US 20170120503A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2017/0120503 A1**

Arthurs (43) **Pub. Date: May 4, 2017**

(54) **PROTECTIVE COVERING FOR WOOD PRODUCTS**

(71) Applicant: **Intertape Polymer Corp.**, Sarasota, FL (US)

(72) Inventor: **Trevor Arthurs**, Truro (CA)

(21) Appl. No.: **15/342,644**

(22) Filed: **Nov. 3, 2016**

Related U.S. Application Data

(60) Provisional application No. 62/250,218, filed on Nov. 3, 2015.

Publication Classification

(51) **Int. Cl.**

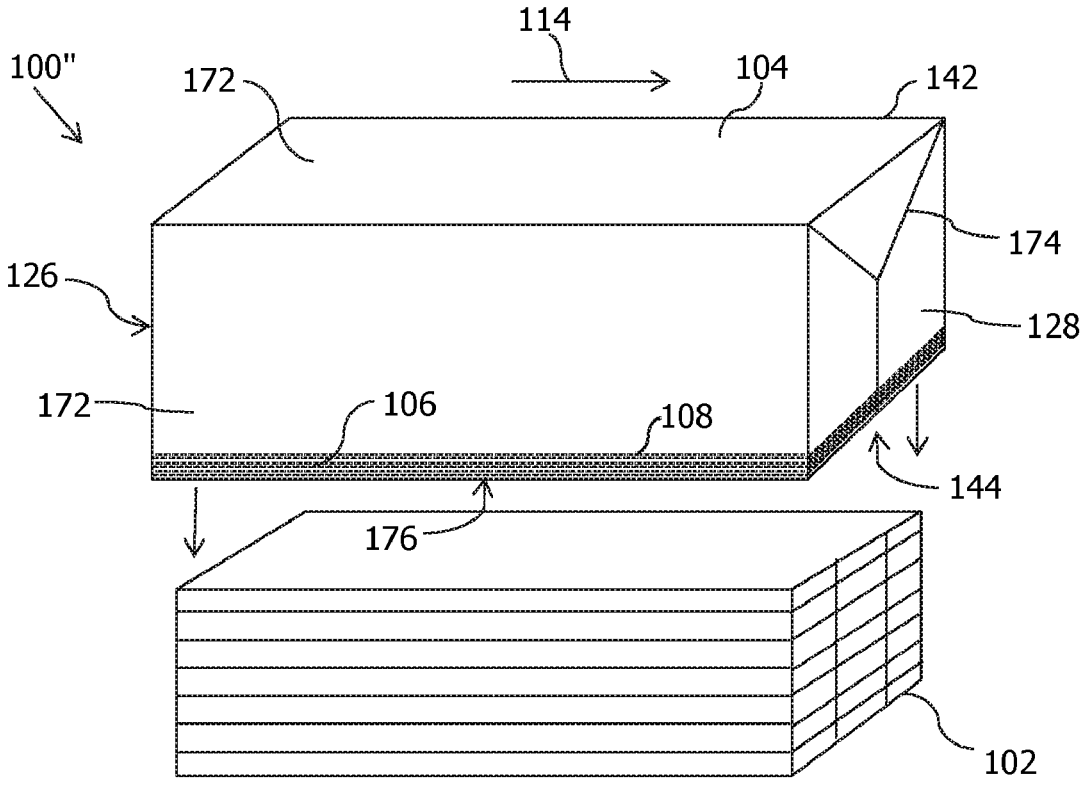
B29C 63/40	(2006.01)
D03D 15/00	(2006.01)
B29C 63/22	(2006.01)
D06N 3/00	(2006.01)
B29C 63/00	(2006.01)
B29C 63/04	(2006.01)

(52) **U.S. Cl.**

CPC ***B29C 63/40*** (2013.01); ***B29C 63/0017*** (2013.01); ***B29C 63/0065*** (2013.01); ***B29C 63/04*** (2013.01); ***B29C 63/22*** (2013.01); ***D06N 3/0006*** (2013.01); ***D06N 3/0031*** (2013.01); ***D03D 15/00*** (2013.01); *B29K 2713/02* (2013.01); *B29K 2623/06* (2013.01); *B29L 2031/7126* (2013.01)

(57) **ABSTRACT**

Protective coverings herein have a coated woven material with a first edge parallel with a warp direction and a second edge opposite the first edge, and have a first edge band proximate the first edge and a second edge band proximate the second edge. The coated woven material has a woven scrim made of a plurality of weft tapes and a plurality of warp tapes, but the warp tapes positioned in the first and second edge bands are high-shrinkage warp tapes and the warp tapes positioned in between the first and second edge bands have a shrinkage that is less than a shrinkage of the high-shrinkage warp tapes, and has a coating on at least one major surface of the woven scrim. The plurality of high-shrinkage warp tapes shrink upon application of heat. Methods of covering a load, such as stacked lumber, with the protective covering are also disclosed.



