generally from about 30 packages to about 150 packages per minute. Generally, such machines may wrap packages having a minimum size of about 2" x 1 1/8" x 3/8" to a maximum size of about 11 1/2" x 5 5/8" x 3". Film cutoff lengths generally range from a minimum of about 4 1/4" to a maximum of about 16". And, such machines generally accommodate film roll widths of from a minimum of about 3 1/4" to a maximum of about 17 1/4".

In operation, sleeves filled with golf balls are brought (i.e. by conveyor, etc.) to the packaging machine. A pusher loads the sleeves (2, 3, 4, 5, etc.) into the wrapper. Film is fed from another side, and a desired length is cut for wrapping. The film is wrapped around the sleeves, the bottom is heat sealed, and then the ends pass by Teflon® coated, heated bars and they are also heat sealed. The wrapped package then is packed with others into a shipping box or whatever shipping container is appropriate.

It will be appreciated that any of the features in any of the embodiments described herein may be utilized or provided in combination with any of the other features of other embodiments described herein. That is, the present invention includes multi-sleeve packs having additional combinations of features that are not expressly disclosed herein.

Use of the present invention multi-sleeve packs and related packaging techniques results in significant cost savings and reductions in packaging time.

As previously explained, use of the present invention eliminates the need for providing relatively expensive retaining boxes for golf ball sleeves, packing the sleeves within those retaining boxes, closing the boxes or otherwise preparing them for shipment, and further wrapping or packaging the retaining boxes.

5 The present invention has been described with reference to the preferred embodiments. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents
10 thereof.

We claim:

- 5 1. A package for economically and securely retaining multiple sleeves
of golf balls, said package comprising:
 a plurality of golf ball sleeves; and
 an opaque, multi-layer sheet containing a masking layer and exhibiting a
shrink rate of about 2% or less is disposed about and enclosing said plurality of
10 golf ball sleeves;
 wherein said package is free from a retaining box otherwise used to
contain said plurality of golf ball sleeves.
2. The package of claim 1 wherein said plurality of golf ball sleeves
15 constitutes three, four, five or six sleeves.
3. The package of claim 1 wherein said multi-layer sheet includes a
first layer of a polyolefin material and a second layer of a polyolefin material.
- 20 4. The package of claim 3 wherein said polyolefin material of at least
one of said first layer and said second layer is selected from the group consisting
of acrylonitrile-butadiene-styrenes, acrylics, cellophane, cellulose, cellulose
derivatives, fluoropolymers, ionomers, polyamides, polycarbonates, polyesters, polyimides,
polyethylenes, polypropylenes, polystyrenes, vinyls, polyurethanes and
25 combinations thereof.
5. The package of claim 4 wherein said polyolefin material of at least one
of said first layer and said second layer is polypropylene.
- 30 6. The package of claim 3 wherein said first layer also includes a
treated layer for ink adhesion.
7. The package of claim 3 wherein said second layer also includes a
thin metal film.

8. The package of claim 6 wherein said first layer also includes a print indicia on one surface.

9. The package of claim 8 wherein said multi-layer film is oriented
5 such that said metallic foil overlay is immediately adjacent to the print indicia.

10. A package adapted for distribution and retail display of a plurality of golf ball sleeves, said package comprising:

10 a plurality of golf ball sleeves, each said golf ball sleeve containing at least one golf ball; and

a sheet of multi-layer film disposed about and enclosing said plurality of golf ball sleeves, said multi-layer film including (i) an inner layer disposed immediately adjacent to said plurality of golf balls, said inner layer comprising a polyolefin material and a metallic foil overlay, and (ii) an outer layer constituting
15 the exterior of said package and comprising a polyolefin material containing print indicia on its inner surface.

11. The package of claim 10 wherein said multi-layer film is oriented
20 such that said metallic foil overlay is immediately adjacent to the print indicia.

12. The package of claim 10 wherein said polyolefin material of said inner layer and said outer layer of said multi-layer film is selected from the group consisting of acrylonitrile-butadiene-styrenes, acrylics, cellophane, cellulose, fluoropolymers, ionomers, polyamides, polycarbonates, polyesters, polyimides,
25 polyethylenes, polypropylenes, polystyrenes, vinyls, polyurethanes and combinations thereof.

13. The package of claim 12 wherein said polyolefin material of at least one of said inner layer and said outer layer of said multi-layer film is
30 polypropylene.

14. The package of claim 10 wherein said package is rectangular in shape and defines a top, a bottom, a first end extending between said top and

bottom, and a second end opposite from said first end, said sheet of multi-layer film further including a seam extending along said bottom of said package.

5 15. The package of claim 14 wherein said seam further extends along at least a portion of said first end and at least a portion of said second end of said package.

10 16. The package of claim 15 wherein said seam is parallel to the longitudinal dimension of said package.

17. The package of claim 10 wherein said sheet of multi-layer film further includes a tear line and a pull tab for facilitating removal of said sheet from said plurality of golf ball sleeves.

15 18. The package of claim 10 wherein said inner layer of said multi-layer film has a thickness of from about 0.01 mm to about 0.25 mm.

20 19. The package of claim 10 wherein said outer layer of said multi-layer film has a thickness of from about 0.01 mm to about 0.25 mm.

25 20. A multi-sleeve golf ball pack having a generally rectangular shape and defining a top, an oppositely directed bottom, a first end disposed between said top and bottom, a second end opposite from said first end and disposed between said top and bottom, a first longitudinal side disposed between said top and bottom and further disposed between said first and second ends, and a second longitudinal side opposite from said first longitudinal side and disposed between said top and bottom and further disposed between said first and second ends, said multi-sleeve golf ball pack comprising:

30 a plurality of sleeves, each sleeve containing at least one golf ball; and
a multi-layer sheet disposed about and enclosing said plurality of sleeves, said multi-layer sheet including (i) an inner layer disposed immediately adjacent to said plurality of sleeves and comprising a first polyolefin material and metallic

foil overlay, and (ii) an outer layer comprising a second polyolefin material containing print indicia on its interior surface.

21. The multi-sleeve golf ball pack of claim 20 wherein said multi-layer
5 sheet defines a first opaque region and a second transparent region.