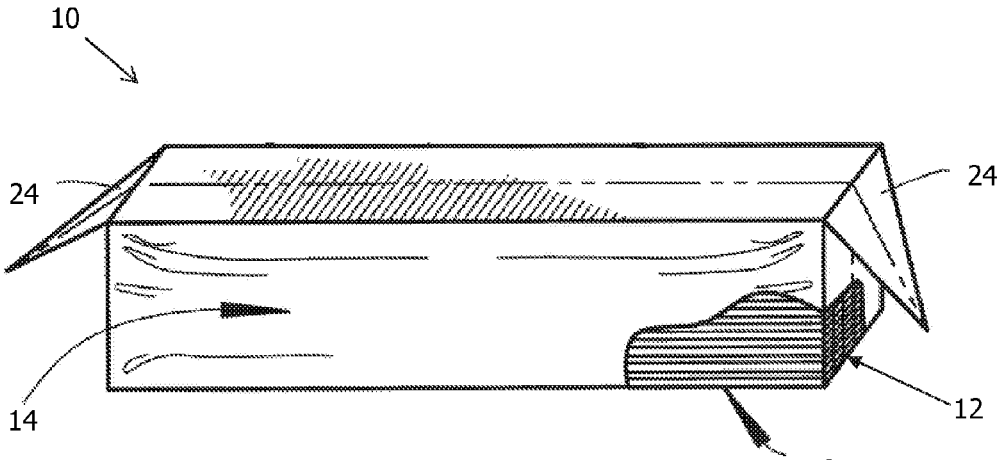


FIG. 1 – PRIOR ART

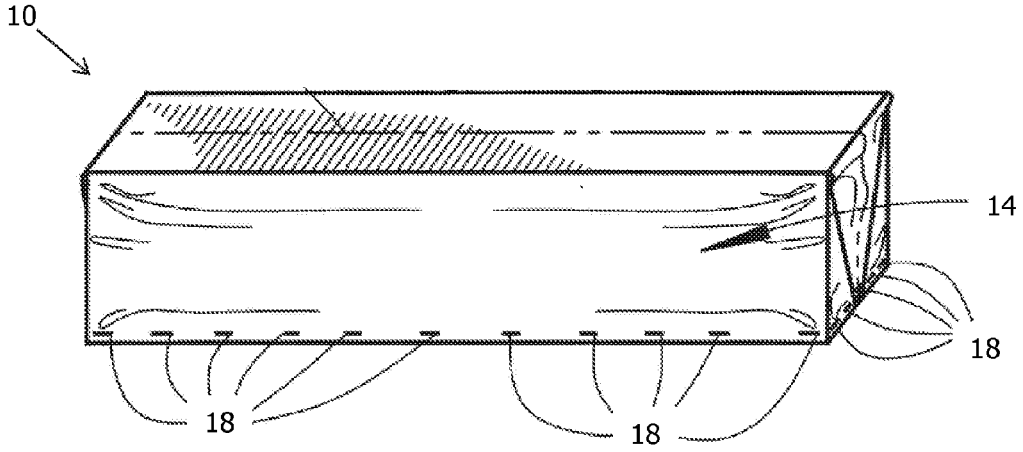


FIG. 2 – PRIOR ART

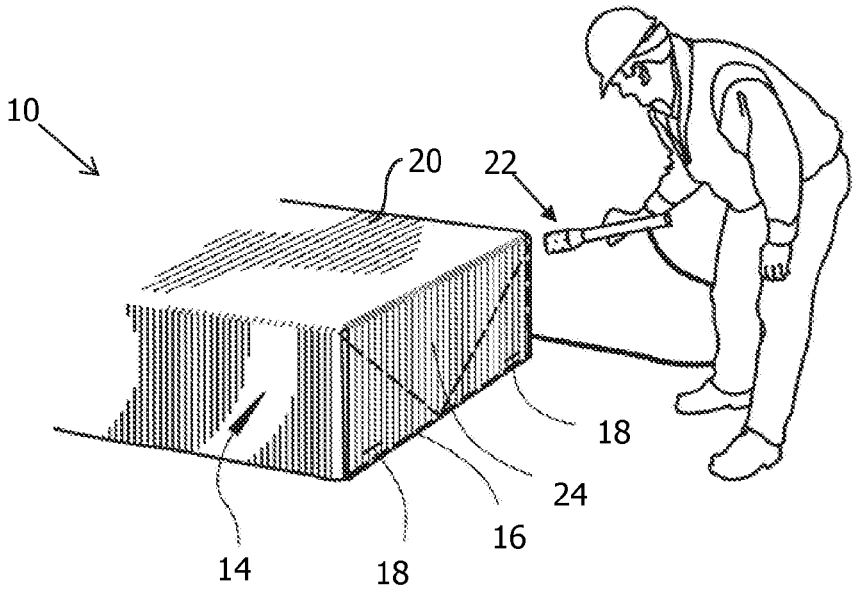


FIG. 3 – PRIOR ART

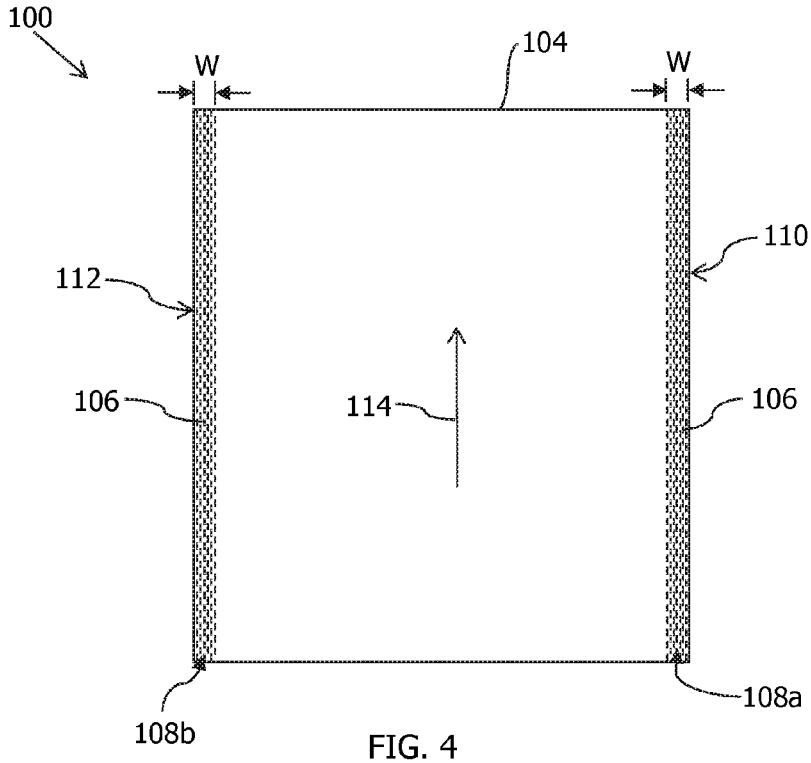

100
W
104
W
110
112
106
114
106
108b
108a

FIG. 4

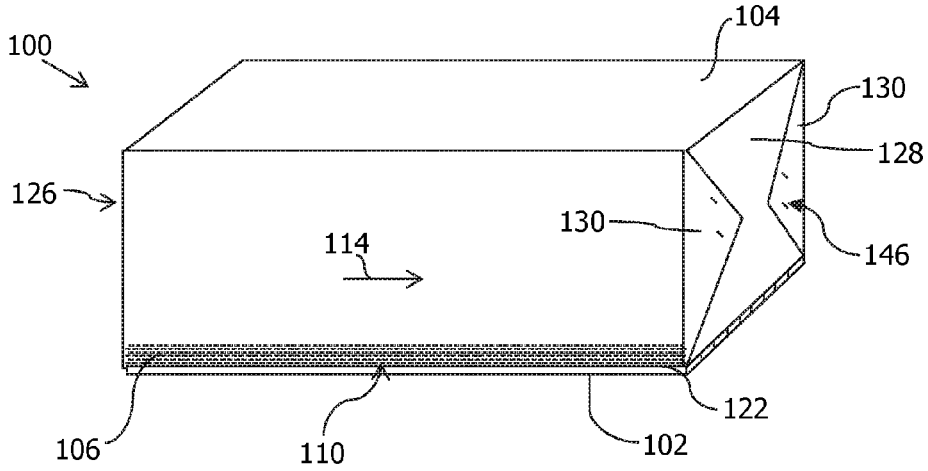

104
100
130
128
126
130
114
146
122
106
110
102

FIG. 5

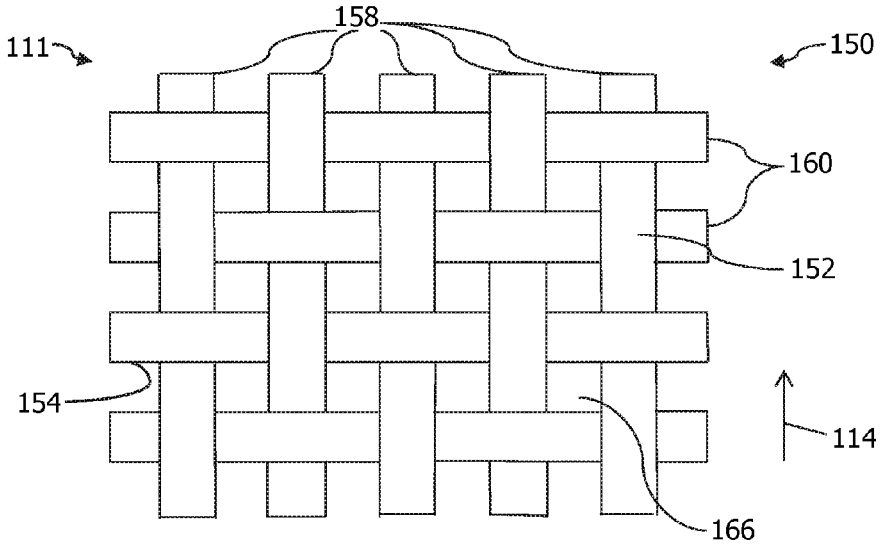


FIG. 6

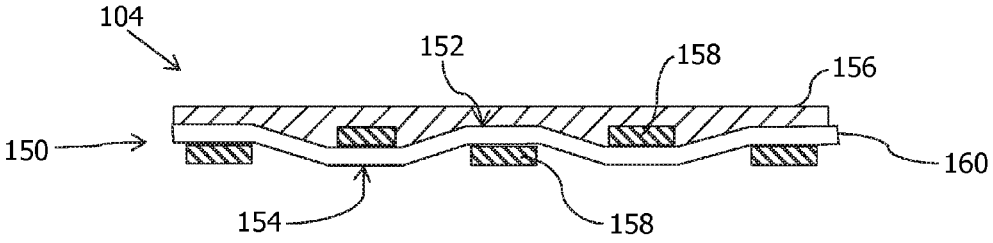


FIG. 7

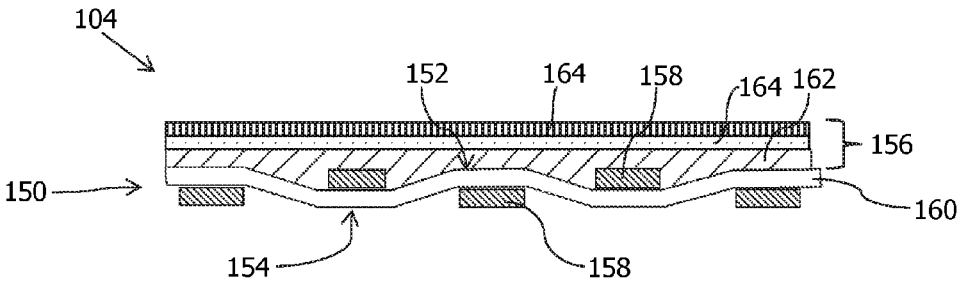

104
152
164
158
164
162
156
150
160
154
158

FIG. 8

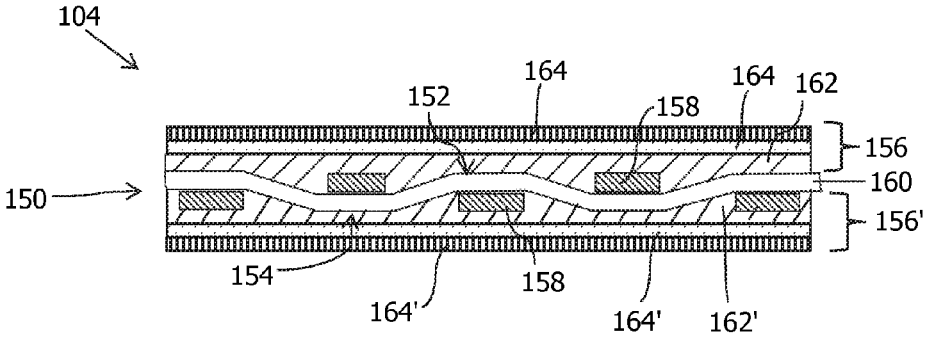

104
164
164
162
152
158
156
160
150
156'
154
164'
158
164'
162'