22. The multi-sleeve pack of claim 21 wherein said inner layer of said multi-layer sheet further comprises a metal foil in said first opaque region.

10 23. A method for packaging a plurality of golf ball sleeves, said method comprising the steps of:

providing a plurality of golf ball sleeves;

providing a sheet of a multi-layer film of a size sufficient to enclose said plurality of sleeves, said multi-layer film having a first edge and a second edge
15 opposite from said first edge, and further having a third edge extending between said first and said second edges, and a fourth edge, opposite from said third edge and also extending between said first and said second edges, said multi-layer film further having an inner layer including a polyolefin and a metal foil overlay and an outer layer including a polyolefin;

20 contacting at least a portion of said plurality of golf ball sleeves with said inner layer of said multi-layer film; and

enclosing said plurality of golf ball sleeves with said multi-layer film by at least securing together said first and said second edges of said multi-layer film.

25 24. The method of claim 23 wherein said step of enclosing said plurality of golf ball sleeves by securing together said first and said second edges of said multi-layer film results in an upper folded flap and a lower folded flap formed at each end of the resulting package, said method further comprising:

30 contacting said lower folded flap with at least a portion of said plurality of golf ball sleeves; and

positioning said upper folded flap over at least a portion of said lower folded flap.

25. The method of claim 24 further comprising:

heating said upper folded flap and said lower folded flap such that said flaps adhere to one another.

5

26. The method of claim 24 further comprising:

applying an effective amount of adhesive upon at least a portion of said upper folded flap and said lower folded flap to thereby secure said upper and lower folded flaps to one another.