FIG. 9

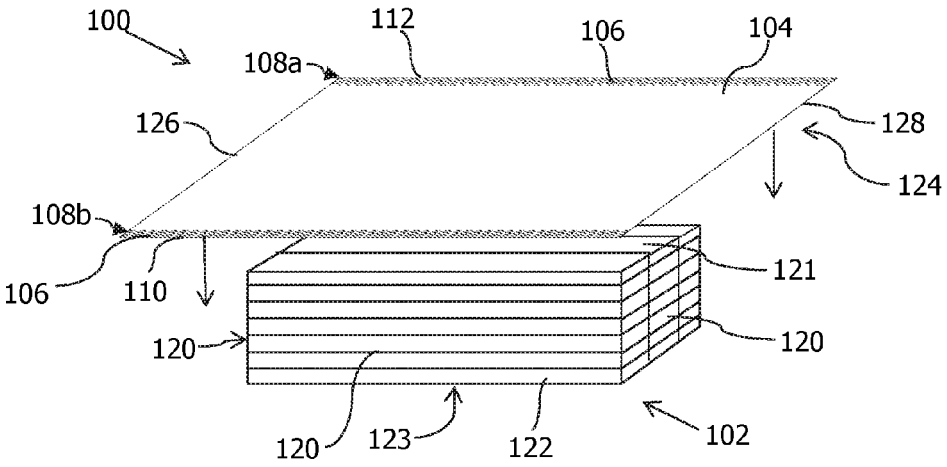

100
112
106
104
108a
126
128
124
108b
106
110
121
120
120
120
123
122
102

FIG. 10

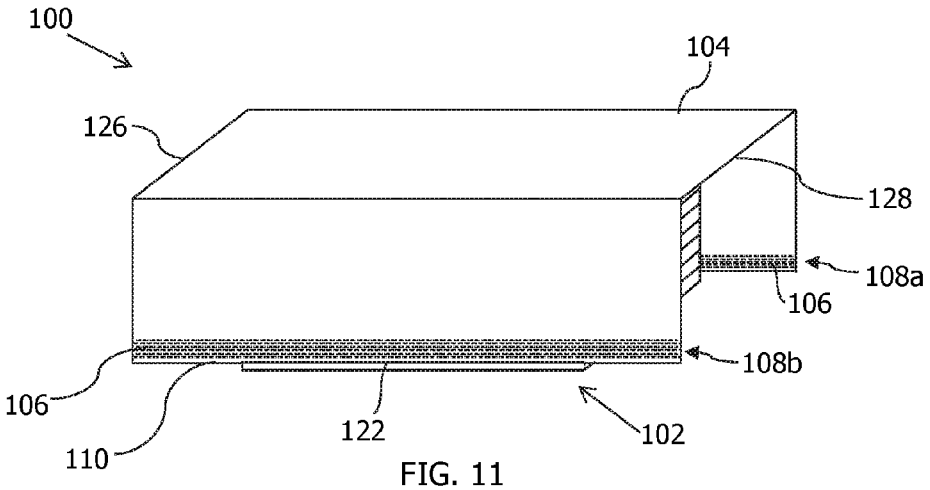

100
104
126
128
108a
106
108b
106
110
122
102

FIG. 11

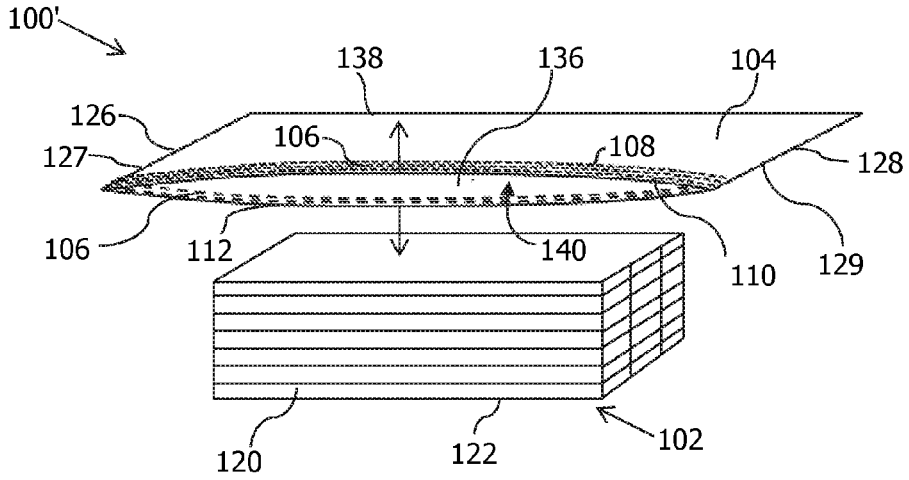

100'
138
136
104
126
106
108
127
128
106
112
140
110
129
120
122
102

FIG. 12

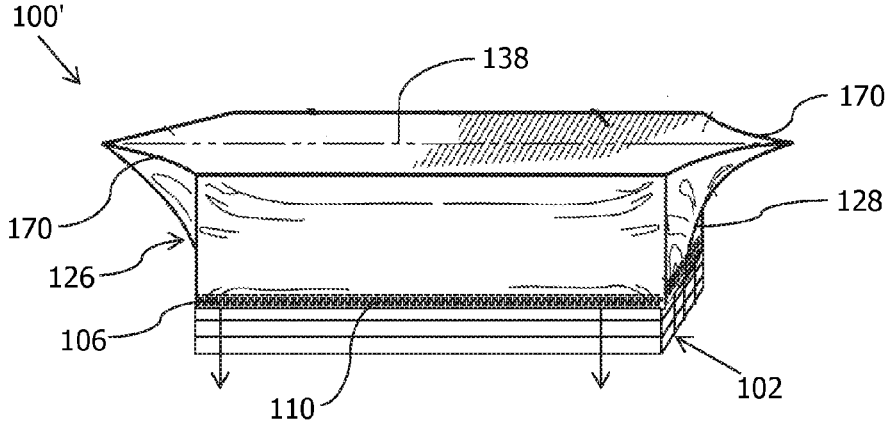

100'
138
170
170
128
126
106
110
102

FIG. 13

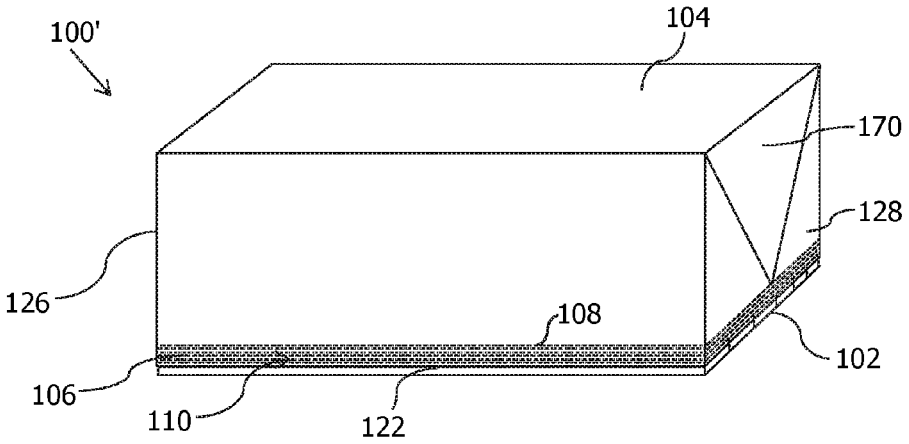

100'
104
170
128
126
108
102
106
110
122

FIG. 14

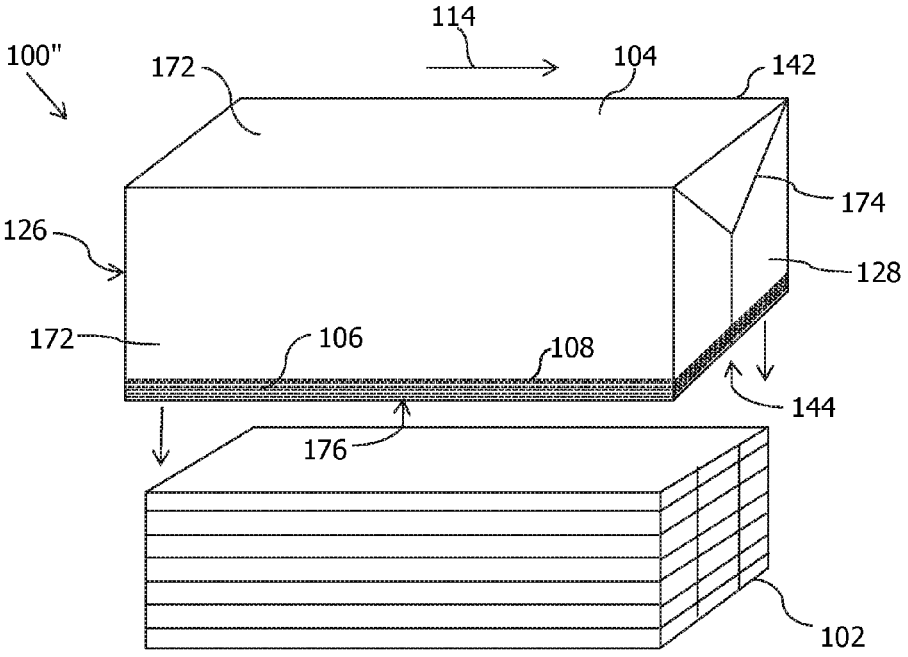

114
100"
172
104
142
174
126
128
172
106
108
144
176
102

FIG. 15

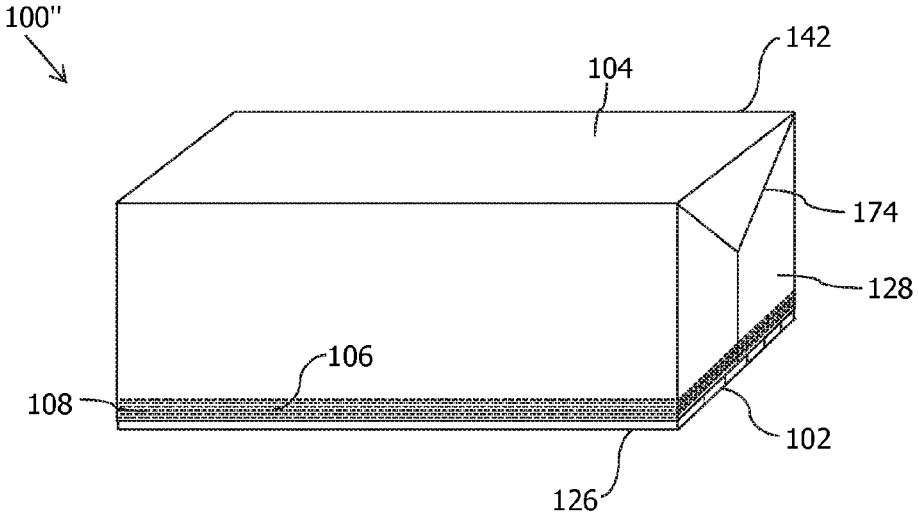


FIG. 16

PROTECTIVE COVERING FOR WOOD PRODUCTS

RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 62/250,218, filed Nov. 3, 2015, the entirety of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present application relates to protective coverings for wood products that protect loads from damage during shipment and storage, in particular to protective coverings for protecting stacked wood products that have high-shrinkable warp tapes in an edge band thereof.

BACKGROUND

[0003] Wrapping materials intended to cover goods on trucks, or the like, are well known in the art. Traditionally, such wrapping materials included tarpaulins, but these have frequently been replaced with other materials, such as polyester filament reinforced fabrics that have been coated with polyvinyl chloride. Other examples of wrapping materials in the transportation industry are lumber covers. Lumber covers tend to be specialized in their construction, being intended to wrap and protect stacks of lumber from the effects of weather during actual shipping and while the lumber sits in a yard prior to sale. A typical example of a lumber wrap is made of a woven high density polyethylene fabric that is coated on one or preferably both sides with an extrusion coating of low density polyethylene containing a particulate mineral filler e.g. as disclosed in U.S. Pat. No. 4,239,831 to T. W. E. Pattenden.

[0004] Materials for the covering of goods on trucks are important for many reasons. For instance, rain and/or sun may have adverse effects on the goods, causing staining, water damage, bleaching, rusting or a variety of other adverse effects. In addition, in cold climates, sand and/or salt may be distributed on roads to overcome problems caused by snow and ice and can cause significant damage to goods—e.g., sand blasting-type effects accompanied by salt corrosion, which result from the spray of slush, salt/sand mixtures or the like from vehicles passing along the road. In other climates, spray from the ocean may similarly cause damage to goods on the vehicle. Coverings on trucks also discourage pilfering, vandalism, or the like.

SUMMARY

[0005] In all aspects, protective coverings are disclosed that address and/or solve the problems discussed in the Background section above. The protective coverings have a coated woven material with a first edge parallel with a warp direction and a second edge opposite the first edge and having a first edge band proximate the first edge and a second edge band proximate the second edge. The coated woven material has a woven scrim having a plurality of weft tapes and a plurality of warp tapes, wherein the warp tapes positioned within the first and second edge bands are high-shrinkage warp tapes and the warp tapes in between the first and second edge bands have a shrinkage that is less than a shrinkage of the high-shrinkage warp tapes, and has a coating on at least one major surface of the woven scrim. The plurality of high-shrinkage warp tapes shrink upon application of heat.

[0006] In all aspects, the shrinkage of the warp tapes that are positioned in between the first and second edge bands is greater than a shrinkage of the plurality of weft tapes. Preferably, the plurality of weft tapes are low-shrinkage tapes and the plurality of high-shrinkage warp tapes are oriented tapes subjected to minimal or no annealing during the orienting process in order to provide high shrinkage. In one embodiment, the high-shrinkage warp tapes comprise polypropylene.

[0007] The protective covering may take a variety of different forms. In one form, the protective covering is a flat sheet of coated woven material, and a first end and a second end of the flat sheet are each folded against and secured to form wrap a load, such as a stack of lumber. In one form, the protective covering is an envelope defining an opening for receiving a load therein, such as a stack of lumber. In a third form, the protective covering is a multi-sided bag.

[0008] Regardless of which form the protective covering takes, the first edge band is juxtaposed with the first edge and the second edge band is juxtaposed with the second edge, and the first edge band and the second edge band each have a width, measured transverse to the machine direction, of about 1 in to about 8 in.

[0009] Regardless of which form the protective covering takes, the first edge band is spaced a distance apart from the first edge and the second edge band is spaced a distance apart from the second edge. Here, the first edge band is spaced a distance of about 0.5 in to about 4 in inward from the first edge and the second edge band is spaced a distance of about 0.5 in inward to about 4 in from the second edge. The first edge band and the second edge band each have a width, measured transverse to the machine direction, of about 1 in to about 8 in.

[0010] In another aspect, methods of applying any of the protective coverings disclosed herein to a load, such as a stack of lumber, are described. The methods include providing one of the various protective coverings, positioning the protective covering over the load so that the plurality of high-shrinkage warp tapes are positioned around a lower periphery of the load, and applying heat to the plurality of high-shrinkage warp tapes to cause the plurality of high shrinkage warp tapes to shrink around the stack of lumber to secure the woven sheet about the stack of lumber.

[0011] If the protective covering is a flat sheet, the method includes draping the flat sheet over the load, folding a first end and a second end of the flat sheet against the load, securing the first end and second end thereagainst. If the protective covering is an envelope defining an opening for receiving the load, the method includes sliding the envelope over the load, wherein the load is received in the opening. In another embodiment, the protective covering is a multi-sided bag.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0013] FIG. **1** is a perspective view of an initial step in a prior art method of covering a lumber stack with a protective cover.

[0014] FIG. **2** is a perspective view of a prior art protective cover applied to a stack of lumber.

[0015] FIG. **3** is a perspective view of another prior art protective cover applied to a stack of lumber.

[0016] FIG. **4** is a top view of an embodiment of a protective cover disclosed herein.

[0017] FIG. **5** is a perspective view of the protective cover of FIG. **4** applied to a load for shipment.

[0018] FIG. **6** is a top view of a woven scrim used to make the protective cover of FIG. **4**.

[0019] FIG. **7** is a cross-section of a coated woven material used to make the protective cover of FIG. **4**.

[0020] FIG. **8** is a cross-section of another example of a coated woven material used to make the protective cover of FIG. **4**.

[0021] FIG. **9** is a cross-section of a third example of a coated woven material used to make the protective cover of FIG. **4**.

[0022] FIG. **10** is a perspective view of the protective cover of FIG. **5** prior to applying the protective cover to the load.

[0023] FIG. **11** is a perspective view of the protective cover of FIG. **10** partially positioned over the load.

[0024] FIG. **12** is a perspective view of another example of a protective cover.

[0025] FIG. **13** is a perspective view of the protective cover of FIG. **12** partially applied to a load.

[0026] FIG. **14** is a perspective view of the protective cover of FIG. **12** fully applied to the load.

[0027] FIG. **15** is a perspective view of yet another embodiment of a protective cover.

[0028] FIG. **16** is a perspective view of the protective cover of FIG. **15** applied to a load.

DESCRIPTION

[0029] Reference is now made in detail to the description of the embodiments as illustrated in the drawings and figures. While several embodiments are described in connection with these drawings, there is no intent to limit the disclosure to the embodiment or embodiments disclosed herein. On the contrary, the intent is to cover all alternatives, modifications, and equivalents.

[0030] Lumber products, such as 2×4's, 2×6's, 2×8's, plywood and other lumber products, for example, are typically arranged in stacks for transportation from a manufacturer to a customer, such as a retailer or a contractor. Referring to FIG. **1**, prior to shipment, these stacks **10** of lumber products **12** are often wrapped in a plastic sheeting material **14**, often including flap ends **24** from folding, to protect the lumber products **12** from exposure to weather and/or damage from pilfering, vandalism, or other cause. The plastic sheeting material **14** also provides a convenient place to identify the manufacturer.

[0031] Referring to FIG. **2**, a typical practice has been to secure the plastic sheeting **14** to the lumber stack **10** by stapling the plastic sheeting **14** to the lowermost layer **16** (shown in FIG. **1**) of lumber **12** in the stack **10** at spaced apart intervals around the entire periphery of the stack **10**. The use of staples **18** to secure plastic sheeting **14** to a lumber stack **10** is disadvantageous. The staples **18** can severely damage the lumber **12** into which they are inserted, and the stapling procedure is time consuming and therefore expensive. Furthermore, the staples **18** often stay in the lumber **12** after the plastic sheeting **14** has been removed. When the staples **18** stay in the lumber **12**, the staples **18** often have one leg (not shown) protruding outward, which creates a cutting hazard for anyone handling the lumber **12**. Staples **18** remaining in the lumber **12** can also interfere with saw blades used to cut the lumber, which can create additional safety and productivity issues.

[0032] Attempts have been made to eliminate the need for stapling the plastic sheeting **14** around the entire periphery of the stack **10** by utilizing shrinkable plastic films, such as the shrinkwrap plastic films disclosed in U.S. Pat. No. 6,371,292. Referring to FIG. **3**, the shrinkwrap material **20** is stretch-wrapped around the lumber stack **10**, and heat **22** is applied to the shrinkwrap material **20** at the ends **24** of the lumber stack **10** to draw the plastic shrinkwrap material **20** tight around the lumber stack **10**. These shrinkwrap film materials **20** are not robust enough to maintain the barrier properties for the required time that the lumber stack **10** needs to be protected due to very low tear propagation resistance. The shrinkwrap film materials **20** often tear through abrasion or wind whip while being transported and are, therefore, an inadequate solution.