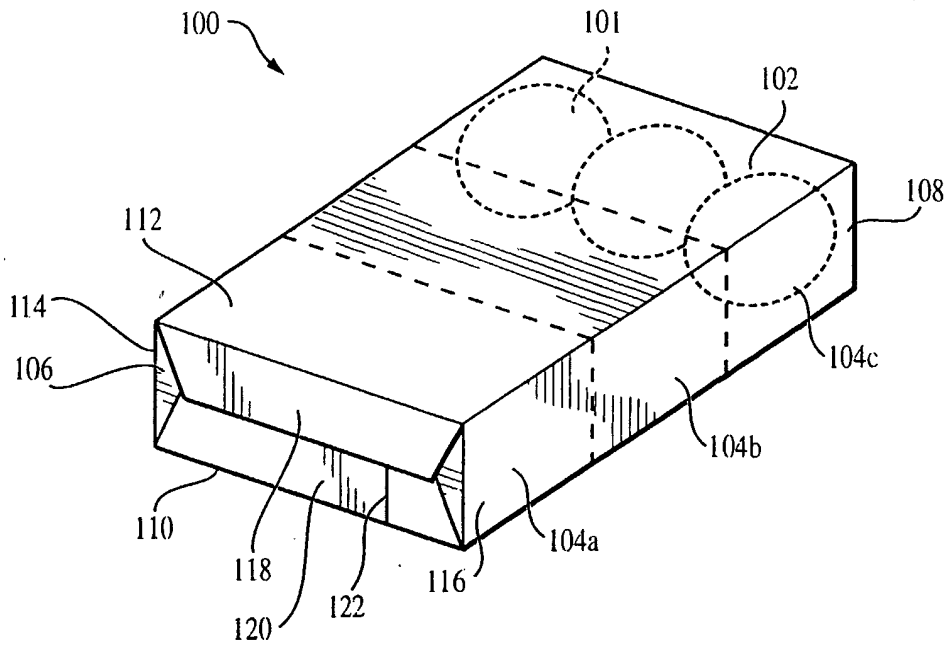


FIG. 1

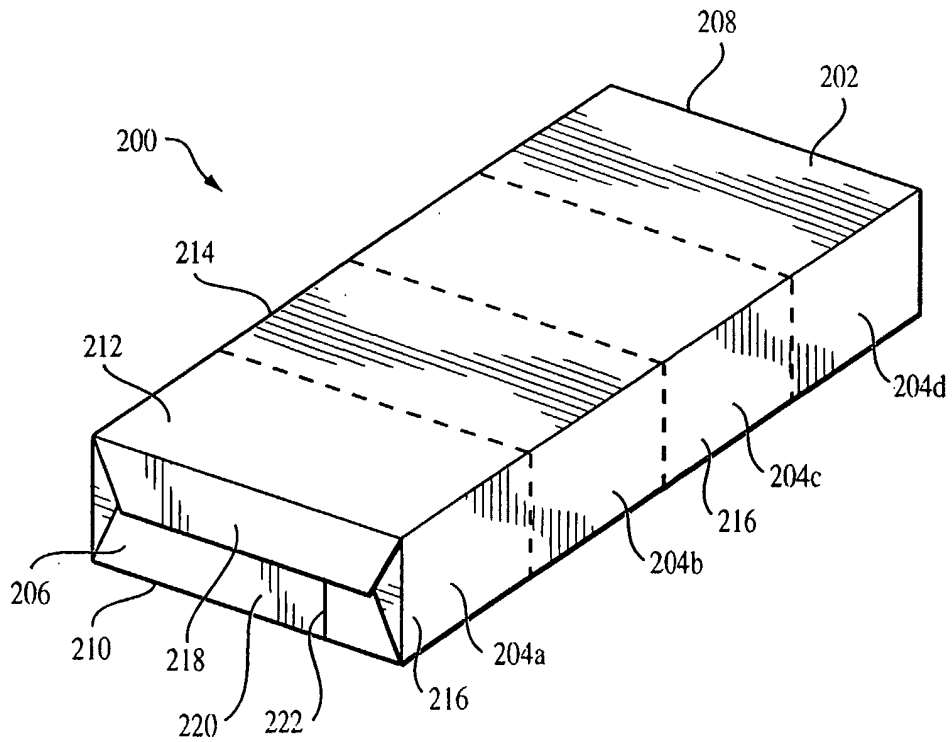


FIG. 2

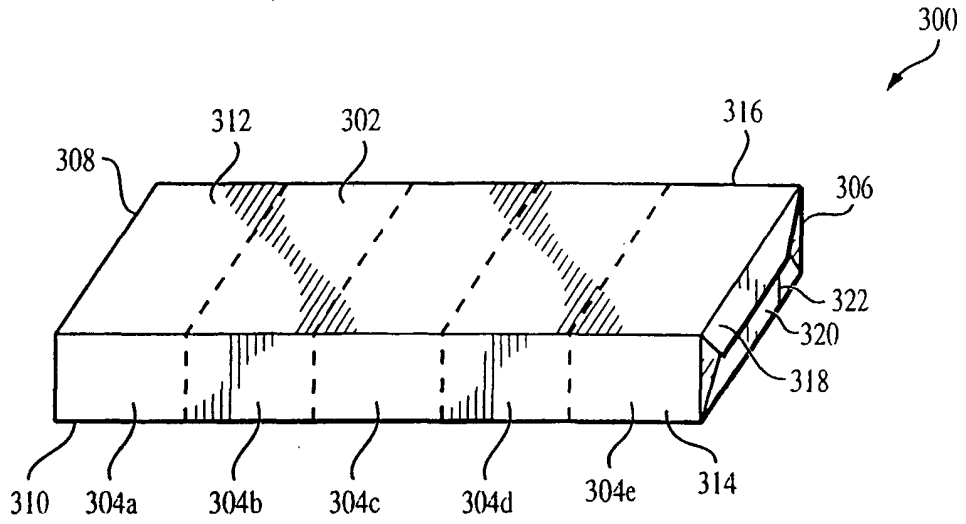


FIG. 3

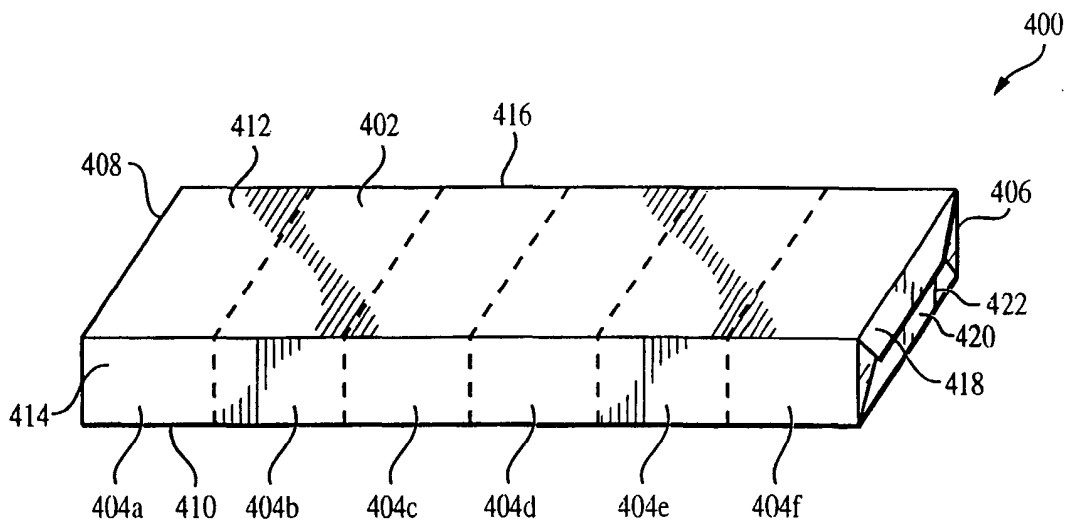


FIG. 4

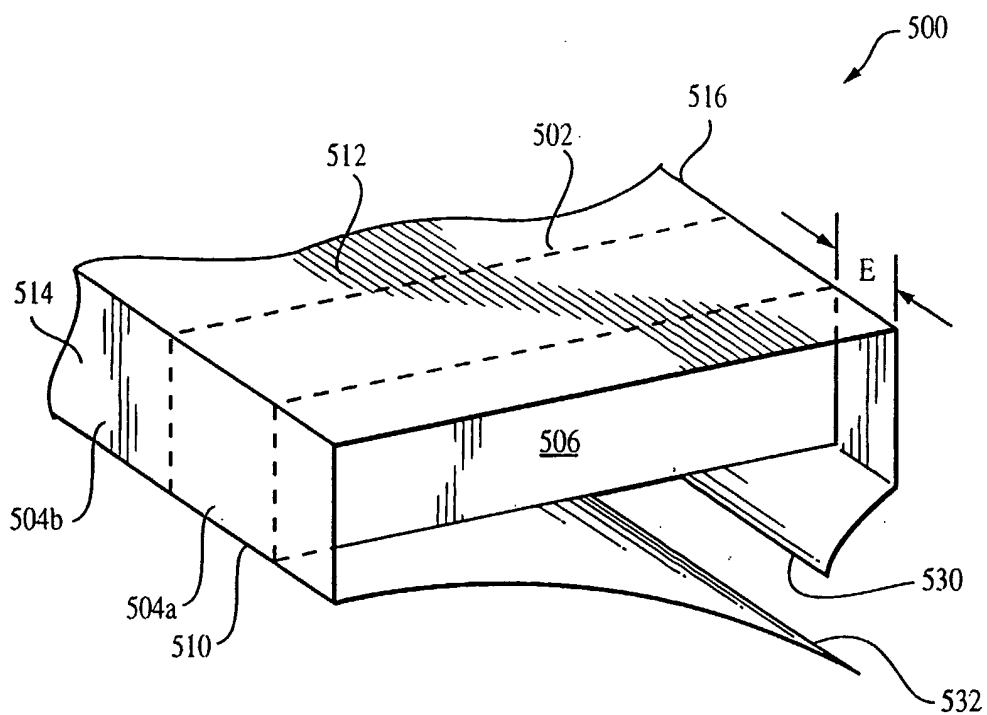


FIG. 5

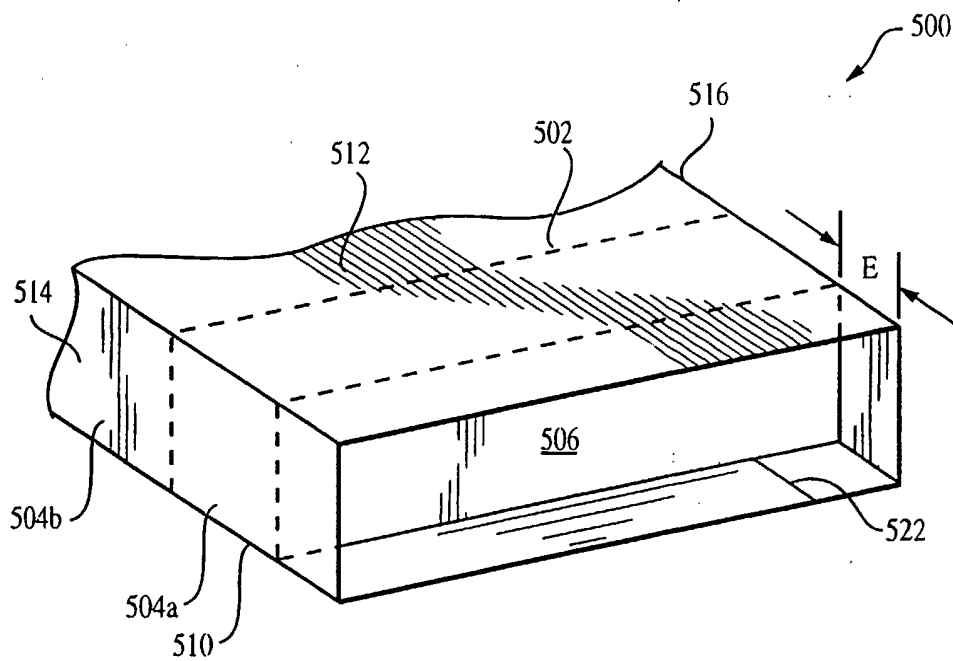


FIG. 6

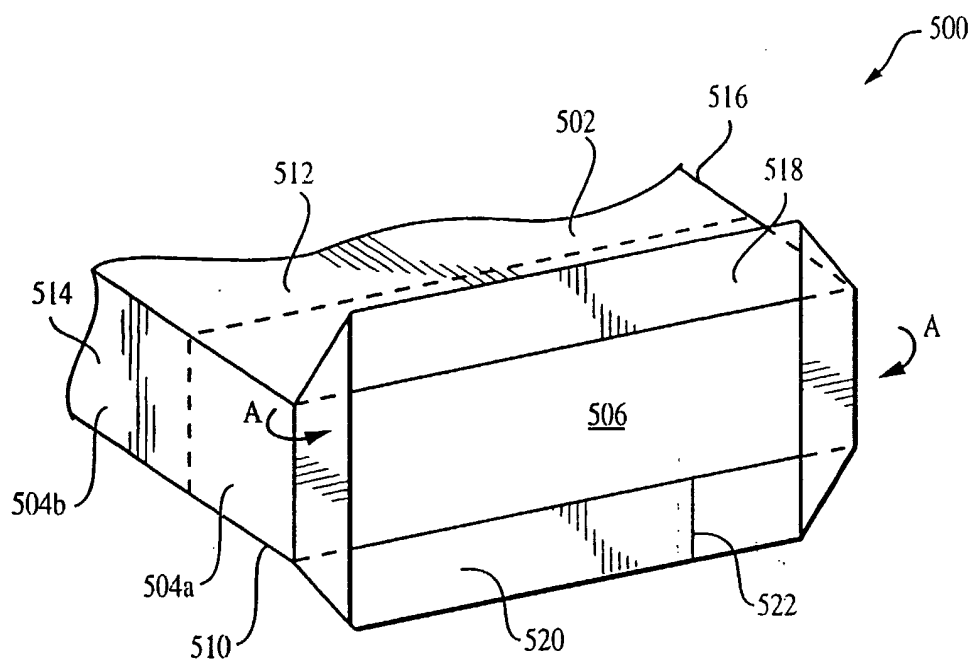


FIG. 7