[0033] Unlike the shrinkwrap film materials **20**, coated woven fabrics are generally tough enough to survive for the required period of time, but are not suited to stretching into place in the manner of shrinkwrap film materials **20**. The load required to stretch woven coated fabrics is generally too high, and the level of stretch often causes cracking of the protective coatings.

[0034] Referring now to FIGS. **4** and **5**, a protective covering **100** for positioning over and protecting a load **102** (FIG. **5**) for shipment, such as a stack of lumber products for example, is disclosed that is constructed from a coated woven material **104** having a plurality of high-shrinkage warp tapes **106** woven into the coated woven material **104** to define a first edge band **108***a* adjacent to a first edge **110** and a plurality of high-shrinkage warp tapes **106** woven into the coated woven material **104** to define a second edge band **108***b* adjacent to a second edge **112**. The first edge **110** and the second edge **112** are parallel to a machine direction **114** (i.e., warp direction) and are on opposite sides of the coated woven material **104**.

[0035] With reference to FIG. **4**, the first edge band **108***a* and the second edge band **108***b* each have a width W. The width W may be in the range of about 1 inch to about 12 inches, more preferably about 2 inches to about 6 inches. Each of the first and second edge bands **108***a*, **108***b* may be juxtaposed to or spaced a distance apart from its respective first or second edge **110**, **112**. The spaced apart distance may be about 0.5 inch to about 4 inches. The positioning of the high-shrinkage warp tapes **106** is indicated by dashed lines in FIGS. **4**, **5**, and FIGS. **10-16**, however, the high-shrinkage warp tapes **106** may not be visible through coating(s) applied to the coated woven material **104**.

[0036] Referring to FIG. **5**, the high-shrinkage warp tapes **106** in the first and second edge bands **108***a*, **108***b* are positioned adjacent to a lower periphery **122** of the load **102** when the protective cover **100** is fully installed on the load **102**. The high-shrinkage warp tapes **106** have a shrinkage greater than a shrinkage of the coated woven material **104** generally. Once the protective cover **100** is positioned on the load **102**, applying heat to the high-shrinkage warp tapes **106** causes a length of the high-shrinkage warp tapes **106** to decrease. As the lengths of the high-shrinkage warp tapes **106** decrease, the high-shrinkage warp tapes **106** constrict

about the lower periphery **122** of the load **102** and exert a force thereagainst. The force exerted by the high-shrinkage warp tapes **106** against the lower periphery **122** of the load **102** is sufficient to secure the protective covering **100** to the load **102** without the need for additional securing means, such as staples or adhesives, along the length of the load. Depending on the configuration of the protective cover **100**, the first and second ends **126**, **128** of the protective cover **100** may have one or more staples **146** or a heat seal (not shown) to secure the ends **126**, **128**, in particular folded-over portions **130** thereof, against the load **102**.

[0037] Referring to FIGS. **6** and **7**, the coated woven material **104** of FIG. **7** is formed from a layer of woven scrim **150** of FIG. **6**. The woven scrim **150** has a first major surface **152**, an opposing second major surface **154**, and at least one coating **156**, as illustrated in FIG. **7**, on at least one of the first major surface **152** or the second major surface **154** of the woven scrim **150**. The scrim **150** is formed from at least one of fibers, filaments, and tapes, which are woven or knitted to form the scrim. The fibers, filaments, and tapes are generally formed from polyolefin materials, examples of which include, but are not limited to, polyethylene, high density polyethylene, low density polyethylene, polypropylene, copolymers, other polyolefins, or combinations thereof. The fibers, filaments, and tapes may also be formed from other thermoplastic materials, examples of which include polyethylene terephthalate, polyesters, polyamides such as nylon, other copolymers, and combinations thereof. In one embodiment, the scrim **150** is formed from high density polyethylene tape woven or knitted to form the scrim **150**. In one embodiment, the scrim **150** is formed from polypropylene tape woven or knitted to form the scrim **150**. The tapes are generally flat, elongated strands of polymeric material.

[0038] FIG. **6** is a central portion **111** of the scrim **150**, the portion located between the first and second edge bands **108***a*, **108***b*, that provides the majority of the tensile strength of the coated woven material **104**. In this central portion **11**, the scrim **150** includes a plurality of non-high shrinkage warp tapes **158** in the machine direction and a plurality of non-high shrinkage weft tapes **160** transverse to the machine direction **114**. The plurality of non-high shrinkage warp tapes **158** may comprise the same material as the plurality of weft tapes **160**, or may comprise a different material; however, it is preferred that these non-high shrinkage warp and weft tapes **158**, **160** are oriented tapes, especially oriented tapes of polypropylene or high-density polyethylene.

[0039] As discussed above with respect to FIGS. **4** and **5**, the scrim **150** also includes the plurality of high shrinkage warp tapes **106** defining the first and second edge bands **108***a*, **108***b*. The tapes **106**, **158**, **160** of the scrim **150** may be woven such that the scrim has a plurality of interstices **166**, shown in FIG. **6**, that define about 10% to about 40% of a surface area thereof, measured relative to the first major surface **152** of the scrim. In another embodiment, the interstices **166** define about 15% to about 25% of the surface area of the woven scrim **150**. In another embodiment, the tapes **106**, **158**, **160** are tightly woven such that the interstices **166** define less than 10% of the surface area of the woven scrim **150**. In one aspect, the scrim **150** has from 4 to 12 non-high shrinkage warp tapes **158** per inch in the warp direction and from 2-8 weft tapes **160** per inch in the weft direction. The coated woven material **104** can be any of the coated woven materials disclosed in co-pending U.S. application Ser. No. 15/165,692, filed on May 26, 2016, which is incorporated herein by reference in its entirety.

[0040] The plurality of non-high shrinkage warp tapes **158** may be moderate-shrinkage tapes having a shrinkage less than the high-shrinkage warp tapes **106**. The moderate-shrinkage warp tapes **158** may have a shrinkage in a range of about 2% up to 6%, more preferably about 4% shrinkage at 250° F. The weft tapes **160** can have moderate to low shrinkage. In one embodiment, the weft tapes **160** are low-shrinkage tapes having a shrinkage less than the moderate-shrinkage warp tapes **158**, preferably less than 5% shrinkage at 250° F.

[0041] Referring back to FIG. **4**, the high-shrinkage warp tapes **106** are woven into the scrim **150** prior to applying the one or more coatings **156** (FIG. **7**) thereto. The high-shrinkage warp tapes **106** may be made from a film, an oriented slit tape, or an oriented multi-filament or mono-filament tape. The high-shrinkage tapes **106** may be made from polypropylene homopolymers, high density polyethylene (HDPE), or a blend thereof, or a blend of polypropylene with LDPE and/or HDPE. The polyolefin blended with the polypropylene is present as about 1% to about 20% by weight thereof. The high-shrinkage tapes **106** can include additives, such as, but not limited to, colorants, pigments, flame retardants, and UV stabilizers.

[0042] The high-shrinkage tapes **106** are oriented tapes, preferably uni-axially oriented tapes. Typical oriented tapes can be produced by heating the tapes to a temperature above the softening temperature thereof, but below the melt temperature of the tapes and then stretching the tapes, which orients the polymers. The tapes can be oriented in the machine direction **114** (FIG. **4**) and/or the transverse direction. The tapes are stretched to a length in a range of about 4 to about 9 times the original length of the tape. The tapes are thereafter cooled to set the orientation. Oriented tapes are annealed after stretching to make the tapes less brittle and easier to weave. The annealing process generally reduces the shrinkage of the tapes when exposed to heat. The high-shrinkage tapes **106** can also be produced from a uni-directionally or bi-directionally oriented film. The film can be oriented in the machine direction **114** or can be bi-directionally oriented. Following the process of orienting the polymer fibers in the film, the film can be annealed and slit into a plurality of uni-directionally or bi-directionally oriented tapes. Processes for making various oriented tapes and films are known.