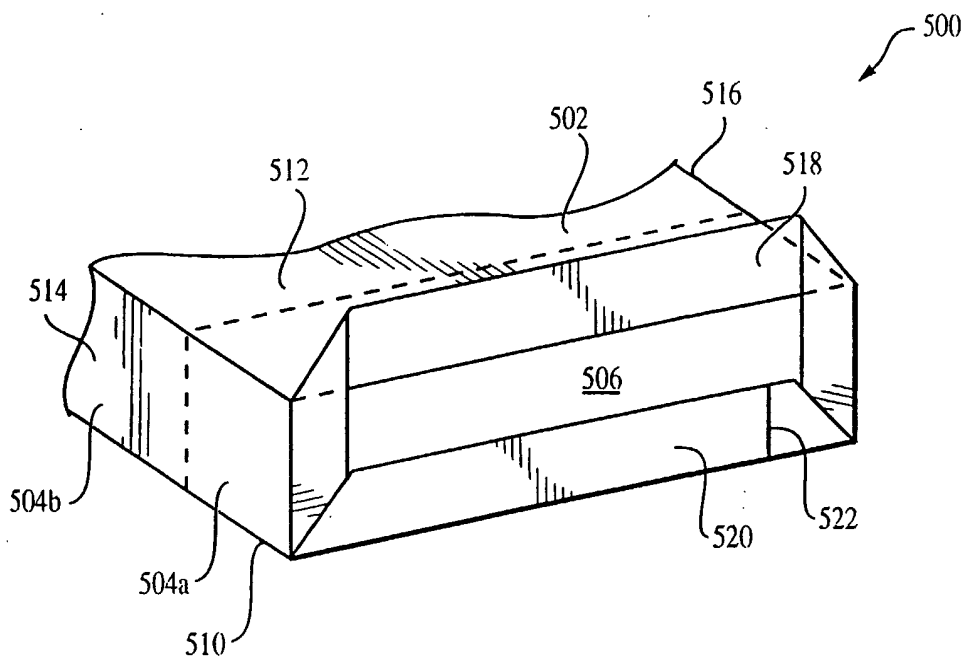


FIG. 8

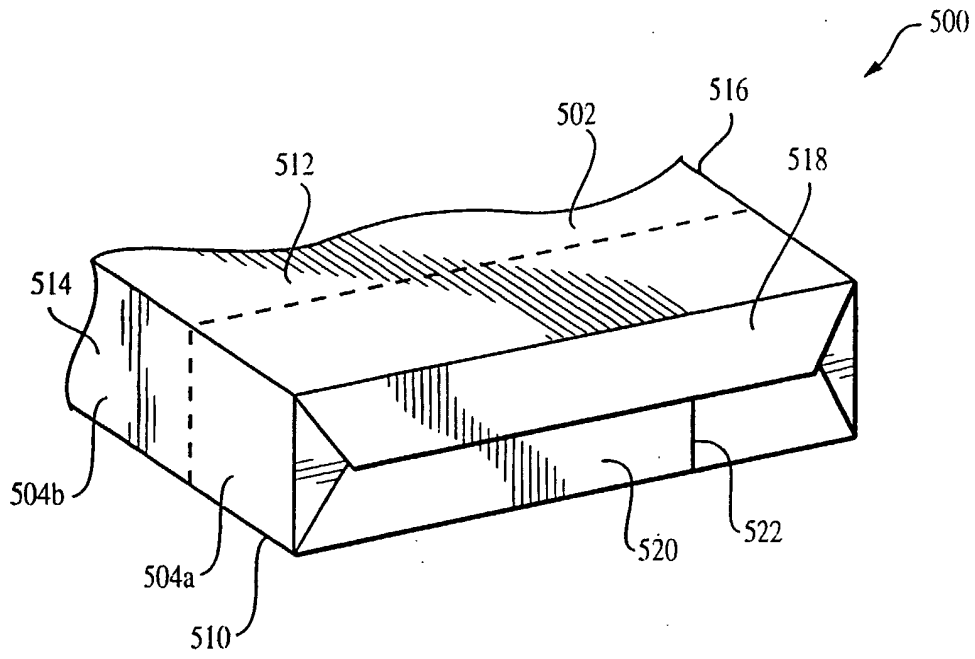
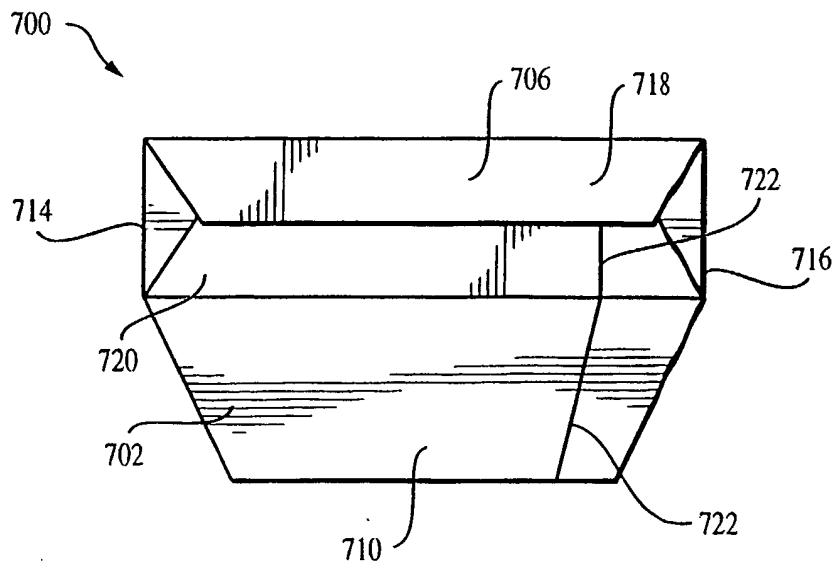
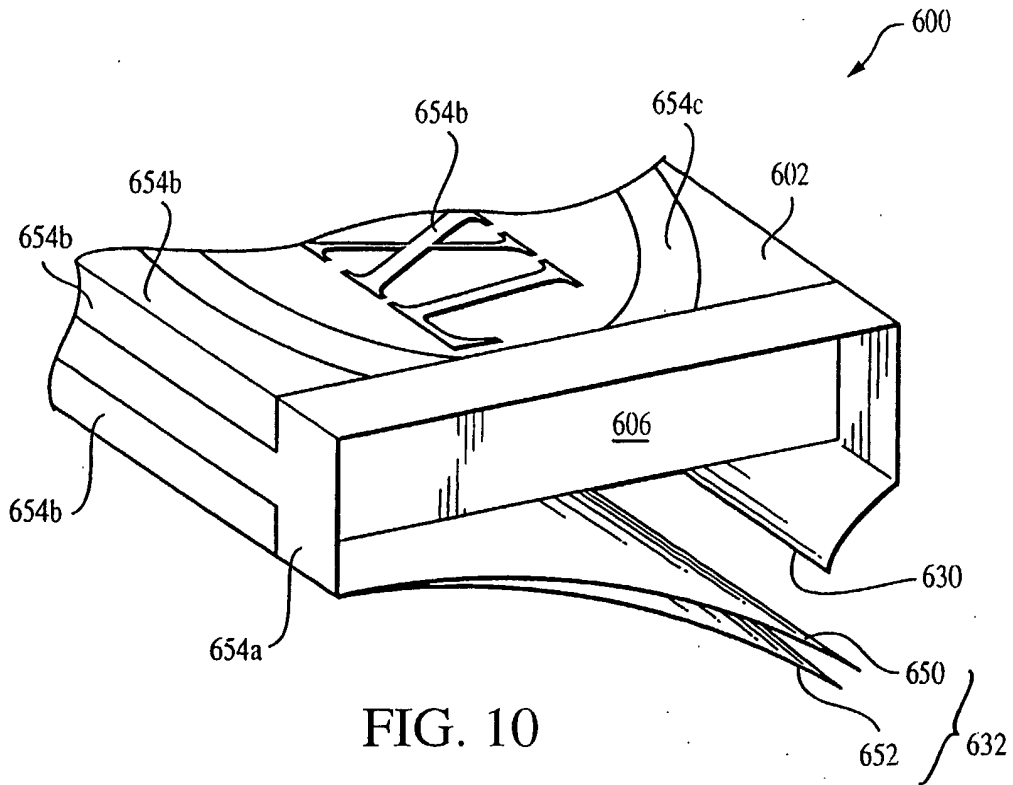


FIG. 9



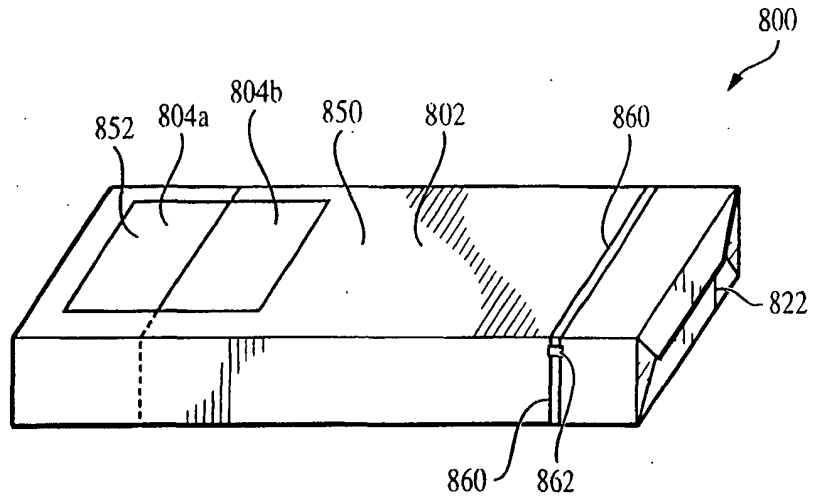


FIG. 12

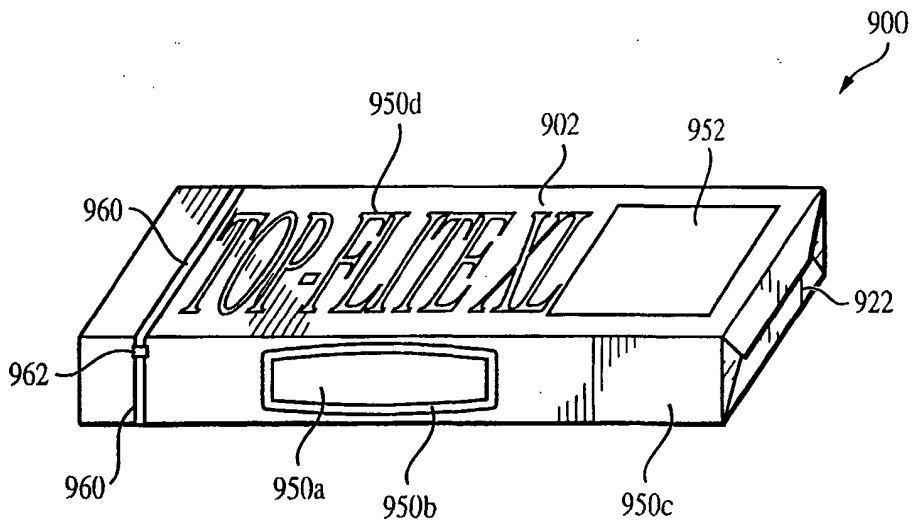