[0043] To create the high-shrinkage warp tapes **106** having a shrinkage greater than the other tapes **158**, **160** in the woven scrim **150**, the amount of annealing to which the high-shrinkage tapes **106** are subjected is reduced or eliminated. For the resulting oriented, high-shrinkage tapes **106**, applied heat relaxes the orientation in the tape, causing the tape to reduce its length or shrink relative to its original state. The high-shrinkage warp tapes **106** can have a shrinkage of at least 9% at 250° F. The shrinkage of the high-shrinkage warp tapes **106** may be in a range of greater than 6% to about 30% shrinkage at 250° F. The high shrinkage enables the high-shrinkage tapes **106** to shrink enough, when exposed to heat, to exert force against the lower periphery **122** of the load **102** (FIG. **5**) sufficient to secure the protective cover **100** to the load **102**.

[0044] Referring to FIG. **7**, at least one coating **156** is applied to at least one of the first major surface **152** or the second major surface **154** of the woven scrim **150**, and

maybe applied to both the first and second major surfaces **152**, **154**. For most end-uses, it is preferred that the coating **156** be on both major surfaces **152**, **154** of the woven scrim **150** (FIG. **9**). The coating **156** forms a barrier against intrusion of the elements, including moisture, UV radiation, dirt, wind, and combinations thereof and may provide a printable surface for printing one or more indicia, such as a company name or advertisement, thereon.

[0045] The coating **156** includes poly-olefin materials, such as polyethylene, polypropylene, LDPE, LLDPE, EMA, EVA, other copolymers, or combinations thereof, and, optionally additives, such as pigments, colorants, antioxidants, UV stabilizers, anti-corrosion agents, flame retardant agents, slip agents, anti-block agents, printable additives, paper match additives, polar additives, or other additives. Referring to FIG. **7**, the coating **156** can be a single-layer coating applied to the first major surface **152** of the woven scrim **150**.

[0046] Referring to FIG. **8**, the coating **156** can be a multi-layered coating **156** having a first coating layer **162** applied to the first major surface **152** of the scrim **150**, and one or more secondary coating layers **164** applied to the first coating layer **162**. Although FIG. **8** illustrates the coating **156** having 3 layers, it is understood that the multi-layer coating **156** can have two layers or more than three layers, such as four layers, five layers, or six layers, for example. Examples of coated woven materials **104** having multi-layer coatings **156** applied to first and/or second major surfaces **152**, **154** of the woven scrim **150** are disclosed in co-pending U.S. application Ser. No. 15/165,692 (mentioned above), incorporated by reference above. In one embodiment of a woven coated material **104**, an adhesive or tie layer (not shown) may be used between the coating **156** and the scrim **150**, which may be applied by co-extruding the coating **156** and tie layer. Referring to FIG. **9**, the coated woven material **104** has a coating **156**, **156'** applied, respectively, to both the first and the second major surfaces **152**, **154** of the woven scrim **150**. The coatings **156**, **156'** can be extrusion coated onto the scrim **150** and may be multi-layered coatings having a first coating layer **162**, **162'** and a second coating layer **164**, **164'**. Extrusion coating and other methods for applying coatings to a scrim are known in the art.

[0047] Referring to FIGS. **10** and **11**, the protective covering **100** can be a flat sheet **124** of the coated woven material **104** that can be draped over the load **102** so that the first and second edge bands **108***a*, **108***b* of high shrinkage warp tapes **106** are positioned along the lower periphery **122** of the load **102**. FIG. **11** shows the protective covering **100** draped over the load **102** in an intermediate position prior to folding the first end **126** and the second end **128** as illustrated in FIG. **5**, such that a first end **126** and a second end **128** of the flat sheet **124** are folded down against the load **102** and secured to the load or the protective cover itself by welding, stitching, heat sealing, adhering, stapling, or otherwise securing any folded-over portions to the load. The first and second ends **126**, **128** are generally transverse to the machine direction **114** and extend perpendicularly from the first edge **110** to the second edge **112** of the coated woven material **104**. The first and second ends **126**, **128** of the flat sheet **124** may be manually or automatically folded and secured to the load **102**. The flat sheet **124** may be oriented to place the first end **126** and the second end **128** along the long sides **132** or the short sides **134** of the load **102**, but typically the short sides as shown in the figures. The protective covering **100** covers the four sides **120** and the top **121** of the load **102** but does not generally extend to cover the bottom **123** of the load. Heat is applied to the high shrinkage warp tapes **106** to cause the high shrinkage warp tapes **106** to shrink against the lower outer periphery **122** of the load **102**, exerting a force against the load **102** to secure the protective covering **100** to the load **102**.

[0048] Referring back to FIG. **5**, staples **146** may be used to secure the first and second ends **126**, **128** of the flat sheet **124** against the load **102**, but only a small number of staples **146** are needed to secure the ends **126**, **128** from unfolding, in contrast to the numerous staples used in the prior art method illustrated in FIG. **2**. Because the high shrinkage warp tapes **106** secure the protective covering **100** to the load **102**, staples **146** are not needed along the lower periphery **122** of the load **102** to secure the protective covering **100** to the load **102**. Other methods of securing the first and second ends **126**, **128** may be used to completely eliminate the need for staples **146** and the concerns therewith.

[0049] Referring to FIG. **12**, a protective covering **100'** can be made by forming a flat sheet of coated woven material **104** into an envelope **136** capable of receiving the load **102**. The envelope **136** may be made by folding a flat sheet (FIG. **4**) of the coated woven material **104** in half along a centerline **138** that is parallel to the machine direction **114** of the coated woven material **104** and welding, stitching, heat sealing, adhering, stapling, or otherwise securing the first ends **126** together into a first seam **127** and the second ends **128** together into a second seam **129** to form the envelope **136**. The envelope **136** is characterized by an opening **140** between the first edge **110** and the second edge **112** of the coated woven material **104**. The protective coverings **100** may be manufactured as a continuous web of envelopes **136** separated by one or more score lines or perforations (not shown) to facilitate separating each individual protective covering **100** from each adjacent protective covering (not shown).

[0050] The protective covering **100'** may be dispensed from a roll or a stack of protective coverings **100'**, and the first edge **110** and the second edge **112** thereof are moved away from each other to open the envelope **136**, and the first and second edges **110**, **112** are guided down over the sides **120** of the load **102** as shown in FIG. **13**. Referring to FIG. **13**, sliding the envelope **136** over the load **102** results in triangular projections **170** extending outwardly from opposite ends **126**, **128** of the protective covering **100'**. Referring to FIG. **14**, the triangular projections **170** can be folded down and secured to the ends of the load **102** by welding, stitching, heat sealing, adhering, or stapling the triangular projections **170** to the protective cover **100'** or the load **102**. When the load **102** is fully received within the envelope **136** of the protective covering **100'**, the plurality of high-shrinkage warp tapes **106** defining the edge band **108** are positioned along the lower periphery **122** of the load **102**. Heat is applied to the high-shrinkage warp tapes **106**, causing the high-shrinkage warp tapes **106** to decrease in size to shrink against the sides **120** of the load **102**, thereby securing the protective covering **100'** to the load **102**.