FIG. 13

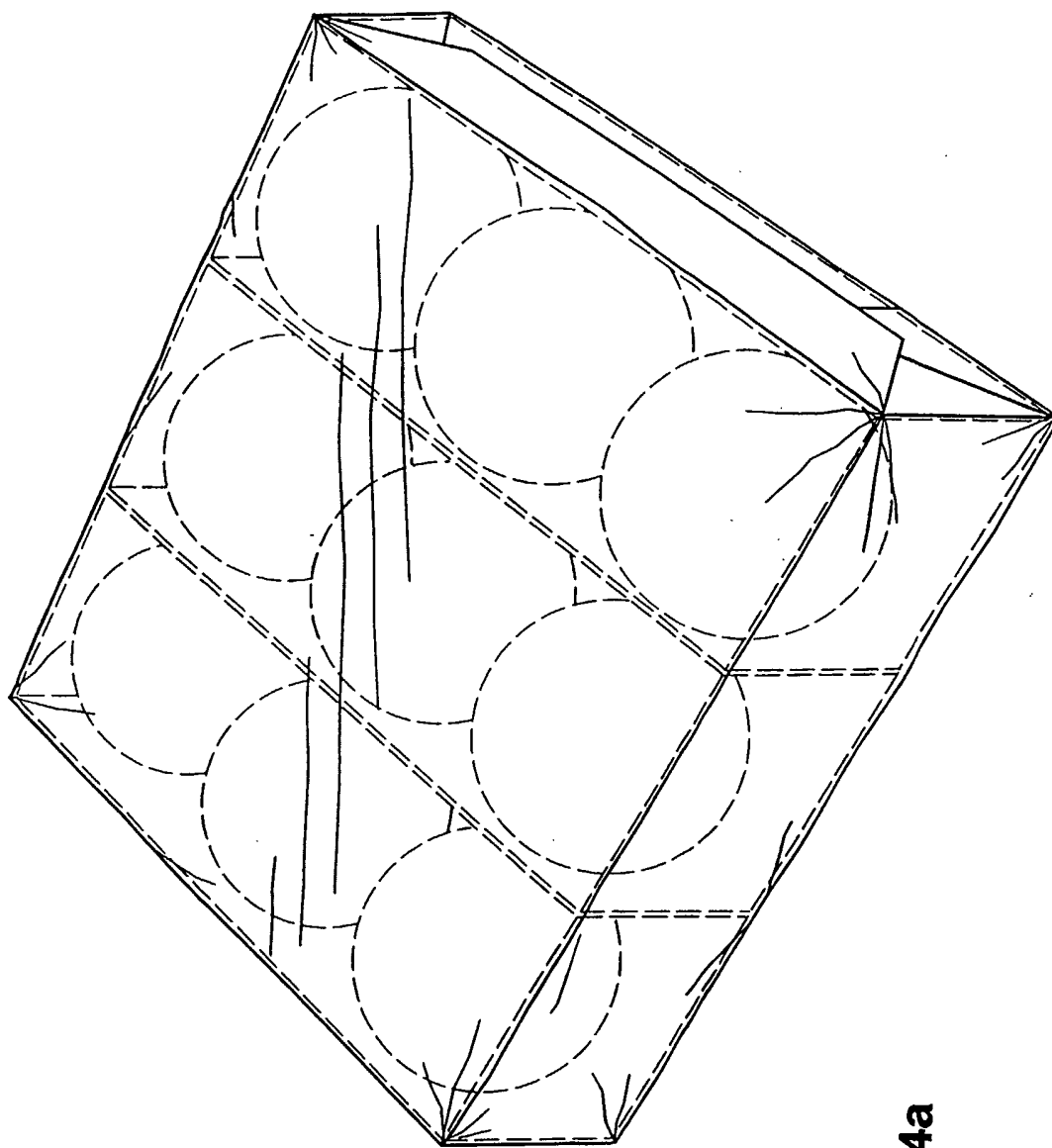


FIG. 14a

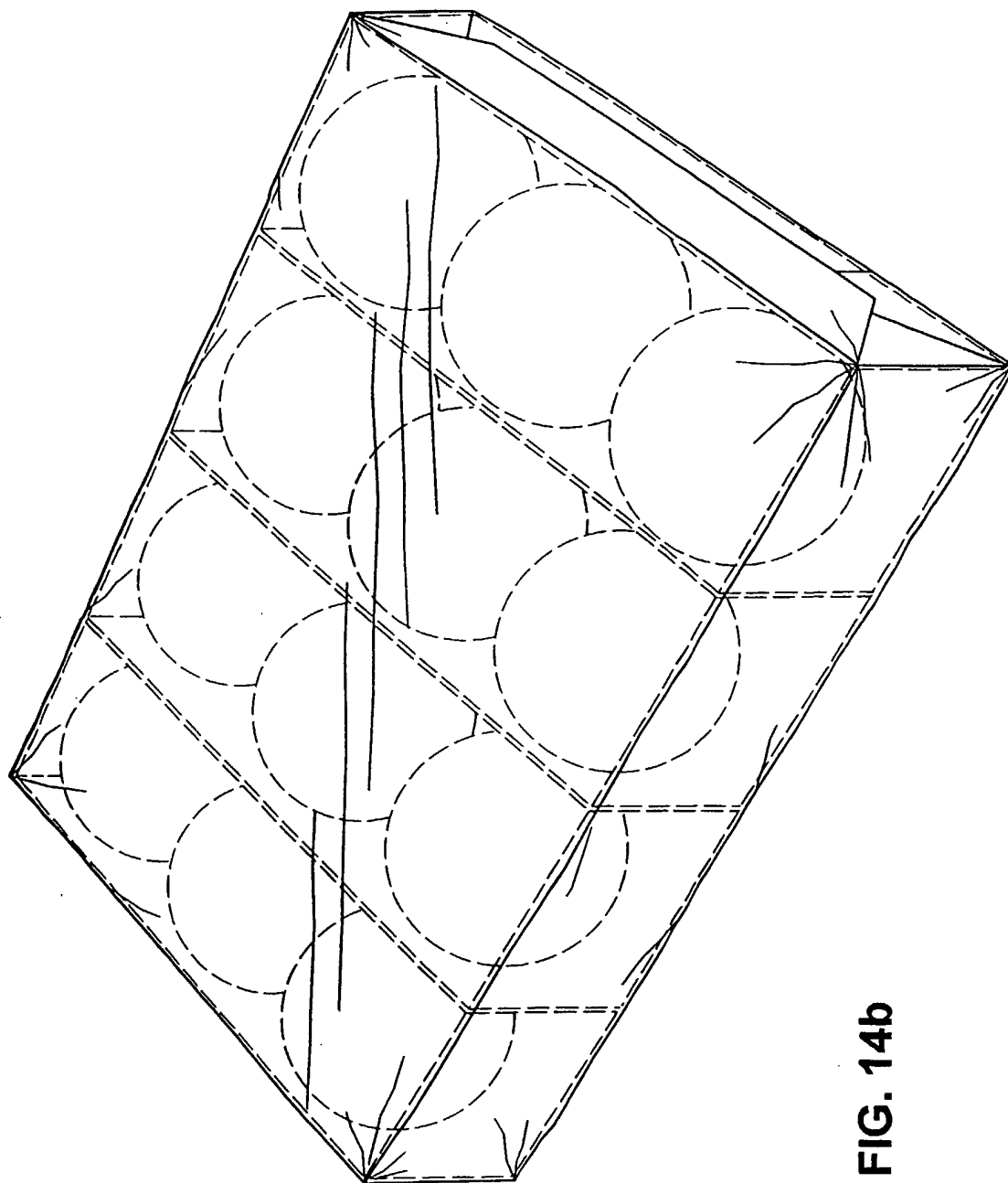


FIG. 14b

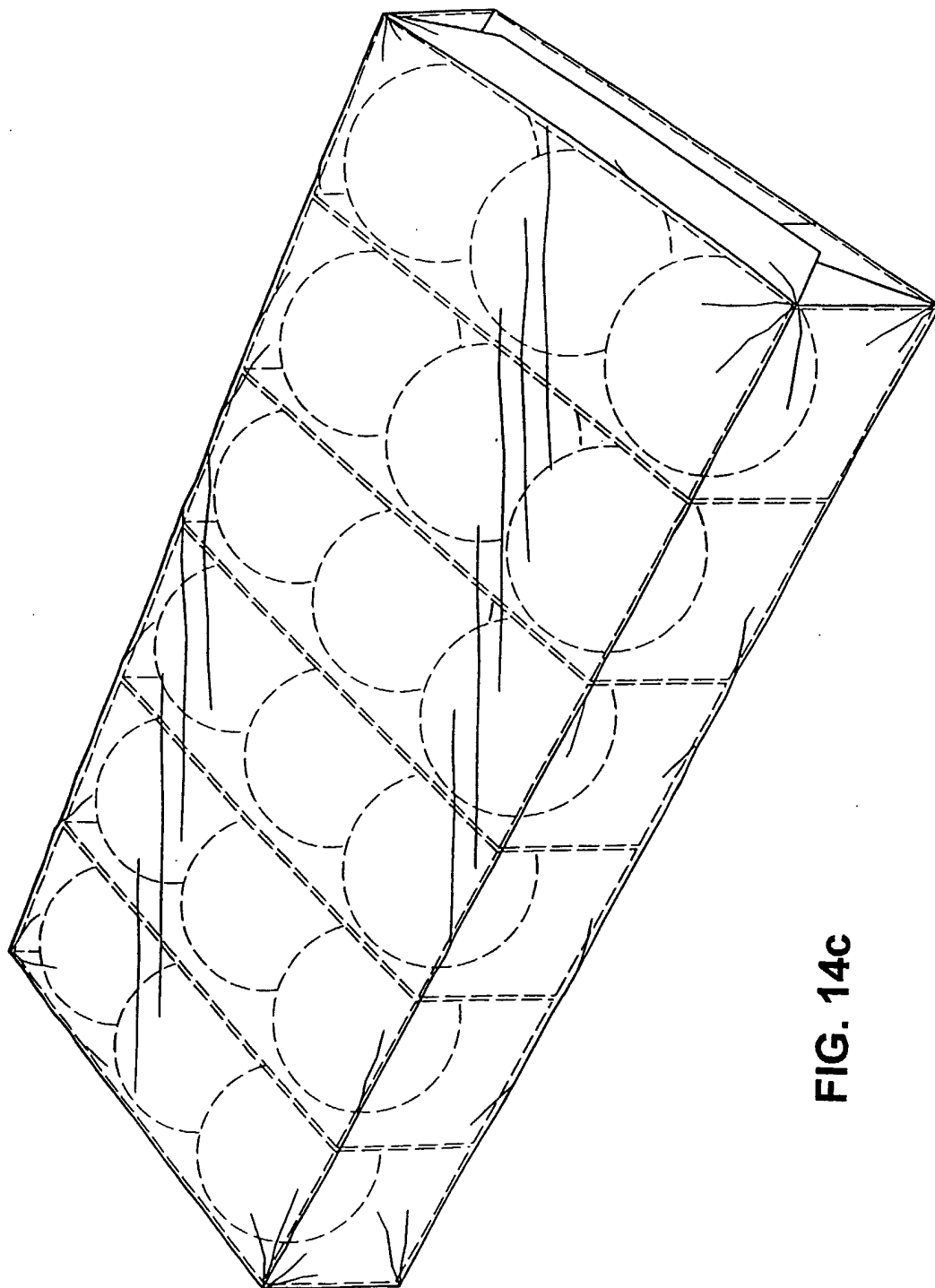


FIG. 14c

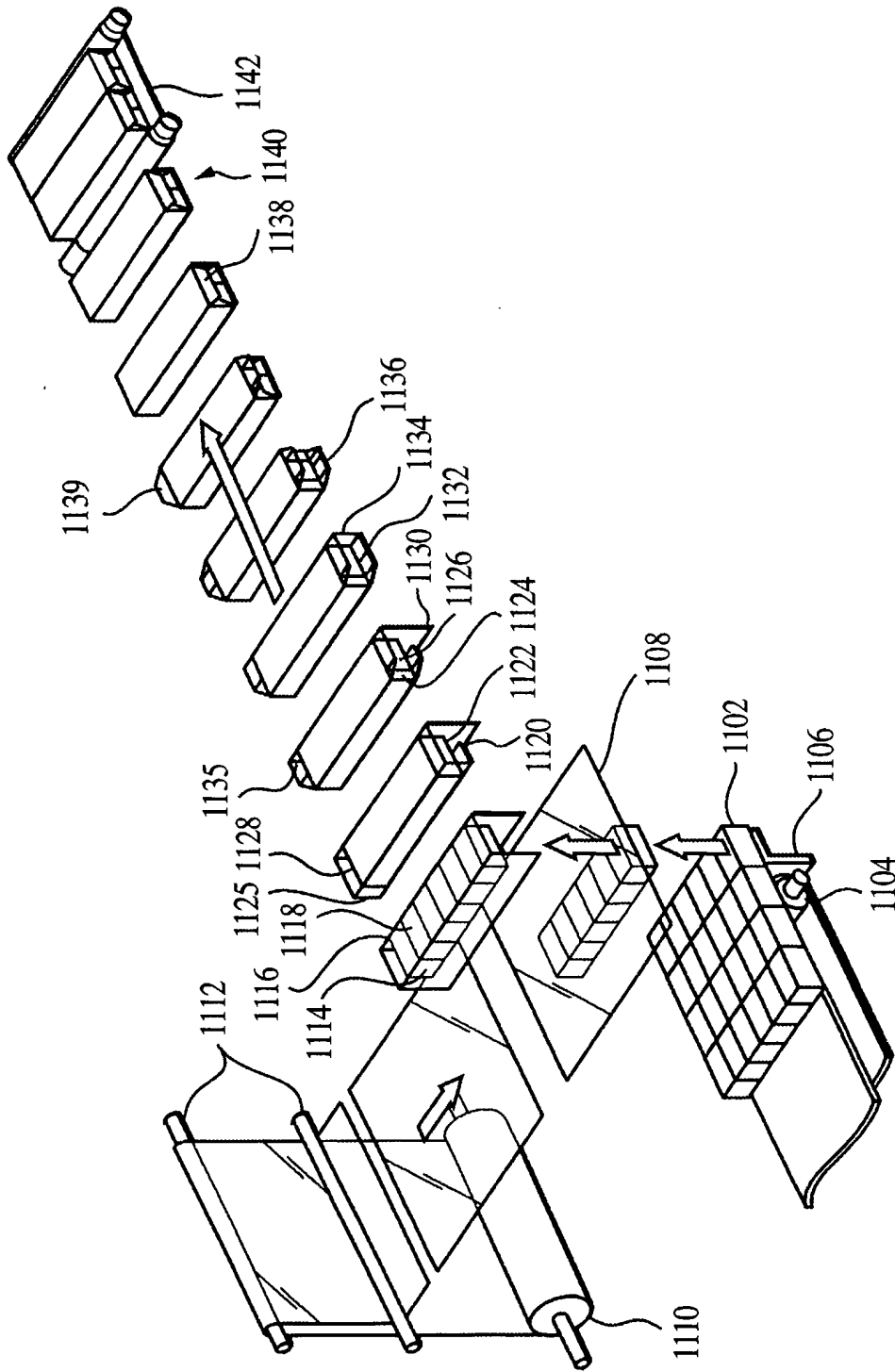


FIG. 15