[0051] Referring to FIG. **15**, the protective covering **100"** can be a multi-sided bag **142** having an open side **144** for receiving the load **102** therein. The multi-sided bag **142** and the open side **144** together define a cavity **176** having a three-dimensional shape that generally conforms to a shape

of the load **102** to be protected. In one aspect, protective covering **100"** is a five-sided bag **142**, and the cavity **176** defined by the five-sided bag **142** can be a rectangular cuboid, which can be useful for the five-sided bag **142** to receive a rectangular load **102**, such as a stack of lumber, for example. Although a protective cover **100"** is described and illustrated as defining a cavity **176** that has a rectangular cuboid shape, it is understood that the coated woven material **104** can be formed into other geometric or irregular three-dimensional shapes.

[0052] The five-sided bag **142** can be formed by folding a flat sheet of coated woven material **104** into the three-dimensional shape and securing each of the first and second ends **126**, **128** to form the cavity **176**. More particularly, the flat sheet can be folded—in the machine direction **114**—into three sections **172** parallel to the machine direction **114**. The three sections **172** define the top and two opposing sides of the cuboidal shaped cavity **176**. In one aspect, the first end **126** is folded inward to form a third side of the cuboidal shaped cavity **176** and secured in place by welding, stitching, adhering, heat-sealing, stapling (together, not to the load), or otherwise securing. The second end **128** is also folded inward to form a fourth side of the cuboidal shaped cavity **176** and secured in place by welding, stitching, adhering, heat-sealing, stapling (together, not to the load), or otherwise securing. Each of the first and second ends **126**, **128** can be secured along one or more seams **174**. In another aspect, a rectangular flat sheet **124** can be trimmed or cut into a blank (not shown), which can then be folded into the five-sided bag **142** and the ends **126**, **128** secured.

[0053] Referring to FIGS. **15** and **16**, the five-sided bag **142** can be positioned over the load **102** and pulled down over the load **102** so that the load **102** is fully received in the cavity **176**. With the load **102** fully received in the cavity **176**, the plurality of high-shrinkage warp tapes **106** are positioned along the lower periphery **122** of the load **102**. Heat can then be applied to the high shrinkage warp tapes **106** to cause the high shrinkage warp tapes **106** to decrease in length and shrink against the lower periphery **122** of the load **102**, thereby securing the five-sided bag **142** to the load **102**.

[0054] A method for protecting a load **102** for shipment includes providing a protective covering **100**, **100'**, **100"**, such as those described herein having a plurality of high-shrinkage warp tapes **106** woven into the first and second edges **110**, **112** of a woven coated material **104** (as shown in FIG. **4**), positioning the protective covering **100**, **100'**, **100"** over the load **102** so that the plurality of high-shrinkage warp tapes **106** are positioned around a lower periphery **122** of the load **102**, and applying heat to the plurality of high-shrinkage warp tapes **106** to cause the high-shrinkage warp tapes **106** to shrink around the load **102** to secure the protective covering **100**, **100'**, **100"** to the load **102**. In one aspect, the protective covering **100** can be a flat sheet of coated woven material **104**, and the positioning step can include draping the flat sheet over the load **102**, folding the first end **126** and second end **128** inward against the sides **120** of the load **102**, and securing the first end **126** and second end **128** from unfolding. The first and second ends **126**, **128** can be secured to the load **102** or to another portion of the protective covering **100**. Securing can be accomplished by welding, stitching, adhering, heat-sealing, stapling, other securing methods, or combinations thereof. In one aspect, the method can include forming a flat sheet **124** of coated woven material **104** into an envelope **136** or a multi-sided bag **142**. In another aspect, providing a protective covering **100**, **100'**, **100"** can include providing a protective covering **100'**, **100"** that is pre-formed into an envelope **136** or a multi-sided bag **142**.

[0055] The protective coverings **100**, **100'**, **100"** disclosed herein are capable of withstanding wind-whip and abrasions, which often lead to tears, experienced during transport of the load because the coated woven material **104** is stronger and more robust than other shrink wrap materials. The protective coverings **100**, **100'**, **100"** remain secured to the load without the need for a plurality of staples and, thus, eliminates the safety hazard of using staples and minimizes the time costs of inefficiently stapling the cover to the load. The protective coverings **100**, **100'**, **100"** also prevent the problems with saws caused by staples left embedded in the wood.

[0056] Although the invention is shown and described with respect to certain embodiments, it is obvious that modifications will occur to those skilled in the art upon reading and understanding the specification, and the present invention includes all such modifications.

What is claimed is:

1. A protective covering comprising:

a coated woven material having a first edge parallel with a warp direction and a second edge opposite the first edge and having a first edge band proximate the first edge and a second edge band proximate the second edge, the coated woven material comprising:

a woven scrim having a plurality of weft tapes and a plurality of warp tapes, wherein the warp tapes positioned within the first and second edge bands are high-shrinkage warp tapes and the warp tapes in between the first and second edge bands have a shrinkage that is less than a shrinkage of the high-shrinkage warp tapes; and

a coating on at least one major surface of the woven scrim;

wherein the plurality of high-shrinkage warp tapes shrink upon application of heat.

2. The protective covering of claim **1**, wherein the first edge band is juxtaposed with the first edge and the second edge band is juxtaposed with the second edge.

3. The protective covering of claim **2**, wherein the first edge band and the second edge band each have a width, measured transverse to the machine direction, of about 1 in to about 8 in.

4. The protective covering of claim **1**, wherein the first edge band is spaced a distance apart from the first edge and the second edge band is spaced a distance apart from the second edge.

5. The protective covering of claim **4**, wherein the first edge band and the second edge band each have a width, measured transverse to the machine direction, of about 1 in to about 8 in.

6. The protective covering of claim **4**, wherein the first edge band is spaced a distance of about 0.5 in to about 4 in from the first edge and the second edge band is spaced a distance of about 0.5 in to about 4 in from the second edge.

7. The protective covering of claim **1**, wherein the protective covering is a flat sheet of the coated woven material.

8. The protective covering of claim **7**, wherein a first end and a second end of the flat sheet of the coated woven

material are each folded against and secured to form an envelope for receiving a load therein.

9. The protective covering of claim **1**, wherein the protective covering further comprises an envelope defining an opening for receiving a load therein.

10. The protective covering of claim **1**, wherein the plurality of weft tapes are low-shrinkage tapes.

11. The protective covering of claim **1**, wherein the shrinkage of the warp tapes positioned in between the first and second edge bands is greater than a shrinkage of the plurality of weft tapes.

12. The protective covering of claim **1**, wherein the plurality of high-shrinkage warp tapes are oriented tapes subjected to minimal or no annealing during the orienting process in order to provide high shrinkage.

13. The protective covering of claim **1**, wherein the high-shrinkage warp tapes comprise polypropylene.

14. The protective covering of claim **1**, wherein the coated woven material is in the form of a multi-sided bag.

15. A method of applying a protective covering to a load, the method comprising:

providing a protective covering of claim **1**;

positioning the protective covering over the load so that the plurality of high-shrinkage warp tapes are positioned around a lower periphery of the load; and

applying heat to the plurality of high-shrinkage warp tapes to cause the plurality of high shrinkage warp tapes to shrink around the stack of lumber to secure the woven sheet about the stack of lumber.

16. The method of claim **15**, wherein the protective covering is a flat sheet.

17. The method of claim **16**, wherein positioning the protective covering over the load further comprises:

draping the flat sheet over the load;

folding a first end and a second end of the flat sheet against the load; and

securing the first end and second end against unfolding.

18. The method of claim **15**, wherein the protective covering comprises an envelope defining an opening for receiving the load therein.

19. The method of claim **15**, wherein the protective covering comprises a multi-sided bag.

* * * * *